Appendix D-1

Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions

ESA

Final

Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions

Prepared for

Pacific Gas and Electric Company

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Acronyms and Abbreviations

APE	Area of Potential Effects
ATV	all-terrain vehicle
BLM	United States Bureau of Land Management
BNSF	Burlington Northern-Santa Fe Railroad
USBR	United States Bureau of Reclamation
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMP	compliance monitoring program
COPC	chemicals of potential concern
DOI	United States Department of Interior
DTSC	Department of Toxic Substances Control
ESA	Endangered Species Act
GMP	groundwater monitoring program
GPS	global positioning system
HNWR	Havasu National Wildlife Refuge
IM	Interim Measure
IMPM	Interim Measures Performance Monitoring
msl	mean sea level
PBA	programmatic biological assessment
PG&E	Pacific Gas and Electric Company
PMP	performance monitoring program
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
RI	CERCLA Remedial Investigation
SWCA	Steven W. Carothers and Associates

SWFL	southwestern willow flycatcher
USFWS	United States Fish and Wildlife Service

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is conducting a Remedial Investigation (RI) and a RCRA Facility Investigation (RFI) to investigate the release of hazardous substances and hazardous wastes at or from the Topock Compressor Station. The RI is being performed under the oversight of the United States Department of Interior (DOI), the United States Bureau of Land Management (BLM), the United States Fish and Wildlife Service (USFWS), and the United States Bureau of Reclamation (USBR) (collectively "the Federal agencies") in accordance with a Consent Agreement entered between the Federal agencies and PG&E pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The RFI is being performed under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) in accordance with corrective action orders entered pursuant to State law. This programmatic biological assessment (PBA) has been prepared to determine any potential effect on species protected under the federal Endangered Species Act (ESA) resulting from past, present, or planned remedial and investigative activities. The Topock Compressor Station site is located in eastern San Bernardino County, California, about 15 miles southeast of Needles (Figure 1).

Activities relate to investigation and remediation of soil, sediments, surface water, and groundwater resulting from historic operations at the Topock Compressor Station. As described further in Section 2.0, historic operations primarily involved the use of chromium in the compressor station cooling water. Subsequent discharge of the cooling water resulted in chromium entering the groundwater aquifer. The activities addressed in this PBA include all RI and RFI activities taken prior to the selection and implementation of a final remedial action and corrective action to address chromium in groundwater, as well as other chemicals of potential concern (COPC) in all environmental media related to historical operations. PG&E is requesting ESA coverage for these activities through the end of 2012. Selection and implementation of a final remedial action/corrective action will be the subject of additional analysis and ESA consultation at a future date.

The action area, also generally referred to here as the Area of Potential Effects (APE), includes lands under the jurisdiction of the Federal agencies and private lands potentially affected by released hazardous substances requiring RI/RFI actions (Figure 2). The "action area" is "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). Because of the federal nexus, activities undertaken pursuant to the investigative remedial program that require discretionary federal review and approval are evaluated for potential project effects to species listed under the ESA.

This PBA serves as supportive documentation by the Bureau of Land Management Lake Havasu Field Office as the lead federal agency, under the provisions of Title 50 Code of Federal Regulations Part 402, the ESA of 1973, as amended, for the evaluation of Project effects to listed species and resulting determinations.

1.1 Consultation to Date

Consultation to date has occurred on a project specific basis. In January 2000, PG&E was issued a no-jeopardy biological opinion for ongoing maintenance activities on the PG&E gas pipeline system in the California desert on lands managed by the BLM and the pipeline's effects on the desert tortoise and its critical habitat. That biological opinion specifically addressed maintenance of the gas pipeline and is not considered applicable to past, present, or planned remedial and investigative activities within the APE.

In September 2004, the BLM Lake Havasu Office initiated informal consultation with the USFWS Ventura Office on behalf of PG&E regarding potential impacts to the desert tortoise and southwestern willow flycatcher (SWFL) related to a time-critical removal action/interim measure within the APE. The anticipated biological impacts were addressed in the *Final Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino County, California* (CH2M HILL, 2004b). Based on the proposed activities, which included a proposed groundwater treatment system, a "no effect" determination was considered appropriate for that project. To date, Interim Measure (IM) No. 3 has been working under this determination with no effect on listed species.

In addition, a biological assessment and Section 7 ESA informal consultation was completed in December 2005 related to construction of the PE-1 groundwater pipeline and implementation of the floodplain *in-situ* pilot study, both located on the floodplain of the Colorado River. The applicable *Biological Assessment for the Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions* (CH2M HILL, 2005j) was completed in November 2005. The subsequent consultation resulted in a determination of "may affect, not likely to adversely affect" the SWFL, and a "no effect" finding for all other listed species potentially occurring in the APE.

In 2006, informal consultation was conducted for the *Site Access and Sampling Procedures for Groundwater Monitoring Wells Located Near Potential Southwestern Willow Flycatcher Habitat, Revision 3, Topock Compressor Station (Technical Memorandum, April 20, 2006)* (CH2M HILL, 2006b). A determination of "may affect, but not likely to adversely affect" was concurred upon by the USFWS. These access and sampling procedures are currently being implemented and will be carried forward in subsequent years. They are included within the scope of this PBA, which covers activities through the end of 2012.

As part of the interim measures on federal lands, Action Memoranda were issued by the Federal Agencies pursuant to Section 104 of the CERCLA. These Action Memoranda include general mitigation measures (outlined in Section 3.4) to manage biological resources. In addition, several measures were subsequently specified or clarified (e.g., migratory bird dates, SWFL dates, access routes) to address the management of ESA-listed species and their habitats.

1.2 Content and Scope

At the direction of the DTSC and DOI, activities are ongoing in the APE and are expected to continue, and in some cases expand, prior to the selection of a final remedy. As such, the

BLM and PG&E believe that it is prudent to pursue programmatic ESA coverage for ongoing, as well as future, RI/RFI activities that are anticipated to occur in the APE prior to the selection and implementation of the final remedy.

The scope of this PBA will address past, present, and planned activities up to the selection and implementation of the final remedy. ESA coverage of the activities described in this PBA is requested through the end of 2012. It is anticipated that this PBA and associated Section 7 consultation will also lay a foundation for a separate Section 7 consultation that will occur prior to implementation of the final remedy.

The content of a biological assessment is at the discretion of the federal agency and depends on the nature of the action for which consultation is requested. The term "action" refers to discretionary activities or programs that are authorized, funded, or carried out, in whole or in part, by federal agencies. In coordination with PG&E, BLM is initiating consultation with USFWS to comply with agency responsibilities to consider the effects of activities to ESA-listed species within the APE. This request for consultation includes information in several basic areas encompassing the nature and scope of the action, the action area, species and habitat description, effects of the action, and relevant reports.

This consultation does not preclude future consultations or additional management restrictions by the BLM or USFWS beyond the measures presented in this document, nor authorize final ESA coverage on current or future response or corrective actions. The primary purpose of this PBA is to put into context the status and management of ESA species within or near the APE and to better evaluate the effects of current and future proposed activities on those species and habitats. It is anticipated that subsequent ESA evaluations/consultations will move more efficiently through the work plan review/approval process as project-specific proposals come forward.

Under the scope of this PBA, ESA consultation will be applied to species and habitat located within or near the APE. If future activities are proposed to occur outside the APE, consultation will be required to be reinitiated with the USFWS.

"Action area" refers to all lands directly or indirectly affected by the action and not merely the immediate area involved in the action. Past, present and planned response activities take place on BLM- and USFWS-managed lands. The action area also applies to related activities on nonfederal lands.

"Species" and "habitat description" refers to all potentially affected listed species, or species proposed to be listed, and the habitat to be considered. Several federally-listed species that are known to or may occur within or near the action area have been identified.

"Effects of the action" include direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the action area; the anticipated impacts of all proposed federal projects in the action area that have already undergone Section 7 consultation; and the impact of state or private actions that are contemporaneous with the consultation in process. The environmental baseline does not include future or

ongoing response or other investigative or interim activities in the APE. For purposes of this PBA, these activities are assessed for their potential effect on species listed under the ESA.

"Indirect effects" are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. For example, an action that results in subsequent changes to land use patterns would be considered an indirect effect.

"Cumulative effects" are those effects of future state or private activities that are reasonably certain to occur within the action area of the federal action subject to consultation.

"Direct effects" include the direct or immediate effect of the action on the species or it's habitat.

"Relevant reports" include any available information on the action, action area, affected listed species, or critical habitat. The Reference Section of this document includes a list of works cited—specific references to relevant reports are provided throughout this PBA. In addition, Appendix E of this PBA includes a series of biological reports and analyses prepared specifically for these activities.

2.0 Background

In December 1951, the Topock Compressor Station began operations to compress natural gas supplied from the southwestern United States for transport through pipelines to PG&E's service territory in central and northern California. The compressor station is still active and is anticipated to remain an active facility into the foreseeable future. The operations at the compressor station consist of six major activities: water conditioning, compressing natural gas, cooling compressed natural gas and compressor lubricating oil, wastewater treatment, facility and equipment maintenance, and miscellaneous operations. Facility operations involve treatment of cooling water.

From 1951 to 1985 chromium-based products were added to cooling water to inhibit corrosion, minimize scale, and control biological growth. From 1951 to 1964 untreated wastewater ("blowdown") containing chromium was discharged to Bat Cave Wash. Beginning in 1964, PG&E began to treat the wastewater. At about this time, PG&E also constructed a percolation bed in the wash by creating soil berms that impounded the discharged wastewater and allowed it to percolate into the ground and/or evaporate. Beginning in May 1970, the majority of treated wastewater was discharged to an injection well located on PG&E property. In 1973, PG&E discontinued use of this injection well, and wastewater was discharged exclusively to a set of four, single-lined evaporation ponds, located about 1,600 feet west of the compressor station.

PG&E replaced the chromium-based cooling water treatment products with phosphate-based products in 1985, at which time PG&E discontinued operation of the wastewater treatment system. Use of the four, single-lined evaporation ponds continued from 1985 to 1989. In 1989, the single-lined ponds were replaced with four new, Class II (double-lined) ponds on BLM-managed lands. The wastewater treatment system and the single-lined ponds were physically removed and "clean-closed" between 1988 and 1993. The four Class II double-lined ponds are still in use and are operated under the jurisdiction of the Colorado River Basin Regional Water Quality Control Board.

In 1996, PG&E entered into a Corrective Action Consent Agreement with DTSC to govern the investigation and remediation of the Topock Compressor Station site under California state law. DTSC is the California state lead agency charged with directing investigative activities in the action area in accordance with the Resource Conservation and Recovery Act (RCRA). In July 2005, PG&E and the Federal Agencies entered into a Consent Agreement that outlined the process by which PG&E would comply with CERCLA requirements during the investigation and remediation of the action area. Activities under both agreements proceeded with active stakeholder input, facilitated through the Topock Consultative Workgroup. PG&E, and DTSC, have also made commitments to engage in consultation with interested tribes. The BLM will consult with potentially affected tribes in accordance with applicable laws, regulations and policies.

Additional activities that pre-date current interim measures include prior RFI wells installed to identify and monitor groundwater conditions at the compressor station. Between 1997

and 2004, such activities included the installation of monitoring wells at 32 locations within the APE. In addition, approximately 300 soil samples were collected and analyzed. Since 2004, interim investigative and remedial actions have continued and include the installation of additional monitoring wells throughout the site and construction and operation of a temporary water treatment system (IM No. 3). Where applicable, ESA consultation for these activities has occurred on a project-specific basis as identified in Section 1.1.

Under the purview of the DTSC and DOI, PG&E is in the process of finalizing the RI/RFI. This report will comprehensively characterize the nature and extent of hazardous substance contamination in the affected area and provide the basis for formulating alternative remedial actions/corrective measures to be considered for the final remedy. The Feasibility Study/Corrective Measure Study will follow the RI/RFI Report, culminating in a proposed final remedy to remediate chromium (and potentially other hazardous substances) to appropriate cleanup levels. As noted above, it is expected that additional consultation with USFWS will occur pursuant to Section 7 of the ESA prior to selection and implementation of the final remedy.

3.0 Description of Activities

3.1 Area of Potential Effects (APE)

The action area is generally defined by the approximately 1,528-acre APE (Figure 2) and includes lands in both California and Arizona. The APE was originally defined by the BLM and DTSC to facilitate a cultural resources assessment (Applied Earthworks, 2005). An identical boundary was subsequently used to define the area in which annual protocol surveys are conducted for listed species (CH2M HILL, 2005b). The approximately 1.6-mile reach of the Colorado River within the APE generally defines the boundary between California and Arizona.

The Topock Compressor Station occupies approximately 65 acres of PG&E-owned land within the APE. PG&E also owns a 100-acre parcel located about 0.25 mile north of the compressor station, which was purchased to facilitate interim remedial measures. The area surrounding these parcels within the APE includes land owned and/or managed by a number of government agencies including the BLM, USFWS, and USBR.

The APE lies within a larger cultural landscape of significance to federally recognized tribes. In addition, the Colorado River itself is of spiritual and cultural importance to local tribes in the region. The continued contemporary traditional and spiritual use of the area and the management of the land, animals, plants, and water are of great importance to the tribes.

Primary access to the California portion of the APE is provided by Park Moabi Road and National Trails Highway, a two-lane paved roadway extending for approximately 2 miles across the APE. Park Moabi Road connects with Interstate 40 in the western portion of the APE and extends to Moabi Regional Park in the northwest. At Moabi Regional Park, the roadway connects to National Trails Highway, which extends eastward and then southward along the Colorado River to the Topock Compressor Station. Various unnamed roadways traverse the APE, including abandoned segments of former Historic U.S. Route 66 and National Old Trails Road.

Access to the Havasu National Wildlife Refuge (HNWR) in Arizona is provided from Interstate 95. The levee road along the eastern shore of the Colorado River provides access to the northeast portion of the APE. The Topock Marina to the south is accessed from Interstate 40. Land use in the APE is primarily open space with several prominent exceptions. Interstate 40 and the Burlington Northern-Santa Fe (BNSF) railway run east-west, roughly bisecting the APE. The compressor station and associated evaporation ponds are located in the southern portion of the APE. Moabi Regional Park in the northwestern portion of the APE includes numerous mobile home sites, boat docks, and associated infrastructure. The Topock Marina is located on the Arizona side of the river, north of the railway. The Topock Marina and nearby lands encompass approximately 29 acres of private land north and south of Interstate 40 Arizona (see Figure 2). Various gas transmission pipelines traverse the APE. These are primarily subsurface pipelines, with occasional surface expressions (e.g., to bridge ravines or the river).

Developed facilities associated with interim measures and time critical removal actions include numerous groundwater wells and an interim groundwater treatment system (IM No. 3). Between Park Moabi Road and the Colorado River floodplain is an approximately 1-acre area, referred to as the MW-20 bench (see Figure 2), which has been the site of past and present interim measures/removal actions. These activities are described further in Section 3.2.

Land ownership and management in the APE is depicted on Figure 2. The BLM manages the federally owned land north of the BNSF railway and west of the Colorado River. This includes lands managed on behalf of the USBR. The USFWS manages the HNWR located in California immediately north, south, west, and east of the Topock Compressor Station. The HNWR is also located in the southern and eastern portions of the APE and includes most lands located on the Arizona-side of the Colorado River. Outside of the APE, the 37,515-acre HNWR extends for approximately 26 miles along the Colorado River, from Needles, California, to Lake Havasu City, Arizona.

Recreational activities within the HNWR include sightseeing, boating, bird watching, fishing, hunting, and camping. Prior damming and channelization of the Colorado River have significantly altered the aquatic, marsh, and riparian habitats associated with the river. These water control and diversion actions have also contributed to increased housing development along the river and facilitated an increase in the intensity of river-related recreation (including watercraft, fishing, and hunting) (BOR, 1996, 2000, 2002, 2004).

The Colorado River flows southeast between California and Arizona and provides the primary aquatic habitat within the APE. The river is approximately 700 to 900 feet wide and 8 to 15 feet deep through the APE. The adjacent river floodplain averages about 500 feet in width but narrows at the Topock Gorge, approximately 4 miles south of the APE. The topography of the floodplain in California is relatively flat with a gentle slope toward the river. The Arizona floodplain is more mound-like creating a low divide between the Colorado River and the wetlands of the Topock Marsh

The Colorado River has been stocked with various game fish that have been linked to predation of native listed fish species (BOR, 2004). The invasion of salt cedar along the Colorado River has significantly altered riparian habitat. This exotic tree dominates and displaces native plant communities. The BOR is responsible for managing the river and has consulted with USFWS on its actions (BOR, 1996, 2000, 2002, 2004). Several biological opinions have been issued to the BOR (USFWS, 1997a-b, 2002, 2005a). A Multi-Species Conservation Plan (MSCP) and Multi-Species Habitat Conservation Plan (MSHCP) recently have been developed for the Colorado River (BOR, 2004).

The terrestrial portions of the APE are characterized by arid conditions (precipitation averages less than 5 inches/year) and high temperatures (routinely exceeding 110 degrees Fahrenheit in the summer) typical to the Mojave Desert. The landscape in the California portion of the APE is considerably eroded by natural processes resulting from the effects of wind and water erosion. The result in part is land forms characterized by alluvial terraces and incised drainage channels. One of the largest incised channels is Bat Cave Wash, which runs from the Chemehuevi Mountains in the south toward the Colorado River in the north. Terraces occurring onsite are homogeneous, comprised of rocky soils with very sparse

vegetation. Of tribal concern and spiritual importance, these terraces are also where the physical evidence of the Maze is most observable. Elevations in the APE range from about 450 feet mean sea level (msl) at the river floodplain to 550 feet msl at the compressor station. The area north of Topock Marina in the Arizona portion of the APE is within the HNWR; the landscape in this area is dominated by dredge spoils and bordered by the Colorado River to the west and the Topock Marsh to the east.

The local geology consists of recent and older river deposits progressing westward to older alluvial deposits associated with the local mountains. Sand, gravel, and cobblestone dominate these deposits, comprising the principal groundwater aquifer at the site. The main surface water drainage channel from the APE toward the Colorado River is Bat Cave Wash and a large unnamed desert wash with several tributaries located to the west. These ephemeral desert washes are dry most of the year, but during heavy precipitation events the washes can have surface flow.

Structurally diverse vegetation is primarily limited to the Colorado River floodplain and ephemeral washes near the river. The uplands consist primarily of a sparse creosote bush scrub community, whereas the floodplains on the California and Arizona shorelines are composed of sandy soils with tamarisk (*Tamarix* sp.), mesquite (*Prosopis* sp.), palo verde (*Cercidium* sp.), and arrowweed (*Pluchea sericea*). A more detailed description of the flora and fauna in the APE, including species listed under the federal ESA, are described in Section 4.0.

3.2 Past and Present Activities

Past and present activities have been limited to the California portion of the APE and the Colorado River. These activities include the installation and sampling of numerous groundwater monitoring wells, as well as Interim Measure (IM) No. 1, IM No. 2, and IM No. 3, which generally involve plume characterization and control including pumping and treating impacted groundwater. For each of the IM's, activities on federal land were authorized as CERCLA time-critical removal actions pursuant to Action Memoranda issued by the BLM.

Additional activities which pre-date current interim measures include prior RFI wells and wells installed to monitor groundwater conditions at the compressor station. Between 1997 and 2004, RFI activities included the installation of monitoring wells at 32 locations within the APE. In addition, approximately 300 soil samples were collected and analyzed at locations within and surrounding the Topock Compressor Station, and impacted soil was removed during removal of former wastewater treatment structures within the compressor station. The locations of the previously constructed RFI well facilities, compressor station monitoring wells, and those associated with IM Nos. 1 through 3, are shown on Figure 3.

Past and present activities discussed below have been authorized by BLM and/or the HNWR. Informal consultation with the USFWS occurred in September 2004, prior to the approval by BLM of the IM No. 3 activities occurring on federal land (CH2M HILL, 2004b). In addition, the PE-1 pipeline project and floodplain *in-situ* pilot study was the subject of a biological assessment (CH2M HILL, 2005j) and subsequent consultation with USFWS in November 2005. Completion reports addressing the implementation of several of the past

projects discussed below have documented no known take of any species listed under the ESA (CH2M HILL, 2005c, d, g, and 2006a).

3.2.1 General Activity Categories

Past and present response and investigative activities have occurred throughout the California portion of the APE and have typically comprised one or more of the following categories of activity:

1. Well installation, maintenance, and operation. This includes access to injection, extraction, and monitoring well sites for surveys, drilling, installation of wellheads, pumps and equipment, monitoring, testing, well maintenance, and sampling. The number of required staff and duration of these activities is provided in the sections that follow.

2. Pipeline installation, maintenance, and operation. This includes above- and belowground piping and appurtenances to and from wells, water treatment, and water and waste management facilities.

3. Facility installation, maintenance, and operation. This includes water treatment facilities, such as IM No. 2 batch treatment plant and the IM No. 3 treatment facility and related injection wells, water and waste management facilities, and *in-situ* treatment operations.

4. Colorado River and soil sampling. This includes open water sample collection from shore and by boat, as well as pore water sampling using techniques including, but not limited to, those described for the Pore Water Sample Study (see Section 3.2.7). Also includes sediment and soil sampling, and seismic surveys.

5. Road maintenance. This includes maintenance of roads and/or paths to project facilities (wells, pipelines, and treatment facilities) within the APE on public and private land.

6. Restoration and mitigation activities. This includes biological restoration or revegetation activities to restore ecological values to areas where project activities/facilities are no longer necessary or have been removed.

3.2.2 Topock Compressor Station Wells

Groundwater monitoring wells have been installed in the vicinity of the existing and former evaporation ponds associated with the Topock Compressor Station. These wells are not associated with corrective actions but are used to monitor operation of the existing ponds. The locations of Topock Compressor Station wells are included on Figure 3. These facilities and the associated activities fall within Category No. 1 described in Section 3.2.1.

3.2.3 Groundwater and Surface Water Monitoring Program

Routine groundwater and surface water monitoring activities were initiated in 1998 as a continuation of the RFI, through the ongoing groundwater monitoring program (GMP). The number of groundwater well and surface water sampling locations, as well as the frequency of sampling from each location, have varied since the GMP inception and will continue to be refined in the future as data needs are evaluated. As of September 2006, monitoring occurs semiannually, quarterly, monthly, biweekly, and biennially, as follows:

- Fourteen groundwater wells are sampled semiannually.
- Sixty-two groundwater wells are sampled quarterly.
- Twelve groundwater wells on the floodplain are sampled monthly.
- Four groundwater wells on the floodplain are sampled biweekly.
- One extraction well, one injection well, and two inactive supply wells are sampled biennially.
- Nine shoreline surface water stations along the Colorado River are sampled monthly.
- Nine depth-specific sampling stations within the Colorado River channel are sampled quarterly (except during winter low-river stage conditions, when the stations are sampled monthly).

The locations of the GMP wells are included on Figure 3. The sampling frequency of wells currently included in the program is in the process of being evaluated by DTSC. The more frequent GMP events focus on wells located on the Colorado River floodplain.

Access to monitoring wells typically occurs via a pickup truck or all-terrain vehicle (ATV) with a trailer. On average, two field personnel are engaged in sampling activities for each individual well. Sampling procedures require purging the wells before sampling can be conducted. Depending on the well characteristics, between 15 and 200 gallons of water are typically purged and subsequently transported to the IM No. 3 treatment facility. Pumping of purge water often involves the use of a portable generator to power a well pump. Several wells on the Colorado River floodplain have dedicated pumps installed that are powered from an electrical power source at the PE-1 wellhead. The time frame to complete field sampling activities at an individual well ranges from approximately 15 minutes to 1 hour. Several monitoring sites include clusters of two to three wells sampled at different groundwater depths. The total time frame to complete a sampling event ranges from 2 days for biweekly events to 7 days for a biennial event.

Vehicles traveling throughout the APE use existing roads and/or predetermined routes to access each of the monitoring wells.

Further details of the GMP program are provided in Appendix A1.

The facilities and the associated activities discussed above fall mainly within Category No. 1 and partially within Category No. 4 (surface water sampling), as described in Section 3.2.1.

3.2.3.1 Floodplain Sampling Procedures

In June 2005, modified sampling procedures were developed due to concerns regarding the potential affects to the SWFL. Floodplain sampling and access procedures during the 2005 SWFL nesting season were modified to include limited use of ATVs and staging of equipment and tanks within specified areas for the purpose of reducing potential impacts to SWFL. These procedures to avoid any potential effects to SWFL comprised a "no effect" avoidance strategy.

In April 2006, PG&E proposed modifications to the floodplain sampling procedures implemented during the SWFL nesting season (May 1 through September 30). The modified procedures include the use of lower-noise ATVs, dedicated well pumps, electrical power supply outlets on the floodplain in lieu of portable generators, reduced sampling frequencies at certain wells, use of 4-inch "lay-flat" hose to purge water outside of potentially sensitive areas, and additional staging areas to limit equipment movement. These procedures are detailed in the *Site Access and Sampling Procedures for Groundwater Monitoring Wells Located Near Potential Southwestern Willow Flycatcher Habitat, Rev. 3* (CH2M HILL, 2006b) provided to the BLM on April 20, 2006.

Based on the above-referenced technical memo and the biological analysis provided therein, BLM and HNWR initiated informal consultation with the USFWS. In a letter dated April 28, 2006, USFWS provided their concurrence with the BLM determination that the proposed sampling procedure modification "may affect, but not likely to adversely affect" the SWFL. The USFWS also concurred with the BLM determination that implementation of these sampling procedures would have "no effect" to the razorback sucker, bonytail chub, Colorado pikeminnow, desert tortoise, and Yuma clapper rail. The sampling procedures described in the April 20, 2006, technical memorandum were subsequently approved by BLM in a letter dated May 1, 2006, and by HNWR in a letter dated May 11, 2006. Figure 4 depicts the approved ATV access routes and staging areas to be used during the SWFL nesting season. No take has been reported to date as a result of implementing these access and sampling procedures.

It is PG&E's intent to carry these or similar access and sampling procedures forward and to consider them as general management measures through 2012.

3.2.3.2 Surface Water Sampling

Sampling procedures for surface water sampling on the Colorado River involve the use of a motorized boat and a global positioning system (GPS) device. At each sample location, river samples are taken from 1 foot off the river bottom, at the mid-point of the water column, and 1 foot below the river surface. Shoreline surface water samples are taken at a depth of approximately 6 inches below the water surface from the shoreline or from a boat. To date, these activities have occurred with no known take of listed species.

The facilities and the associated activities discussed above fall mainly within Category No. 1 and partially within Category No. 4 (surface water sampling), as described in Section 3.2.1.

3.2.4 Interim Measures No. 1

The IM No. 1 project was authorized in March 2004 and provided for additional groundwater monitoring wells at eight locations to complement the existing network of monitoring wells in the APE (see Appendices A2 and A3). IM No. 1 also included several potential extraction wells. However, the extraction portion of IM No. 1 was subsequently supplanted by IM No. 2 (Section 3.2.5), which provided a more comprehensive program to extract, treat, and haul groundwater containing chromium. In early 2005, a second phase of IM No. 1 was implemented involving the development of groundwater wells at five additional locations on the Colorado River floodplain (see Appendices A4 through A6). An assessment of the land used during the second phase of IM No. 1 construction activities was

prepared for BLM and USFWS HNWR, per stipulations provided in their approval. That analysis is provided in Appendix A7.

Typical well installation activities involved the use of a rotosonic drilling rig, forklift, and support vehicle for equipment and material transfer to each drill site. Materials temporarily stored at well sites included drilling equipment and well construction materials (casing, sand, bentonite, cement grout). Drill cuttings generated from drilling were transferred by forklift to lined steel rolloff soil bins. The water produced from drilling was temporarily stored in 55-gallon steel drums placed on pallets or portable storage tanks at each drill site. After installation, the injection and monitoring wells were developed by a combination of surging, bailing, and pumping to remove sediment from the well casing. All waste generated was disposed of at a permitted disposal facility.

Well installation activities involved an average of three drill crew members, two to three staff specialists to collect and record core samples, one biologist, and one archaeologist (if required). The amount of time to install a well varies depending on whether the facility is a single well or well cluster. On average, about 15 days are required to install and develop a well cluster. Well development time may vary, depending on whether conducted by the drill crew or other dedicated staff immediately subsequent to the drilling activity.

Authorization for IM No. 1 was provided by BLM via an Action Memorandum in March 2004 (Appendix A3). To date, these activities have occurred with no known take of listed species.

Monitoring wells installed under IM No. 1 included wells used for both the Groundwater Monitoring Program (see Section 3.2.3) and Performance Monitoring Program (see Section 3.2.6.1). The facilities and activities discussed above fall within Category No. 1, as described in Section 3.2.1.

3.2.5 Interim Measures No. 2

IM No. 2 was authorized by BLM and DTSC in March 2004 and in May 2004. IM No. 2 involved the extraction, treatment, and hauling of treated water to an offsite disposal facility (see Appendices B1 and B2). Groundwater was extracted at rates of up to approximately 90 gallons per minute and pumped into a series of Baker tanks. A batch treatment process to remove chromium occurred within the Baker tanks, resulting in a 99 percent reduction in the volume of hazardous waste (see Appendices B3 and B4). The treated water was pumped into tanker trucks for disposal at a permitted treatment facility in Los Angeles. Groundwater treatment operations at IM No. 2 were phased out in July 2005 following commencement of groundwater treatment at the IM No. 3 plant. Groundwater extraction and hauling of brine continues at the same site as a part of IM No. 3, discussed in Section 3.2.6.

The extraction, treatment, and truck-loading facilities and operations were limited to an approximately 1-acre area on BLM land (referred to as the MW-20 bench) due to the proximity to monitoring well MW 20. This area is bounded by Park Moabi Road to the west and the Colorado River floodplain to the east. This site was selected based on various factors that included proximity to Park Moabi Road, available space, lack of vegetation/habitat, existing groundwater wells, and flat topography. The MW-20 bench and IM No. 2 project area are shown on Figure 3.

The facilities and activities discussed above fall within Category No. 3, as described under Section 3.2.1. Two extraction wells (TW-2S and TW-2D) were installed on the MW-20 bench as part of IM No. 2, and installation of these wells falls within Category 1, as described under Section 3.2.1. Details of the IM No. 2 program and related federal authorizations, including applicable biological stipulations, are provided in Appendix B. Authorization for IM No. 2 was provided by BLM via an Action Memorandum in March 2004 (Appendix B2) and a subsequent Action Memorandum provided in May 2004 (Appendix B4). To date, these activities have occurred with no known take of listed species.

3.2.6 Interim Measures No. 3

IM No. 3 was designed to provide greater groundwater extraction and management capacity to maintain hydraulic control of groundwater near the Colorado River. Under IM No. 3, the pumped water is treated in a treatment plant on property owned by PG&E, with treated water also managed onsite, through re-injection into the groundwater aquifer. IM No. 3 operations provide a significantly higher rate of extraction and treatment than IM No. 2. Details of the IM No. 3 project are described in the work plans provided in Appendices C1 through C3. The BLM approval, including biological stipulations, is provided in Appendix C4.

IM No. 3 facilities include extraction, treatment, conveyance, injection, and monitoring facilities, shown on Figure 3. Construction of IM No. 3 commenced in September 2004 and was completed in July 2005. An analysis of IM No. 3 construction and the total area used by IM No. 3 is provided in Appendix C5. Prior consultation between BLM and USFWS regarding IM No. 3 construction and operation resulted in a determination of no effect to the desert tortoise, a species listed as threatened under the federal ESA. The biological investigation of the IM No. 3 project is provided in Appendix C6. Following construction, a report of IM No. 3 construction and operation was prepared (Appendix C7). This document includes the applicable approvals and stipulations provided by BLM.

Access to IM No. 3 is provided by roads extending from the east and west off Park Moabi Road and National Trails Highway. These access roads have been improved to facilitate effective transportation to the treatment plant and to protect key cultural resources. The roads will continue to require maintenance several times each year to repair storm damage and control dust. This will require the use of graders, backhoes, and water trucks (for example) to complete the maintenance. The IM No. 3 treatment plant occupies an approximately 1-acre site. Double-walled influent conveyance piping is subsurface and generally follows the eastern access road. Effluent piping from the treatment system to the injection wells is mostly located aboveground, along the shoulder of the western IM No. 3 access road. The subsurface and aboveground piping extend for approximately 3,000 and 1,900 feet, respectively.

There are four existing extraction wells available for operation of IM No. 3. Currently, the system operates using two wells: TW-3D located on the MW-30 bench, and PE-1 located on the floodplain. Construction of the pipeline between the PE-1 site and the MW-20 bench was recently completed, and extraction operations began in January 2006 (see Figure 3 and Section 3.2.6.3). Installation of TW-3D was completed in late 2005 and extraction operations began in December 2005 (see Figure 3 and Section 3.2.6.4). The other two extraction wells (TW-2S and TW-2D) were installed on the MW-20 bench as part of IM No. 2 and are available for backup,

but are not currently in operation. The injection wellfield consists of two wells (IW-02 and IW-03) located on PG&E property west of the treatment plant, installed in 2004. Construction and development of the extraction and injection wells was similar to the typical well installation activities described above in Section 3.2.4

Operation of IM No. 3 commenced in late July 2005. Continuing operations require one to two operations staff to manage and monitor IM No. 3 functions 24 hours per day, primarily at the IM No. 3 treatment plant. The operations staff drives to the injection well area and the extraction well locations several times each day to monitor the condition of the wells and conveyance piping. In addition to the operations staff, a security company has been employed to provide 24-hour-a-day patrolling of the IM No. 3 project area.

Periodic maintenance activities include routine repairs, waste removal, and deliveries of supplies and treatment compounds. Maintenance activities may also involve enhancement of existing facilities to optimize operations (e.g., upgrading or replacing equipment). Delivery of supplies and materials occurs several times per week. Repair activity includes recent repairs to the IM No. 3 access road. These repairs mainly involved the installation of sufficiently sized culverts to convey stormwater below the roadway and the addition of fill material to eroded sections. As part of the BLM mitigation for HR66, which is the primary access route to IM-3, approximately 5 inches of road base must be maintained over the original HR66 surface to protect the historic landmark from potential vehicular impacts.

During IM No. 3 operations, brine wastewater from the water treatment process is pumped back to the MW-20 bench and trucked to an offsite disposal facility. Currently, the offsite disposal facility receiving the brine wastewater is located in Los Angeles, California. Approximately 24 trucks per week are required to haul brine waste at the extraction rate of 135 gallons per minute. The required trucking activity varies throughout the year as the flow rate requirements change. In the future, the brine may be hauled to the existing Topock Compressor Station evaporation ponds currently utilized for compressor station operations. These operations would continue but would also involve discharge of IM No. 3 brine waste in the compressor station ponds in lieu of transport to an offsite facility. Alternatively, in the future, brine wastewater may be disposed at an offsite disposal facility in Nevada, Arizona, or alternate location in California.

In September 2004, BLM initiated informal Section 7 consultation with USFWS related to implementation of IM No. 3. Specifically, the consultation addressed potential effects to the Desert Tortoise and SWFL during construction and operation of this project. The anticipated biological impacts of the project, including potential impacts to sensitive species, were assessed in the *Biological Resources Investigation for Interim Measures No. 3* (CH2M HILL, 2004b) provided in Appendix C6. Based on this analysis and the consultation between BLM and USFWS, a "no effect" determination was provided for IM No. 3. The 2004 Action Memorandum providing BLM authorization to implement IM No. 3 included numerous biological stipulations (see Appendix C4). To date, the project has been working under the "no effect" determination with no take of listed species. A report documenting the completion of IM No. 3 construction activities (CH2M HILL, 2005d) is provided in Appendix C7.

These facilities and activities fall within Category Nos. 1, 3, and 5, as described in Section 3.2.1.

3.2.6.1 Performance Monitoring Program

The performance monitoring program (PMP) involves monitoring, data evaluation, reporting, and response actions associated with the IM No. 3 pumping, treatment, transport, and disposal of extracted groundwater near the floodplain area. The network of groundwater wells used for performance monitoring includes the monitoring and extraction wells in the floodplain and adjoining area, as shown on Figure 3. The network of groundwater wells used for performance monitoring includes monitoring wells in the floodplain, the MW-20 bench/Park Moabi Road area, and the upland interior plume area.

As part of the PMP, a network of pressure transducers are maintained and operated to continuously monitor water levels and assess hydraulic gradients (horizontal and vertical) in the floodplain area. The transducer data are downloaded biweekly to the PMP database. Manual water levels are measured periodically at the monitoring wells, river locations, and extraction wells to calibrate and supplement the pressure transducer data. The majority of the PMP wells used for hydraulic data and groundwater sampling are clusters consisting of two or three individual wells installed at one monitoring location. The PMP activities and standard operating procedures are detailed further in Appendix C2.

The PMP uses existing monitoring wells, equipped with transducers and data loggers. To the extent that the PMP is a component of the IM No. 3 project, it is included in the prior Section 7 ESA consultation for IM No. 3 described above.

The facilities and activities discussed above fall within Category No. 1, as described in Section 3.2.1.

3.2.6.2 Compliance Monitoring Program

The compliance monitoring program (CMP) monitors the aquifer in the IM No. 3 injection well area to ensure that injection of treated groundwater is not causing an adverse effect on the aquifer water quality. Groundwater levels are measured in the vicinity of the injection wells, and groundwater samples are collected and analyzed. Groundwater analyses are performed to ensure that the distribution and concentrations of constituents of concern remain consistent with the baseline sampling results. The CMP monitoring well network consists of both observation wells and compliance monitoring wells. The CMP plan is provided in Appendix C3.

The December 2004 BLM letter of approval (Appendix A5) for the CMP facilities makes reference to prior authorization provided under the March 2004 IM No. 1/2 Action Memorandum and applies all stipulations included in the September 2004 IM No. 3 Action Memorandum.

The facilities and activities discussed above fall within Category No. 1, as described under Section 3.2.1.

3.2.6.3 PE-1 Pipeline

IM No. 3 operation was planned to process groundwater influent from extraction well PE-1, located approximately 400 feet east of the MW-20 bench on the Colorado River floodplain (Figure 3). The PE-1 extraction well was installed in March 2005. Construction of a double-walled conveyance pipeline to connect the PE-1 extraction well with existing conveyance pipeline at the MW-20 bench was completed in January 2006. The pipeline alignment extends for approximately 500 feet between PE-1 and the MW-20 bench (Figure 3). The alignment also includes power conduit for use during activities in the floodplain, including the well sampling program. The PE-1 extraction well is currently operational. The *Design Plan Conveyance Piping and Power Supply for Extraction Well PE-1* (CH2M HILL, 2005e) is provided in Appendix C8.

Potential biological impacts associated with this facility were covered under the *Biological Assessment for the Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions* (CH2M HILL, 2005j) prepared in November 2005 and an ESA Section 7 consultation process completed in December 2005. The result of that consultation was a finding of "may affect, not likely to adversely affect" for the SWFL, and a "no effect" finding for all other listed species. As documented in the completion report for PE-1 (CH2M HILL, 2006a), the construction activities were completed with no take of any listed species.

The facilities and activities discussed above fall within Category No. 2, as described in Section 3.2.1.

3.2.6.4 Well TW-3D

An additional IM No. 3 extraction well was installed at the MW-20 bench site in late 2005 and is currently in operation. This well is referred to as TW-3D, and is located approximately 15 feet west of the TW-2D extraction well, which was originally installed as the primary extraction well for IM No. 2. The work plan detailing installation of extraction well TW-3D is provided in Appendix C9.

Construction and development of this well was similar to the typical well installation activities described above in Section 3.2.4. In addition, approximately 50 feet of underground piping were constructed to connect TW-3D to the existing IM No. 3 groundwater conveyance system. TW-3D construction activities occurred entirely within the MW-20 bench.

The October 2005 BLM letter of approval for TW-3D indicated that the facilities were authorized via the IM No. 3 Action Memo of September 2004 (Appendix C4).

These facilities and activities fall within Category Nos. 1 and 2, as described in Section 3.2.1.

3.2.6.5 Interim Measures Performance Monitoring Wells

In 2005, DTSC requested the installation of eight groundwater well clusters within and in the vicinity of the Colorado River floodplain to further characterize the nature and extent of the chromium plume in this area and to assess the performance of interim measures. The *Well Installation Work Plan for Interim Measures Performance Monitoring Program,* describing the installation and operation of five well clusters on the river floodplain and three well

clusters immediately upland from the floodplain, is provided in Appendix A10. The eight well cluster locations are included on Figure 3.

BLM and HNWR approval of the eight Interim Measures Performance Monitoring (IMPM) well clusters was provided in a letter dated February 21, 2006, pursuant to prior authorization provided by the September 2004 Action Memorandum related to IM No. 3 activities. Construction of the IMPM well clusters commenced in February 2006 and concluded in May 2006. Construction and development of these wells was similar to the typical well installation activities described above in Section 3.2.

These facilities and activities fall within Category No. 1 described above in Section 3.2.1.

3.2.7 Pore Water Study and Seismic Survey

The pore water study focused on water within pore spaces in sediments immediately beneath the Colorado River. Samples from the river were taken along approximately 16 transects—eight downstream of the groundwater plume and eight upstream of the groundwater plume. Pore water transects within the APE are shown on Figure 3. Approximately four samples were taken at each transect. In addition, approximately 10 core samples of river sediment were taken. Sampling depths ranged from 2 to 6 feet below the riverbed. The *Pore Water and Seepage Study Work Plan* detailing project activities is provided in Appendix A8.

Prior to implementation of the pore water study, the United States Geologic Survey (USGS) conducted a seismic survey within the Colorado River to better understand bedrock characteristics below the riverbed. This survey involved the use of a small watercraft utilizing equipment similar to a fish finder to conduct the seismic bedrock survey.

Prior review and approval by the USFWS HNWR concluded that no effect to sensitive fish species would result from implementation of the pore water study (USFWS 2005e). Authorization and approval for the pore water study provided by the USFWS HNWR on November 15 included a prohibition on take of any wildlife, particularly threatened and/or endangered species.

The pore water study sampling activities were planned to coincide with low water levels within the river, which generally occur in the months of December and January. The study field activities commenced in December 2005 and were completed in early January 2006. Further details regarding the pore water study are described in the work plan, provided in Appendix A8.

These activities fall within Category No. 4, as described in Section 3.2.1.

3.2.8 *In-situ* Floodplain Pilot Study

The *in-situ* floodplain pilot study activities involve injection of food-grade compounds into the groundwater aquifer and measurement of the reduction of chromium levels. The pilot study is located on the floodplain within an approximately 0.25-acre area 300 feet east of the MW-20 bench. Facilities at the site include one injection well cluster and six monitoring well nests. The permanent nested well structures have a surface expression of less than 500 square feet (0.01 acre). The floodplain pilot study project wells are included on Figure 3.

The *In-situ Hexavalent Chromium Reduction Pilot Test Work Plan, Floodplain Reductive Zone Enhancement* (MWH, 2005a) is provided in Appendix A9.

The pilot study wells were installed in early 2006, prior to the SWFL nesting season. Construction of the injection and monitoring wells occurred over approximately 2 months. Typical well installation activities associated with the pilot study are similar to those described above in Section 3.2.4.

Beyond the project wells, no other permanent equipment or facilities are required for *in-situ* pilot study operations; temporary hoses connect the injection well to temporary containers during injection activities. Operations commenced in April 2006, and involve injection of reagents at up to four separate times over the 8-month operation period and groundwater monitoring. Groundwater monitoring occurs as frequently as daily over the first week of operations, and then weekly to monthly until the end of the study, anticipated to be late 2006. Monitoring activities are similar to those described above for the GMP project. Details of the *in-situ* floodplain pilot study are described in the work plans for these activities, provided in Appendix A9.

Potential biological impacts associated with these activities were covered under the *Biological Assessment for the Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions* (CH2M HILL, 2005j) prepared in November 2005 and an ESA Section 7 consultation process completed in December 2005. The result of that consultation was a finding of "may affect, not likely to adversely affect" for the SWFL, and a "no effect" finding for all other listed species. As documented in the completion report for these facilities (CH2M HILL, 2006a), the construction activities were completed with no take of any listed species.

These facilities and activities fall within Category Nos. 1 and 3, as described in Section 3.2.1.

3.2.9 Restoration

To date, restoration activities primarily have involved revegetation of the area affected by installation of monitoring well MW-43, and decommissioning of the IM-2 batch treatment system at the MW-20 bench. Restoration at MW-43 involved the planting of approximately 100 mesquite trees along the approximately 250-foot access corridor to MW-43. Decommissioning of the IM No. 2 batch treatment system to date has involved cleaning tanks and associated containment structures, removal of support facilities (including the field trailer, field laboratory, generator, ice machine and potable water tanks, etc.), securing batch treatment pumps, piping and appurtenances, and modifying the security fencing to reduce the footprint of the secured area. Decommissioning of the MW-20 bench is being performed in phases, as described in the *MW-20 Bench Decommissioning Work Plan,* submitted to BLM on August 8, 2005 (CH2M HILL 2005g).

These restoration activities fall under Category No. 6 described above in Section 3.2.1. Additional and future restoration efforts are currently in planning, as discussed in Section 3.3.8.

3.3 Planned Activities

Various investigative and remedial activities are currently planned prior to implementation of the final remedy. It is expected that DTSC and DOI will require additional investigatory and/or response activities as part of the RI/RFI prior to the selection of the final remedy, which is currently unspecified. Such activities are likely to fall within the general activity categories described below. Where information is currently available, specific planned activities are also described. Table 1 provides a list of planned activities and a summary of the area estimated to be used during implementation. Overall, future activities are anticipated to be substantially similar to past and current activities, particularly those conducted since 2004.

3.3.1 Planned Activity Categories

The planned investigative and remedial activities occur throughout the APE and may comprise any one or more of the following activity types listed below. Where necessary, staging of equipment and materials will typically occur at the MW-20 bench, an area approximately 1,200 feet to the north between Park Moabi Road and the MW-35 well, and/or at the Topock Compressor Station. Further details regarding equipment, personnel, and time frames are provided as available for the planned activities described below in Sections 3.3.2 through 3.3.8.

1. Well installation, maintenance, operation, and decommissioning. Includes access to existing and future injection, extraction, and monitoring well sites for surveys, drilling, installation of well heads, pumps and equipment, aquifer testing, monitoring, well maintenance, retro-fitting, decommissioning (e.g., well abandonment), and sampling. Approximately 30 new well clusters may be installed throughout the APE. Also includes related improvements such as dedicated well pumps to facilitate well sampling activities. Access to well locations would use existing access roads and/or pre-defined travel corridors wherever possible.

2. Pipeline installation, maintenance, and operation. Includes above- and belowground piping and appurtenances to and from wells, water treatment, and water and waste management facilities. Potential pipelines include a connection from the MW-20 bench to the Topock Compressor Station to convey brine waste from the IM No. 3 treatment plant operations.

3. Facility maintenance and operation. Includes water treatment facilities, such as IM No. 2 batch treatment, IM No. 3 treatment facilities, water and waste management facilities, and *in-situ* treatment operations. Periodic maintenance activities include routine repairs, well maintenance, waste removal, and deliveries of supplies and treatment compounds.

4. Colorado River and soil sampling. Includes open water sample collection from shore and by boat, as well as pore water sampling using techniques including, but not limited to, those and similar techniques as described in the Pore Water Sample Study (see Section 3.2). This category also includes soil sampling activities via a number of collection methods including, but not limited to: boring, augers, trenching, and such sampling methods conducted via track- and truck-mounted apparatus. Other sampling

activities may include seismic studies and/or bedrock sampling using drilling equipment. Non-intrusive test methods (i.e., geophysical methods) may also be employed if useful data can be collected by such means. Access to soil sampling locations would use existing access roads and/or pre-defined travel corridors wherever possible.

5. Road maintenance. Includes maintenance of roads and/or paths to project facilities (wells, pipelines, and treatment facilities) within the APE on public and private land. Examples include regrading and/or re-paving of existing access routes, and the installation of stormwater culverts to limit roadway erosion during storm events.

6. Restoration and mitigation activities. Includes activities to restore spiritual, cultural, ecological, aesthetic, or other values to areas where project activities/facilities are no longer necessary or have been removed. Also includes revegetation and removal of debris located within the APE (e.g., scrap metal, wood, brick, plastic, or similar materials). Some restoration sites will require removal or addition of soil and rocks to re-contour the landscape and drainage ditches that may require barriers and irrigation facilities. Reasonably foreseeable planned restoration areas are shown on Figure 5. Other additional restoration and mitigation areas may be identified by BLM and USFWS, including restoration outside of the APE as investigative and response activities continue at a 2:1 ratio (restored:lost).

7. Emergency activities. Includes any activity that cannot be reasonably foreseen but, due to public health/safety concerns, requires immediate response and/or corrective action. Examples of such activity include, but are not limited to, response of police, fire, ambulance or other personnel to the site, and subsequent work, in the event of explosion, fire, vehicle accident, spill, natural disaster, equipment failure, chemical reaction, heat illness, heart attack, or other medical emergencies.

3.3.2 IM No. 3 Discharge Options

Treated water effluent from the IM No. 3 treatment plant is currently re-injected into the groundwater aquifer. Brine waste resulting from the treatment process is currently transported offsite to a facility located in Los Angeles, California. Potential changes to IM No. 3 operations include (1) transporting brine waste to the Topock Compressor Station ponds, (2) transporting brine waste to an alternate offsite disposal facility in Nevada, Arizona or elsewhere in California, and (3) using treated IM No. 3 water in the compressor station cooling towers.

Current IM No. 3 operations involve the transport of brine waste via truck from the MW-20 bench to an offsite disposal facility located in Los Angeles, California. Approximately 26 truckloads of brine waste per week are generated. Potential changes to IM No. 3 operations include transport of the brine waste along National Trails Highway to the compressor station evaporation ponds. This transfer can be accomplished by trucking the brine waste to compressor station tank facilities and commingling the brine waste with cooling water blowdown, which is subsequently piped to the evaporation ponds.

The potential transport of brine waste offsite to an alternate offsite disposal facility would involve little or no change in the onsite operations to access Interstate 40.

Potential use of treated IM No. 3 water in the compressor station cooling towers would partially offset, but not completely replace, existing potable water usage. The treated water would be hauled from the MW-20 bench to the compressor station and pumped into existing cooling water tank facilities. After use in the cooling towers, the treated water would ultimately be discharged to the existing evaporation ponds.

Implementation of both the brine waste and treated water options involve the transport of approximately 300 truckloads per week of treated water and brine waste from the MW-20 bench to the Topock Compressor Station. In addition, both of these options would require the construction of a small transfer facility at the discharge point to ensure proper management of brine waste and treated water pumping operations. Activities associated with the transport and use of brine water and treated water at the compressor station would be conducted within a predominantly industrial setting and would not require any expansion of the footprint of the existing industrial facilities.

In lieu of trucking brine waste and/or treated water from the MW-20 bench to the Topock Compressor Station described above, a conveyance pipeline may be constructed in National Trails Highway. PG&E maintains an existing agreement with the County of San Bernardino to construct such facilities within the existing roadway right-of-way. Use of a pipeline to transport brine waste and treated water would also require construction and operation of a pump station at the MW-20 bench. The conceptual pipeline alignment would follow the brine waste haul route shown on Figure 5 between the MW-20 bench and the entry to the Topock Compressor Station.

Details regarding potential pipeline installation activities are not currently specified, but could involve up to 12 construction staff over a period of 2 to 3 months. Typical equipment would include a backhoe, excavator, roller, and smaller support vehicles. Following pipeline installation, National Trails Highway would be repaved to pre-construction conditions.

These activities generally fall under Category Nos. 2, 3 and 5, as described in Section 3.3.1.

3.3.3 Soil Sampling

Several soil sampling programs are planned to further characterize COPCs in soil resulting from historic operations at the Topock Compressor Station and/or to characterize back ground soil conditions, as described below. Soil sampling is expected to primarily occur in the upland areas, but may involve some sampling in the Colorado River floodplain. Further soil sampling is expected to be required by DTSC and DOI to support site characterization or remedy selection and design. Details of currently planned sampling methods are provided in Appendix D1 and outlined further below. The activities described below fall under Category No. 4, as described in Section 3.3.1.

3.3.3.1 IM No. 3 Soil Sampling

The primary objective of the IM No. 3 soil sampling program is to determine naturally-occurring background concentrations of metals, including hexavalent chromium, total chromium, and other inorganic compounds in soil in the direct vicinity of the IM No. 3 system. As part of future IM No. 3 closure activities, or in the event of a release of wastewater and/or treatment chemicals from the treatment system or pipelines during

operation, such baseline data would be used to assess impacts associated with the release, assess the appropriate level of site restoration, and guide remediation, if necessary.

Approximately 21 sample locations have been preliminarily identified, primarily along the pipeline alignment and Bat Cave Wash, as shown on Figure 5. Within the upland and Bat Cave Wash areas, approximately three samples will be taken from each location between 0 to 6 feet below ground surface. Within the floodplain area, approximately five samples will be taken from each location between 0 and 20 feet below ground surface. Mechanized sampling would use a Bobcat-mounted auger rig to drill and sample a borehole. This technique would involve two field personnel. Hand digging would occur with a hand auger, posthole digger, shovel, or pry bar and would require two to four field personnel. Field sampling activities for all of the locations shown on Figure 5 are expected to be completed in about 3 days.

Additional details of the IM No. 3 soil sampling, including proposed sampling methods, are described in the work plan provided in Appendix D1.

3.3.3.2 RCRA Facility Investigation/CERCLA Remedial Investigation Soil Sampling

The Final RI/RFI Report, Volume 1 (Site Background and History) recommends soil sampling at 27 locations in the vicinity of the Topock Compressor Station to collect additional data needed to verify past closure activities, or to complete the RFI objectives of defining the nature and extent of contamination, characterize risks to human health and the environmental, and gather information for the Corrective Measures Study/Feasibility Study (CH2M HILL 2006d). Of these 27 locations, 17 are within the fence line of the compressor station. The remaining locations are on PG&E property surrounding the fenced area, or on HNWR property north, east, and west of the PG&E property. The areas of soil sampling are shown on Figure 5. Multiple samples will be taken at each of the 27 locations. In addition, future activities will include implementation of a background soil sampling program to assess naturally occurring concentrations of inorganic constituents in soil. Samples collected for the background study will be collected in areas removed from the sources of potential contamination at the compressor station.

Sampling activities would be similar to the IM No. 3 baseline soil sampling described above and could occur via a number of collection methods including, but not limited to, boring, augers, and trenching. Depending on the location, sampling activities may be conducted via track- and truck-mounted apparatus or using hand equipment. Approximately 200 soil samples would be obtained at multiple depths via the sampling methods described above for the RFI soil sampling and IM No. 3 baseline soil sampling. If substantial soil contamination is encountered during sampling activities, soil may be hauled off-site to an appropriate permitted disposal facility, in lieu of leaving or returning the soil in place.

3.3.4 Future Wells and Related Activities

3.3.4.1 California and Arizona Floodplain Monitoring Wells

In 2005, DTSC requested the installation of five groundwater well clusters on the Colorado River floodplain in California to further characterize the nature and extent of the chromium plume in this area and to assess the performance of interim measures, as described in Section 3.2.6.5. Installation of these well facilities was completed in May 2006.

Approximately 15 additional floodplain well clusters may be installed prior to the final remedy. While the precise location of additional wells has not yet been identified, additional well clusters could be located in both the California and Arizona portions of the APE.

Typical well construction activities would be substantially similar to past activities, as described above under Section 3.2.4 (Interim Measures No. 1) and as documented in the construction completion report provided in Appendix A7 that addresses prior well installation activities in the APE (CH2M HILL, 2005c). Modifications to future well construction may include "slant drilling" where the mast of the drill rig is set to an angle off vertical, resulting in a boring that penetrates at a similar angle. This approach may be taken so that samples can be collected beneath a surface obstruction (e.g., the Colorado River). The surface expression of slant drilling activities is substantially similar to that associated with vertical drilling activities.

Sampling of future floodplain wells would occur per the existing GMP program, discussed in Section 3.2.3. As noted, due to potential concerns regarding the SWFL, floodplain sampling and access procedures were originally modified during the 2005 SWFL nesting season. Recent approvals provided by BLM and USFWS updated the sampling procedures implemented during the SWFL nesting season. These procedures include the use of lower-noise ATVs, dedicated well pumps, and electrical power supply sources, as described above in Section 3.2.3.1 and as shown on Figure 4. The current 2006 sampling procedures will be carried forward for implementation during future SWFL nesting seasons.

In addition to the monitoring wells discussed above, planned activities include the installation of slant wells below the Colorado River. A proposed drill site is located immediately south of Interstate 40 on the western shore of the Colorado River in California. This slant drill site is shown on Figure 5. In addition, a seismic survey of the Colorado River would precede the well installation activities to obtain additional detail regarding bedrock characteristics below the river. These proposed activities were addressed in a separate project-specific Biological Assessment (CH2M HILL 2006e) and ESA consultation.

The facilities and activities discussed above fall within Category No. 1, as described in Section 3.3.1.

3.3.4.2 Upland Monitoring Wells

Additional monitoring wells may be required at upland locations throughout the APE. Recent construction activities completed in May 2006 involved the installation of three additional well clusters at upland locations in the APE (see Appendix A10). These three well locations are included on Figure 3. No other well facilities or locations have currently been specified by DTSC or DOI. However, approximately 15 additional well clusters may be installed within the upland portion of the APE, based on future monitoring well results and changing data needs. The potential locations include areas within both the California and Arizona portions of the APE.

Typical well installation activities would be substantially similar to past activities, as described above under Section 3.2.4 (IM No. 1) and as documented in the construction completion report provided in Appendix A7, which addresses prior well installation activities in the APE (CH2M HILL, 2005c). Given the typical management measures to be

applied at the site (see Section 3.4), including those associated with cultural resources, potential impacts to sensitive species such as the desert tortoise would also tend to be minimized.

Existing groundwater monitoring wells are located in the vicinity of the existing and former evaporation ponds associated with the Topock Compressor Station. These wells are not associated with corrective actions but are used to monitor closure of the former evaporation ponds and operation of the existing ponds. In the future, these wells may be sampled as part of the ongoing corrective action process.

The facilities and activities discussed above fall within Category No. 1, as described in Section 3.3.1.

3.3.4.3 California and Arizona Floodplain Monitoring Well Improvements

Additional facilities may be constructed to support ongoing groundwater monitoring on the river floodplain. The purpose of these improvements would be to further limit noise and activity associated with the GMP, similar to past improvements described above in Section 3.2.3.1 (e.g., electrical power sources, dedicated well pumps, etc.). Approximately five additional dedicated well pumps would be installed in monitoring wells located in California on the Colorado River floodplain. The well sites have not yet been identified. Well site selection will be based on proximity to potentially-sensitive nesting habitat and frequency of sampling. Similar improvements may also be installed at future wells sites in Arizona.

These facilities fall under Category No. 1, as described in Section 3.3.1.

3.3.4.4 Compliance Monitoring Wells

The IM No. 3 project included the construction of four compliance well (CW) clusters to monitor groundwater in the vicinity of the injection wellfields. The existing CW-1 through CW-4 clusters may be enhanced to include additional shallow-depth wells. Drilling at these four locations would involve the typical well installation activities described in Section 3.3.3.1. The work plan describing these activities is provided in Appendix D2. The well installation activities would occur directly adjacent to the existing CW clusters, in areas previously used for well installation activities.

The facilities and activities discussed above fall within Category No. 1, as described in Section 3.3.1.

3.3.4.5 Well Decommissioning

Additional planned well activities include the decommissioning of well PGE-6 located north of the compressor station and south of Interstate 40 in an area referred to as the MW-24 bench, within the HNWR. This well is located within an area that has been previously graded and very sparsely vegetated. The associated activities involve the removal of the upper portion of the well casing, and filling of the well casing with inert materials. The well surface would be restored to the original grade.

The decommissioning work could be accomplished in 2 to 3 days. Because of the short duration of the work and the relatively small amount of materials needed, there will be no

need for an equipment or materials staging area. It may be necessary to locate some pallets of cement or sand at the work site during the decommissioning work. Buried gas pipelines cross PG&E property just outside the north gate of the Compressor Station. An earthen berm will need to be placed over top of these pipelines to allow the safe passage of heavy vehicles across them. This berm would be removed at the completion of the decommissioning work. The planned decommissioning of well PGE-6 is detailed in the work plan provided in appendix D3. Other wells within the APE may also be decommissioned by PG&E, if required.

The facilities and activities discussed above fall within Category No. 1, as described in Section 3.3.1.

3.3.4.6 Well Maintenance and Testing

Planned activities include retrofitting and/or testing at existing monitoring wells PGE-7, PGE-8 and MW-48. PGE-8 is located within the compressor station. PGE-7 is located at the southern end of the MW-24 bench on the HNWR, and MW-48 is located northeast of the compressor station on the HNWR. A work plan will be prepared to describe retrofitting of PGE-7, performing a flow meter survey and/or spinner logging within PGE-7 and PGE-8 to evaluate vertical hydraulic gradients, and conducting aquifer testing in PGE-7, PGE-8 and MW-48 to further characterize the hydraulic properties of the aquifer. Aquifer testing involves pumping water at a controlled rate to measure aquifer properties. This testing requires temporary water containment tanks at the well location for storage prior to transport to IM-3 for treatment.

Retrofitting and testing at PGE-7, PGE-8 and MW-48 will occur over approximately 4 weeks. PG&E may conduct similar activities at other existing or future wells in the APE, if required.

The facilities and activities discussed above fall within Category No. 1, as described in Section 3.3.1.

3.3.4.7 Seismic Studies

Additional seismic studies may be conducted to advance knowledge of bedrock conditions under the Colorado River. Similar to prior seismic studies (see Section 3.2.7), the survey would typically involve a small watercraft equipped with a measuring device similar to a recreational fish finder. The watercraft would move along the surface of the river only. No sub-surface activity is required.

The facilities and activities discussed above fall within Category No. 4, as described in Section 3.3.1.

3.3.5 *In-situ* Upland Pilot Study

A work plan for an *in-situ* upland pilot study has been drafted and is provided in Appendix D. This work plan has been submitted to regulatory agencies, but it is likely that specifics of the work could be modified in the future by oversight agencies or other requirements, and in such case, changes to the implementation activities described in this section would be necessary.

Information collected from the uplands pilot study will complement information provided by the *in-situ* floodplain pilot study currently underway on the Colorado River floodplain. Similar to the floodplain pilot study, the upland pilot study involves the injection of reductant compounds into the groundwater aquifer and measurement of the reduction of chromium levels. The upland pilot study would be conducted within an area of approximately 0.25 acre. The proposed study site is located within the HNWR north of the Topock Compressor Station, south of Interstate 40, and east of Bat Cave Wash in an area referred to as the MW-24 bench (see Figure 5).

Planned facilities include two recirculation wells with pumps, wellhead vaults, and pump controls. These wells will provide circulation of the groundwater and reductant, thereby facilitating the reduction of hexavalent chromium concentrations. In addition, three new monitoring well clusters would be developed. Pilot study operations may use existing monitoring wells at the site to collect data. These existing well facilities include MW-24, MW-11, and MW-38. Once constructed, the new pilot study well structures would have a surface expression of less than 500 square feet (0.01 acre).

The wells will be drilled using rotosonic techniques. The rotosonic drill rig will be equipped with drilling casing with an outside diameter of approximately 10 inches for the recirculation and monitoring well boreholes. Rotosonic drilling provides continuous highly representative, core samples that can be recovered in all formations without the use of air, water, or additives, thus minimizing the waste produced. Recirculation wells will be 6 inches in diameter and will be spaced approximately 150 feet apart. The monitoring well nests will be located between and in the vicinity of recirculation wells to monitor coverage of the injected reagents and the circulation between the wells. The monitoring well nests will consist of three separate 2-inch well completions in a single boring (if feasible). Activities and equipment required for well construction are similar to those described above under Section 3.2.4 (IM No. 1) and as documented in the construction completion report provided in Appendix A7 that addresses prior well installation activities in the APE (CH2M HILL, 2005c).

Pilot study implementation may require maintenance of an existing access road extending from the northern portion of the Topock Compressor Station to the MW-24 bench and pilot study site. Road maintenance would primarily involve minor grading. Construction of the upland pilot study recirculation and monitoring wells will last approximately 2 months.

Following construction, the proposed pilot test will be conducted by introducing a food-grade carbon source to be used by indigenous microbes coupled with the available electron acceptors in the aquifer to provide a reducing environment in the aquifer. Ethanol (denatured by methanol) is the preferred carbon substrate due to its solubility, low viscosity, and minimized potential for well biofouling. A total of 38,000 gallons of 40 percent ethanol solution will be injected in two recirculation wells in 6 months. Reagent tanks will be temporarily placed adjacent to each injection well during the pilot test. No other permanent aboveground equipment will be employed during the pilot test. Diluted ethanol (and for the first month, a dye tracer) will be kept in double-contained reagent tanks temporarily located at each well head. The reagent tanks (sized 3,000 gallons or less) will be refilled approximately once a month.

Concurrent with the pilot test injection, a tracer test will also be initiated to better understand the flow conditions in the pilot test area. The tracer study will be conducted with each injection well receiving its own tracer (e.g., fluorescein and rhodamine). These dyes will be introduced at a target concentration of 1 milligram per liter in the injection water and will be continuously injected for the first month of circulation. Approximately 12 pounds of each dye will be injected in the respective wells during the 1-month dye injection period.

Monitoring of reagent flow (rate and volume) into the injection well and water levels in nearby monitoring wells will be conducted as proposed in the work plan or in accordance with other requirements, if more stringent. The work plan proposes daily monitoring throughout the first week of injection until the injection system is operating routinely. Thereafter, weekly monitoring visits will record volumes of reagent injected. Groundwater chemistry monitoring will be conducted to evaluate the effectiveness of the reagent introduction to the aquifer. Monitoring wells will be sampled twice prior to the initial injection event and on a phased schedule post-injection (weekly for the first month, bi-weekly for next 3 months, and monthly for the next 5 months). Monitoring will continue for a minimum of 9 months. Depending on the results obtained, post-test monitoring may continue beyond the 9-month time frame.

These facilities and activities fall within Category Nos. 1 and 3, as described in Section 3.3.1.

3.3.6 Maintenance and Other Activities

Ongoing and future activities include maintenance and operation of the IM No. 3 system, and groundwater monitoring well network. This includes routine maintenance and any required repairs to the treatment system, injection, extraction, pipelines, and monitoring wells. Maintenance activities may also involve enhancement of existing facilities to optimize IM No. 3 operations (e.g., upgrading or replacing equipment). Such maintenance/optimization activities would occur primarily in areas where existing facilities are located. In addition, road repairs will be periodically required to ensure adequate access to investigative and remedial facilities throughout the APE. This may include paving of an existing roadway on PG&E property extending from the west side of the Topock Compressor Station into Bat Cave Wash. Paving this roadway would reduce or eliminate the need for other maintenance activities such as grading, which is regularly required to ensure adequate access to facilities near the Topock Compressor Station.

Periodic maintenance of the IM No. 3 injection wells involves backwashing approximately every 8 weeks. Associated equipment includes a pickup truck mounted with an air compressor to remove water and accumulated sediments from the well casing. Water is collected in tanks and transported back to the IM No. 3 treatment plant. Maintenance of the IM No. 3 extraction wells involves periodically replacing the pumps, using an approximately 1-ton truck with a hoist to lift and replace the well pump. Such maintenance is typically completed within 1 day.

Potential structural IM No. 3 enhancements outside of the existing project footprint include enhanced spill control structures such as containment berms and truck loading pads. At the MW-20 bench, spill containment berms may be installed around the IM No. 3 water/brine

tanks. In addition, the truck-loading area at the MW-20 bench would be improved with a concrete spill pad and surrounding moat to minimize potential impacts in case of a spill. Additional improvements at the MW-20 bench may include the replacement of the existing water/brine tanks (six blue tanks and three brown tanks). Up to four new concrete tanks would replace these tanks. Each concrete tank would have a capacity of approximately 100,000 gallons, and measure about 35 feet in diameter and 20 feet in height. Alternatively, the three existing brown tanks may remain in place, and could be augmented by relocation of several of the existing blue tanks. Any remaining blue tanks not required for IM No. 3 operations would be removed. In addition, connective pipe and pumps may be installed at the MW-20 bench to provide for water transfer among the tanks, and between the tanks and tanker trucks.

A concrete spill containment pad structure may also be installed at the existing loading facility on the eastern side of the IM No. 3 Treatment Plant. The loading area is currently a permeable gravel surface; installation of a concrete pad and moat would serve to contain any potential spills and avoid or limit release to the environment. In addition, a second clarifier may be added to the IM No. 3 treatment system. Installation of a second clarifier would involve the construction of a concrete pad measuring about 20 feet by 15 feet. The new clarifier would be mounted on the concrete pad directly adjacent to the existing clarifier and outside of the existing sun shade structure. The new clarifier would be similar in height as the existing clarifier (about 20 feet).

Other activities include possible actions that require immediate corrective action. This includes repairs to existing facilities or emergency cleanup operations following a potential spills or releases. The *Emergency Notification Binder* (CH2M HILL, 2005f) covers investigative and interim remedial activities in the APE and provides site personnel contact information in the event of an emergency that requires immediate reporting. Reporting covers internal and external entities and may include site management personnel, PG&E management, emergency response personnel, regulatory agencies, other agencies, and/or landowners.

IM No. 3 activities are specifically subject to defined emergency response procedures described in the *Hazardous Materials Management Business Plan* (HMMP) (PG&E, 2006), which addresses hazardous substances handled at the IM No. 3 Treatment Plant. Emergency situations covered in the HMMP include spills, leaks, fire, explosion, equipment failure, vehicle accident, a chemical reaction, natural disaster and employee exposure, accident, injury, or incident. Procedures presented in the HMMP give, in order, the basic steps to be followed for the emergency actions. For example, the procedure for a non-transportation-related spill, with no water contact, gives direction on how to:

- Assess and evaluate the (potential) hazard.
- Isolate and stop the flow the material.
- Apply proper absorbent or other material and contain waste generated during cleanup.
- Complete a scene-management checklist.
- Decontaminate and cleanup equipment used.
- Properly dispose any waste generated.

The HMMP also states that site personnel assessing and responding to emergency situations should make every effort to minimize impact to the surrounding environment.

These activities fall within Category Nos. 2, 3, 5, and 7 described in Section 3.3.1.

3.3.7 Unspecified Actions and Interim Measures

Additional studies and/or responses or corrective actions not identified in the actions specified above may occur prior to implementation of the final remedy. It is anticipated that these actions would be very similar to activities that have already occurred for investigative and response activities and would generally fall into any one or a combination of Category Nos. 1 through 7, as described in Section 3.3.1.

Preferably, construction and operation of these unidentified or unspecified activities would occur within areas that provide existing access, are already disturbed (e.g., those sites already impacted by investigative and response actions), and are limited to topographically flat sites to avoid or minimize additional landscape disturbances. Such activities may include, but are not necessarily limited to, new pipeline alignments, soil sampling and/or new extraction or injection wells. In addition, contingency activities may involve re-starting the IM No. 2 plant including associated batch treatment facilities and operations (e.g., storage tanks, trucking) focused on the MW-20 bench. These activities are described above in Section 3.2.5 and detailed further in Appendices B3 and B4.

To the maximum extent possible, such facilities and their associated activities would be designed, constructed, and implemented within previously-used areas. The project intent will be to avoid or minimize additional effects to listed species and all biological resources. It is estimated that an additional 4 acres (2 acres on the floodplain and 2 acres on the uplands) may be required to construct or implement unspecified/unidentified facilities and activities. Habitat loss is defined as the removal of trees and perennial shrubs. Therefore, of the estimated 4 acre total, the acreage of habitat lost would be substantially less due to the siting of activities within previously used areas and/or areas with little or no vegetation.

As with all future activities subject to this PBA and related Section 7 consultation, to avoid and/or minimize effects to listed species and their habitats, aggregate habitat loss thresholds of 2.5 acres for the floodplain and 3 acres for the uplands are hereby established to preclude any adverse effects to listed species. As noted above, habitat loss is defined as the removal of trees and perennial shrubs, and does not include trimming of vegetation. If the respective acreages are exceeded, consultation with the USFWS will be reinitiated to reassess the potential effects to listed species and consider possible mitigation. The above acreages do not imply project coverage or approval at the risk of other resources (e.g., cultural resources).

Unanticipated or currently unspecified activities not adequately described and assessed in this PBA may require additional Section 7 ESA consultation as determined by BLM and USFWS. The expected format of the required information would be similar to the technical memorandum provided previously that addressed the 2006 floodplain sampling procedures during the SWFL nesting season (CH2M HILL, 2006b). Specifically, subject field activities will be designed to minimize biological impacts, particularly those involving sensitive species listed under the Federal ESA.

ESA consultation will occur by applying the concept and practice of adaptive management, which accounts for uncertainties through a process of information feedback and subsequent

adjustments to management practices. Future activities not adequately specified in this PBA will integrate any new or updated information related to APE biology. All approvals by BLM and/or USFWS, including ESA clearance, will account for any new information and provide for additional management or mitigation measures as needed.

3.3.8 Restoration / Mitigation Activities

In accordance with agency conditions and direction, various restoration activities are planned throughout the APE. As investigative and response activities continue, additional restoration/mitigation measures may be required by the BLM or USFWS, should new information require the addition of these measures.

Restoration involves return of a project site or sites to prior topographic conditions and/or reestablishment of native vegetation in areas which were cleared for remedial or investigative activities. The cultural landscape is also considered. Restoration is anticipated to occur in four major areas, in addition to other offsite restoration activities and general debris removal throughout the APE. The approximate locations of these major restoration areas within the APE are shown on Figure 5. Restoration areas associated with the IM No. 3 project are considered priorities for implementation.

- IM No. 2 Batch Treatment Plant Decommissioning: Planned decommissioning of batch treatment facilities associated with IM No. 2. Limited earthwork is anticipated. Activities primarily involve the removal of existing facilities. The affected area is about 1.3 acres.
- IM No. 3 Staging Area: Restoration of topographic features and revegetation to replicate conditions prior to IM No. 3 implementation at the construction staging area and other areas used during construction. Restoration at the IM No. 3 construction staging area specifically will include fill removal and soil contouring to restore preconstruction topographic contours and drainage patterns. The affected area is about 0.9 acre.
- East Mesa and West Mesa: These two IM No. 3 injection wellfield areas will be restored to conditions occurring prior to injection well drilling. Primary restoration activities involve revegetation with limited earthwork required. The acreage of the East and West Mesa is about 1.4 and 0.6 acres, respectively.
- City of Needles Electric Areas: Restoration of areas affected by offroad access in March 2005 (not shown on Figure 5). Little or no earthmoving activities are involved in these efforts.
- Potential cleanup of debris located within the APE (e.g., removal of scrap metal, wood, brick, plastic, or similar materials) in accordance with the RFI/RI (these areas are not shown on Figure 5).

If the amount of habitat disturbance for project implementation or restoration exceeds a total of 2.5 acres on the floodplain and 3 acres on the uplands, consultation with the USFWS will be reinitiated to reassess the potential effects to listed species.

These activities fall within Category No. 6, as described in Section 3.3.1.

3.4 General Project Management Measures

Similar to the approval of past activities within the APE, approval of planned future activities are expected to be consistent with the substantive intent of current mitigation measures applied by BLM and USFWS to investigative and interim measures/removal actions as stipulated in BLM Action Memorandum dated Sept. 17, 2004. In addition to the measures noted below, project activities could also be subject to other regulatory requirements including, but not necessarily limited to, California Fish and Game Code Section 1600 et seq. and the requirements of the California Endangered Species Act. Further, prior to the approval of field activities, the BLM and/or USFWS will engage in consultation with the Native American community. The consultation typically includes nine local tribes.

To clarify existing BLM mitigation measures, March 15 through September 30 was established to delineate the migratory bird nesting season and May 1 through September 30 was established to signify the nesting period for the SWFL. During these periods, a biological monitor would be in the field to conduct preconstruction surveys for nesting birds and USFWS-approved surveys would be conducted annually for the presence of SWFLs. In addition, February 1 through May 31 is established as conservation dates to identify the up/down river migration and spawning period for razorback suckers and bonytail chubs.

General management measures, also referred to as "Mitigation Measures, Lake Havasu Field Office" will apply to future field activities are listed below:

1. All project activities will be conducted in a manner that avoids take of a federally listed species. Take is defined to include any harm or harassment , including significant habitat modification or degradation potentially kill or injure listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Should a listed species enter the project site or become harmed or killed by project activities, the project shall be shut down and the USFWS, BLM, and CDFG shall be consulted. Impacts to habitat will also be minimized to the maximum possible extent.

2. PG&E shall designate a field contact representative (FCR) who will be responsible for overseeing compliance with the mitigation measures. The FCR must be onsite during all construction activities. The FCR shall have authority to halt activities that are in violation of the mitigation measures and/or pose a danger to listed species. The FCR will have a copy of the mitigation measures when work is being conducted on the site. The FCR may be a project manager, PG&E representative, or a biologist.

3. PG&E shall have a qualified biologist responsible for assisting crews in compliance with the mitigation measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist shall be implemented for special-status wildlife species in impact areas immediately prior to initiation of ground-disturbing activities. The inspection shall provide 100 percent coverage of the area within the project limits. Any desert tortoise burrows and pallets outside of, but near, the project footprint shall be flagged at that time so that they may be avoided during work activities. At conclusion of work activities, all flagging shall be removed.

4. Listed species, including the desert tortoise, shall not be handled or harassed. Encounters with a listed species shall be reported to the project biologist and BLM Lake Havasu biologists. These biologists will maintain records of all listed species encountered during project activities. This information will include for each individual: the locations (narrative, vegetation type, and maps) and dates of observations; general conditions and health; any apparent injuries and state of healing; and diagnostic markings.

5. All PG&E employees and the contractors involved with the proposed project shall be required to attend PG&E's threatened and endangered species education program prior to initiation of activities. New employees shall receive training prior to working onsite.

6. To the maximum extent possible, facilities (treatment facility, pipelines, injection wells, and access routes) shall be sited within an existing right–of-way (ROW) and previously disturbed or barren areas to limit new surface disturbance.

7. Existing routes of travel to and from the proposed project site shall be used. Cross-country vehicle and equipment use shall be prohibited.

8. Trash and food items shall be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as common ravens (*Corvus corax*), coyotes (*Canis latrans*), and feral dogs.

9. To minimize effects, lights shall be angled toward the ground, reduced in intensity to levels compatible with safety concerns, and limited in duration of usage. The hue of lighting shall be that which is most compatible with and least disturbing to wildlife.

10. Employees shall not bring pets to the project site.

11. Firearms shall be prohibited from the project site, except as required for security employees.

12. Employees shall be required to check under their equipment or vehicle before it ismoved. If a desert tortoise or other wildlife is encountered under vehicles or equipment, the vehicle shall not be moved until the animal has voluntarily moved to another location, or to a safe distance from the parked vehicle.13. Upon project completion, all unused material and equipment shall be removed from the site. This condition does not apply to fenced sites.

13. Upon completion, all unused material and equipment shall be removed from the site. This condition does not apply to fenced areas.

14. Palo verde, ocotillo, mesquite, cat-claw, smoke tree, and cacti species are considered sensitive by the BLM. To the extent practicable, these species shall be avoided. If avoidance is not possible, these species shall be transplanted when practical. Should any of the aforementioned plants be destroyed, they shall be replaced.

15. The area of disturbance shall be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors. As needed, work area boundaries shall be

delineated with flagging or other marking to minimize surface disturbance associated with vehicle straying.

16. Activities shall be restricted to a pre-determined corridor. If unforeseen circumstances require project expansion, the potential expanded work areas shall be surveyed for listed species prior to use of the area. All appropriate mitigation measures shall be implemented within the expanded work areas based on the judgment of the agencies and the project biologist. Work outside of the original ROW shall proceed only after receiving written approval from the BLM, Fish and Wildlife Service (Service) and CDFG describing the exact location of the expansion.

17. PG&E has the option of erecting desert tortoise fencing in lieu of inspection open trenches If the trench is short, personnel may monitor the trench. All open holes and trenches shall be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum. During excavation of trenches or holes, earthen ramps shall be provided to facilitate the escape of any wildlife species that may inadvertently become entrapped. If desert tortoises are trapped, the project biologist shall be notified immediately. The desert tortoise shall be allowed to escape before work continues in that location. A final inspection of the open trench segment shall also be made immediately before back filling. All open pipe segments shall be covered when work activity is not occurring at the site.

18. All construction vehicles and equipment shall be periodically checked to ensure proper working condition and to ensure that there is no potential for fugitive emissions of oil, hydraulic fluid, or other hazardous products. The BLM shall be informed of any hazardous spills.

19. Workers shall exercise caution when traveling to and from the APE. To minimize the likelihood for vehicle strikes of listed species, speed limits when commuting to project areas on ROW roads shall not exceed 20 miles per hour.

20. Intentional killing or collection of either plant or wildlife at construction sites and surrounding areas shall be prohibited. The BLM shall be notified of any such occurrences.

21. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E shall notify the BLM within 48 hours. As a part of this emergency response, the BLM may require specific measures to protect listed species. During cleanup and repair, the agencies may also require measures to recover damaged habitats.

22. Once the treatment facility is no longer needed, PG&E shall restore disturbed areas in a manner that will assist in the reestablishment of biological values within the disturbed ROW. Methods of such restoration shall include the reduction of erosion, re-spreading of top two inches of soil, planting with appropriate native shrubs, and scattering of bladed vegetation and rocks across the ROW, depending upon the appropriateness or effectiveness in a given area.

23. Within 60 days of completion of construction activities, the FCR and biologist shall prepare a brief report for the BLM documenting the effectiveness and practicality of the mitigation measure and making recommendations for modifying the measures to enhance species protection. The report will also provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.

24. Any future construction during August for most birds, will require preconstruction surveys for nesting pairs, nests and eggs. These preconstruction surveys shall occur in areas proposed for any vegetation removal and active nesting areas flagged. If nesting birds are detected, vegetation removal be avoided during the nesting season. All construction activity within 200 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests.

25. All areas within the proposed action areas, subject to operations and maintenance activities, and within the potential impact of the action, shall be monitored annually during the active period for tortoise by a biologist knowledgeable of desert tortoise ecology. Surveys shall be completed throughout the duration of the action to verify the presence or absence of desert tortoise and reports shall be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.

26. Riparian areas surrounding the proposed action site and subject to influence of operations and maintenance activities shall be surveyed for southwestern willow flycatcher according to the protocol established by the USFWS. These surveys shall be completed each year by a biologist permitted by the USFWS to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports shall be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.

27. Upon locating an individual of a dead or injured listed species, PG&E shall make initial notification to the BLM and US Fish and Wildlife (Service) within three working days of its finding. The notification must be made by telephone and writing to the Lake Havasu BLM Office (2610 Sweetwater Avenue, Lake Havasu City, Arizona 86406, 928-505-1200) and the Phoenix Fish and Wildlife Office (2321 West Royal Palm Road, Suite 103, Phoenix, AZ 85021, 602-242-0210). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities shall be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the CDFG and the BLM shall be contacted for final disposition of the animal.

28. PG&E will immediately notify the BLM Lake Havasu Field Manager (or his designated representative) of any cultural resources (prehistoric/historic sites or objects) and/or paleontological resources (fossils) encountered during permitted operations and will maintain the integrity of such resources pending subsequent investigation. All operations in the immediate area of the discovery must be suspended until written authorization from BLM to proceed is issued. An evaluation of the discovery shall be

made by a qualified archaeologist or paleontologist to determine appropriate actions to prevent the loss of significant cultural or scientifically important paleontological values.

29. No permanent improvements that affect the integrity of the bridge/culvert over Bat Cave Wash on historic Route 66 shall be implemented.

30. Actions that result in impacts to archaeological or historical resources are subject to the provisions of the Archaeological Resources Protection Act of 1979, as amended, and the Federal Land Policy and Management Act of 1976.

4.0 Biological Setting and Environmental Baseline

This section describes the biological setting and environmental baseline in the APE. The information in this section was obtained from several sources that may be found in Section 7.0.

4.1 Biological Setting

The APE is located approximately 15 miles to the southeast of the City of Needles along Interstate 40 in the easternmost portion of San Bernardino County, California (see Figure 1). Agriculture and public lands dominate the surrounding area. The APE includes areas within both California and Arizona (see Figure 2). The state boundary is located within the Colorado River, as shown on Figure 2. West of the Colorado River, the topography is abrupt, rising from around 450 feet msl at the river to over 1,200 feet above msl within 1 mile to the south and southwest. Slopes encountered west of the Colorado River reflect a series of ancient river terraces. East of the Colorado River within the HNWR (see Figure 2), dredge spoils rise approximately rise 30 feet above the river surface forming a mound of sand and tamarisk that gradually slopes back to water level and emergent vegetation at the Topock Marsh further east.

The Colorado River is the primary aquatic habitat located approximately 1,300 feet east of the Topock Compressor Station. The river is approximately 700 to 900 feet wide and 8 to 15 feet deep at this location (E&E 2000). Flood Insurance Rate Mapping is available on the Arizona-side of river (Panel No. 040058215C). However, mapping on the California side of the river (Panel No. 06071C5725) is not available. The interpretation of this limited information is that the 100-year floodplain elevation in the vicinity of the APE is approximately 460 feet msl based on information from the Flood Insurance Rate Mapping map that indicates a Zone A 100-year flood elevation in the Topock Marsh of 460 feet (Matt Johns, CH2M HILL, personal communication, 2006). Within the APE, the 460-foot contour is generally located on the Colorado River floodplain within approximately 30 feet of the river channel. However, in the vicinity of the BNSF Railway and Interstate 40 bridge crossings, the 460-foot contour extends approximately 300 feet from the river channel as evidenced by the dense vegetation in this area. East of the River, the 100-year floodplain encompasses the majority of the Topock Marsh.

Little to no submergent vegetation exists within the Colorado River. Small patches of emergent vegetation along the banks consist of common reed (*Phragmites communis*), cattails (*Typha* sp.), sedges (*Carex* sp.), and bulrush (*Scirpus* sp.). Several of these wetland patches are located at the confluence of Bat Cave Wash, near Moabi Regional Park, and the mouth to Topock Marsh. Larger wetlands and marshes exist along the eastern bank of the peninsula north of the Topock Marina. The Topock Marsh, extending northeast of the APE within the HNWR, provides important aquatic marsh and riparian habitat in the local vicinity. The

Colorado River functions as an important corridor for fish and migratory birds (CH2M HILL, 2004b, 2005a-d, g, i, 2006a-b; E&E, 2000).

Terrestrial habitats, typical of Mojave Desert uplands, in the APE consist of creosote bush scrub, Mojave wash, desert riparian, and tamarisk thicket. The dominant upland plant community is creosote bush scrub. The area is sparsely vegetated with widely distributed creosote bushes (*Larrea tridentata*). Other plant species that occur within this plant community include burrobush (*Ambrosia dumosa*), allscale (*Atriplex polycarpa*), split grass (*Schismus* sp.), spineflower (*Chorizanthe* sp.), desert trumpet (*Eriogonum inflatum*), beavertail cactus (*Opuntia basilaris*), golden cholla (*Opuntia echinocarpa*), brittlebush (*Encelia farinosa*), cheesebush (*Hymenoclea salsola*), dalea (*Dalea mollisma*), red barrel cactus (*Ferocactus pilosus*), sweetbush (*Bebbia juncea*), and ratany (*Krameria erecta*) (CH2M HILL, 2004b, 2005a-d, g, i, 2006a-b; E&E, 2000). The creosote bush and salt bush scrub plant communities comprise approximately 974 acres within the APE (Figure 6).

West of the Colorado River, the Mojave Wash habitat type is comprised of Bat Cave Wash and the other unnamed washes in the area. Bat Cave Wash is an ephemeral drainage that extends from the Chemehuevi Mountains to the Colorado River approximately 3,500 feet north of the Topock Compressor Station. Although this wash may periodically flood during stormwater runoff events, it remains dry throughout most of the year due to arid desert conditions. The wash floor is relatively barren of vegetation and consists of sand, gravel, and cobblestone substrate. Although the drainages occur within the creosote bush scrub plant community, several native tree species are associated with the washes including palo verde (*Cercidium* sp.), acacia (*Acacia greggii*), mesquite (*Prosopis* sp.), and smoke tree (*Dalea spinosa*). Desert riparian vegetation is predominately present at the confluence of Bat Cave Wash and the Colorado River. This plant community consists of scattered mesquite, palo verde, and salt cedar (*Tamarix* sp.) (CH2M HILL, 2004b, 2005a-d, g, i, 2006a-b; E&E, 2000). The salt cedar and mesquite combination plant community comprises approximately 3 acres within the APE on the California side of the River (Figure 6).

East of the Colorado River, the APE is a sand and salt cedar environment very similar to that found of the floodplain on the California side. North of the Topock Marina is an approximately 120-acre peninsula bordered by water to the west, south, and east. This area is within the HNWR and is also the southern portion of the Topock Marsh. The Topock Marsh is an extensive wetland community that extends from approximately the BNSF Rail northward for about 10 miles beyond the APE to the Fort Mojave Indian Reservation.

South of the Topock Marsh and the HNWR is the Topock Marina and other private property totaling approximately 30 acres. Development on the property includes the marina, multiple trailer sites, a restaurant, and residential dwellings. Also crossing this property is the BNSF railroad tracks, the Interstate 40, and natural gas transmission lines. The marina, restaurant and trailer sites are located near the mouth to the Topock Marsh. The residential dwellings and gas transmission lines are located just south of the Interstate 40. The habitat ranges from riverine to dry uplands and is highly altered to facilitate human occupation, transportation and energy transmission needs. Land use in the area is discussed in more detail in Section 3.1.

Salt cedar (also referred to as tamarisk) thicket is the dominant plant community along the Colorado River floodplain. This invasive, exotic plant species has displaced native plant

species. This plant community consists of dense monotypic stands of salt cedar with an understory of arrowweed (*Pluchea sericea*). The salt cedar and arrowweed plant communities comprise approximately 349 acres within the APE (Figure 6).

The aquatic habitat of the Colorado River supports several game fish species including striped bass (*Morone saxatillis*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), white crappie (*Pomoxis annularis*), flathead catfish (*Pylodictis olivaris*), and channel catfish (*Ictalurus punctatus*) (CH2M HILL, 2004b, 2005a-d, g, i, 2006a-b; E&E, 2000).

Avian species commonly associated with the river include American coot (*Fulica americana*), mallard (*Anas platyrhynchos*), pied-billed grebe (*Podilymbus podiceps*), great egret (*Casmerodius albus*), great blue heron (*Ardea herodias*), northern rough-winged swallow (*Stegidopteryx serripennis*), and belted kingfisher (*Ceryle alcyon*). Other avian species found in the upland areas include red-tailed hawk (*Buteo jamencensis*), Gambel's quail (*Callipepla gambelii*), mourning dove (*Zenaida macroura*), common raven (*Corvus corax*), song sparrow (*Melospiza melodia*), Canyon wren (*Catherpes mexicanus*), brewer's blackbird (*Euphagus cyanocephalus*), great-tailed grackle (*Quiscalus mexicanus*), turkey vulture (*Cathartes aura*), greater roadrunner (*Geococcyx californianus*), lesser nighthawk (*Chordeiles acutipennis*), and rock dove (*Columba livia*) (CH2M HILL, 2004b, 2005a-d, g, i, 2006a-b; E&E, 2000).

Mammals that may occur in the APE include deer mouse (*Peromyscus maniculatus*), Merriam kangaroo rat (*Dipodomys merriami*), whitetail antelope squirrel (*Ammospermophilus leucurus*), desert woodrat (*Neotoma lepida*), California ground squirrel (*Spermophilus beecheyi*), desert cottontail (*Sylvilagus audubonii*), and black-tailed hare (*Lepus californicus*), coyote (*Canis latrans*), desert kit fox (*Vulpes macrotis*), American badger (*Taxidea taxus*), bobcat (*Lynx rufus*), stripped skunk (*Mephitis mephitis*), beaver (*Castor canadensis*), and raccoon (*Procyon lotor*) (CH2M HILL, 2004b, 2005a-d, g, i, 2006a-b; E&E, 2000).

Reptiles that may occur in the area include chuckwalla (*Sauromalus obesus*), side-blotched lizard (*Uta stansburiana*), western whiptail lizard (*Cnemidophorus tigris*), zebra-tailed lizard (*Callisaurus draconoides*), desert iguana (*Dipsosaurus dorsalis*), coachwhip (*Masticophis flagellum*), gopher snake (*Pituophis melanoleucus*), and western diamondback rattlesnake (*Crotalus atrox*) (CH2M HILL 2004b, 2005a-d, g, i, 2006a-b; E&E 2000).

4.2 Environmental Baseline

The APE lies within a larger area of significant cultural and sacred tribal resources. In addition, the Colorado River itself is of spiritual and cultural importance to local tribes (Applied Earthworks, 2004; CH2M HILL, 2004a). Over time, the Colorado River corridor has undergone many changes influenced by past and present federal, state, or private actions, which comprise the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation process (50 CFR 402.02). However, for purposes of this PBA, ongoing activities discussed under Section 3.2 (Past and Present Activities) are assessed for potential impacts to listed species and are included in the related ESA consultation.

By 1852, the first steamboat traveled up the Colorado River to resupply Fort Yuma. This marked the beginning of the steamboat trade that would have profound effects on the mature riparian areas along the river (Lingenfelter, 1978). The Colorado River Gold Rush began in 1862 (Lingenfelter, 1978). The gold rush fueled steamboat trade along the lower Colorado River. Initially, downed, dried cottonwood, willow, and mesquite trees were used as fuel for the steamboats (Ives, 1861). Increased river traffic soon used all of the available wood debris, and crews began cutting down large quantities of cottonwoods, willows, and mesquites. By 1890, most of the large cottonwood-willow stands and mesquite bosques had been cut down (Ohmart et al., 1988; Grinnell, 1914). The railroad crossing at Needles by the Atlantic and Pacific Railroad in 1883 resulted in the end of steamboat trade along the lower Colorado River (LaRue, 1916).

By the late 1800s, salt cedar was introduced into the United States as an ornamental tree and soon it escaped cultivation. Expansion of its range was rapid by the early 1900s (DeLoach, 1989). By 1920, salt cedar appeared along the mainstem of the Colorado River (Ohmart et al., 1988). This species adapted to the altered riverine ecosystem and displaced native riparian species throughout the lower Colorado River. Important wildlife habitats, including the cottonwood-willow gallery forests, have all but disappeared from the Colorado River and have been replaced by the less desirable salt cedar (Anderson and Ohmart, 1984).

In 1910, Joseph Grinnell led a 3-month expedition from Needles to Yuma to collect data on mammals, birds, and associated habitats. The expedition provided one of first detailed accounts of the flora and fauna of the lower Colorado River. Grinnell documented the loss of riparian habitat to agriculture during his expedition (Grinnell, 1914).

Starting in the 1930s, federal actions consisted of the channelization of the Colorado River and the construction of several dams, including the Hoover Dam, Parker Dam, and Davis Dam. The changes to the natural river flows significantly altered available fish habitats and reduced the river's ability to meander and create or destroy backwaters and marshes. Alleviating the threat of floods also allowed for conversion of riparian areas to agricultural uses. In addition, USBR implemented intermittent riverbank stabilization and dredging programs from 1951 to today. As part of the mitigation for the various river control projects, USBR has undertaken to improve and enhance backwater and marsh areas (USBR, 1996, 2000, 2002, 2004).

Specific to the APE, several past activities have occurred within or adjacent to the site. In the southern section of the APE, PG&E owns and operates a compressor station and gas transmission line (Figure 2). A biological opinion was obtained to cover the operations and maintenance of this facility and associated pipelines (USFWS, 2000a). Ongoing and planned investigative and remedial activities are related to an existing chromium plume in groundwater (Figure 2). As described in Section 3.2.6, a groundwater treatment facility was recently constructed on land owned by PG&E (Figure 3), along with associated groundwater wells within the upland and floodplain (see IM No. 3 discussion in Section 3.2.6 and Appendix C for additional details). Near the treatment facility, there is evidence of an old abandoned quarry pit and World War II-era military training exercises. A major gas utility and travel corridor are located between the compressor station and treatment facility. The corridor includes Interstate 40, BNSF railroad, and four natural gas transmission lines (Figure 2). A substantial amount of train and vehicular traffic and associated noise and air emissions are generated along this corridor. Also intersecting the APE are several

alignments of Historic Route 66, which attracts tourists to the APE and vicinity. Moabi Regional Park, managed by San Bernardino County, is located in the far northern section of the APE. This regional park contains facilities for mobile homes, campers, and boaters. A marina leads into the park from the Colorado River. The small town of Topock, with several mobile homes, a restaurant, and marina, is located along the southeastern section of the APE in Arizona (Figure 2).

The proposed project is within the HNWR. Recreational activities within the HNWR include sightseeing, boating, bird watching, fishing, hunting, and camping. Prior damming and channelization of the Colorado River have significantly altered the aquatic, marsh, and riparian habitats associated with the river. These water control and diversion actions have also contributed to increased housing development along the river and facilitated an increase in the intensity of river-related recreation (including watercraft, fishing, and hunting) (USBR, 1996, 2000, 2002, 2004).

The Colorado River has been stocked with various game fish that have been linked to predation of native listed fish species (USBR, 2004). The invasion of salt cedar along the Colorado River has significantly altered riparian habitat. This exotic tree dominates and displaces native plant communities. The USBR is responsible for managing the river and has consulted with USFWS on its actions (USBR, 1996, 2000, 2002, 2004). Several biological opinions have been issued to the USBR (USFWS, 1997a-b, 2002, 2005a). A Multi-Species Conservation Plan (MSCP) and Multi-Species Habitat Conservation Plan (MSHCP) recently have been developed for the Colorado River (USBR, 2004).

5.0 Species and Habitat Description, Effects of the Action, and Relevant Reports

5.1 Introduction

This section describes the status, natural history, distribution, and abundance of federally listed species that may occur or are known to occur within or near the APE. This section also analyzes the potential effects to each species and its critical habitat resulting from on-going and future investigative and interim remedial activities that may occur prior to the implementation of the final remedy. Table 1 provides a list of planned activities and a summary of the area estimated to be used during implementation. A background search of available documents and databases was performed in preparation for this PBA and the information in this section was obtained from several sources (AGFD, 2004; USBR, 1996, 1999, 2000, 2002, 2004; CNDDB, 2003; CDFG, 2003; CH2M HILL, 2004b, 2005 a-h, 2006a-c; E&E, 2000; USFWS, 2004; USFWS, 2005a).

In March 2005, a work plan was produced and submitted to USFWS, BLM, and California Department of Fish and Game representatives describing proposed surveys within suitable habitat for the SWFL, Mojave desert tortoise, and Yuma clapper rail within the APE (Figure 7) (CH2M HILL, 2005a). Surveys were proposed according to USFWS-approved protocols (Sogge et al., 1997; USFWS 1990c; USFWS 2000b). The 2005 and 2006 flycatcher and tortoise surveys were conducted in accordance with these protocols (GANDA, 2005a-b and 2006a-b), and a brief summary of the survey results are included in this section. Based on prior discussions, PG&E received a letter from USFWS HNWR staff in January 2005 requesting that protocol surveys for clapper rail not be performed because HNWR staff were interested in avoiding duplication of prior USFWS survey efforts and were concerned with potential added stress to the clapper rail (USFWS, 2005c). Accordingly, PG&E did not perform surveys for this species. The USFWS stated that it would share data collected from the 2004 and 2005 surveys with PG&E. The USFWS data results are briefly summarized in this section (USFWS, 2005d; Fitzpatrick, 2006). The 2005 work plan and survey reports are attached to this PBA as Appendix E. Overall the management measures identified in Section 3.4 are intended to avoid, reduce, or mitigate potential direct, indirect, and cumulative effects to these species and habitats.

5.2 Terrestrial

5.2.1 Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

5.2.1.1 Status

The SWFL (*Empidonax traillii extimus*) was listed as federally endangered on February 27, 1995 (USFWS, 1995). Critical habitat was designated on October 19, 2005 (USFWS, 2005b). The SWFL Recovery Plan was released on March 5, 2003 (USFWS, 2003). The SWFL was listed as endangered by the state of California in 1991.

Several factors have caused the decline in SWFL populations. Extensive areas of suitable riparian habitat have been lost due to river regulation and channelization, agricultural and urban development, mining, road construction, and overgrazing (Tibbitts et al., 1994). As a result of habitat fragmentation, cowbird (*Molothrus ater*) nest parasitism has increased. The invasion of the exotic tamarisk has also altered the riparian ecosystem in the Southwest. Willow flycatcher nesting has been documented in tamarisk stands along the Colorado River. Many of the observations of SWFL since 1993 have occurred in habitat dominated by tamarisk (Koronkiewicz et al., 2005). This provides strong evidence that successful breeding is occurring in tamarisk on the Lower Colorado River. Because of low population numbers rangewide, identifying and conserving SWFL breeding sites is thought to be crucial to the recovery of the species (USFWS, 2003).

5.2.1.2 Natural History, Distribution, Abundance and Habitat

The SWFL is one of four subspecies of willow flycatcher. *Empidonax* flycatchers are noted for their physical similarities and the difficulty in identifying individuals in the field. This species is a small bird, approximately 14.6 centimeters (5.75 inches) long, with a grayish-green back and wings, whitish throat, light grey-olive breast, and pale yellowish body. Two white wing bars are visible. The upper mandible is dark, the lower is light. The most distinguishable taxonomic characteristic of the SWFL is the absent or faintly visible eye ring. This willow flycatcher can be differentiated from other species by its distinctive "fitz-bew" song. As an insectivore, it forages within and above dense riparian vegetation taking insects on the wing and gleaning them from the foliage. It also forages along water edges, backwaters, and sandbars adjacent to nest sites (Tibbitts et al, 1994). The current estimate of the rangewide SWFL population is between 1,100 and 1,200 pairs/territories (Koronkiewicz et al., 2005). From 1997 to 2004, breeding populations of SWFL were documented at seven study areas along the Virgin and Lower Colorado Rivers and tributaries (Koronkiewicz et al., 2005).

The SWFL breeds in dense riparian habitats in all or part of seven southwestern states, from sea level in California to over 2,600 meters (8,550 feet) in Arizona and southwestern Colorado (Sogge et al., 1997). This particular species breeds only in dense riparian vegetation near surface water or saturated soil. Along the Colorado River , they may typically nest in riparian habitat characterized by a dense stand of intermediate-sized shrubs or trees, such as willows (especially *Salix gooddingii*), *Baccharis*, or arrowweed (*Pluchea sericea*), usually with an overstory of scattered larger trees, such as cottonwoods (*Populus fremontii*). Occupied habitat always has dense vegetation in the patch interior regardless of the plant composition and height. These dense patches are often interspersed with small openings, open water, or sparser vegetation, creating a mosaic that is not uniformly dense (Sogge et al., 1997).

Riparian patches used by breeding flycatchers vary in size and may be a relatively dense, linear, contiguous stand or an irregularly shaped mosaic of dense vegetation with open areas. SWFLs are known to nest in patches as small as 0.8 hectare (2 acres) to as large as several hundred hectares (Sogge et al, 1997). The mean size of flycatcher breeding habitat patches is 8.5 hectares (21.2 acres) (Sogge et al, 1997; USFWS, 2003). Habitat patches as small as 0.5 hectare (1.23 acres) may support one or two nesting pairs (USFWS, 1995). Sogge et al. (1993) found territorial flycatchers in habitat patches ranging from 0.5 to 1.2 hectares (1.23 to

2.96 acres). However, this species has not been observed nesting in narrow, linear riparian habitats that are less than 10 meters (30 feet) wide, although they may use such linear habitats during migration (Sogge et al., 1997; USFWS, 2003). In the southwest, several willow flycatcher breeding territories are found within small breeding sites containing five or fewer territories; only two sites are known to have 50 or more territories (Gila and Rio Grande). The Hoover to Parker Management Unit that includes the Topock Marsh contains approximately 21 territories (Sogge et al., 2003).

Nesting habitat almost always contains or is adjacent to water or saturated soil. With the loss of preferred habitat throughout the southwest, SWFL have been observed using tamarisk thickets for nesting. Nearly 50 percent of willow flycatcher territories occur in mixed native/exotic habitat, and 25 percent are at sites where tamarisk is dominant (Sogge et al., 1997). Flycatchers nest in tamarisk at many river sites and, in many cases, use tamarisk even if native willows are present. Tamarisk eradication can be detrimental to willow flycatchers in mixed and exotic habitats, especially in or near occupied habitat or where restoration is unlikely to be successful. Risks to the flycatcher increase if the tamarisk control projects are implemented in the absence of a plan to restore suitable native riparian plant species or if site conditions preclude the reestablishment of native plant species of equal or higher functional value. Threats also increase if the eradication projects are large-scale, thus possibly setting the stage for large-scale habitat loss (USFWS, 2005a).

Migrant SWFLs may occur in nonriparian habitats and riparian habitats unsuitable for breeding. These migration stopover areas, even though not used for breeding, may be critically important sites affecting local and regional flycatcher productivity and survival (Sogge et al., 1997). One of the last long-distance, neo-tropical migrants to arrive in North America during spring migration, willow flycatchers have a short (approximately 100-day) breeding season, with individuals typically arriving in May or June and departing in late August. All four subspecies of willow flycatchers spend the non-breeding season in portions of southern Mexico, Central America, and northwestern South America. Willow flycatchers have been recorded on the wintering grounds from central Mexico to southern Central America as early as mid-August, and wintering resident individuals have been recorded in southern Central America as late as the end of May.

5.2.1.3 Recent Findings

The APE is located between two SWFL study areas—the Topock Marsh and Topock Gorge. In 2004, USBR contracted Steven W. Carothers and Associates (SWCA) to perform surveys for SWFL at these study areas. During this survey, SWCA recorded 65 and three SWFL individuals within Topock Marsh and Topock Gorge, respectively (Koronkiewicz et al., 2005).

Nesting and migratory habitat for the SWFL exists within and near the APE. The nesting and migratory period for SWFLs occurs May (arrival) through September (departure). Tamarisk and arrowweed are the dominant vegetation types within the portion of the APE that is associated with the Colorado River floodplain. The dense tamarisk thickets are considered suitable nesting, roosting and foraging habitat for willow flycatchers.

East of the river, suitable nesting habitat exists in the Topock Marsh where nesting pairs of SWFLs have been documented within 4 miles of the APE. Along the northeastern edge of

the APE exists a contiguous band of suitable habitat (approximately 42 acres) that could support a nesting pair of SWFLs (Figure 7). However, the annual protocol surveys conducted in 2005 and 2006 have not documented SWFLs nesting in this area. The topography along this peninsula from west to east consists of rolling sand dunes increasing in elevation from the levee road to an additional 20 feet and decreasing to tamarisk thicket and eventually to marsh habitat.

Within the APE and west of the Colorado River, less suitable SWFL nesting habitat exists that may be used for roosting and foraging during migration. These thickets are concentrated below the BNSF Railway and Interstate 40 bridge (approximately 6 acres), near the Bat Cave Wash and Colorado River confluence (approximately 5 acres), near the unnamed wash and Colorado River confluence directly northwest of Bat Cave Wash (approximately 3 acres), and near Park Moabi Marina (approximately 7 acres) as shown on Figure 7. Each of these tamarisk thickets constitute a very small portion of the total APE, ranging from about 0.5 percent to 2.0 percent of the APE as shown in Table 2. These patches tend to be fragmented and subject to human disturbance, two factors that may decrease the habitat value for the species (GANDA, 2005b).

While tamarisk thicket habitat exists in the APE, this species is not expected to nest within or directly adjacent to the APE based on past USBR annual surveys that indicate flycatchers are selecting the higher-quality habitat at the Topock Marsh and Gorge (Koronkiewicz et al., 2005). Although tamarisk habitat exists within the APE, the vegetation density, habitat structure, and patch-size of thickets are sparser, smaller, and more fragmented in comparison to observed/known breeding habitat within the Topock Marsh. Additionally, SWFLs are not known to nest in mesquite, palo verde, and acacia trees (Sogge et al., 1997), which are the other tree species in the APE. Furthermore, there is no known breeding habitat within the APE where flycatcher reproductive success and survivorship has resulted in a stable or growing population.

To assess SWFL presence or absence, PG&E contracted GANDA in 2005 and 2006 to perform USFWS protocol surveys of potential suitable habitat within the APE. (Figure 7; CH2M HILL, 2005b; GANDA, 2005b). The methodology followed the protocol for project related surveys that recommends five surveys be conducted during three survey periods, with three surveys occurring during the last survey period. These periods are from May 15 to 31, June 1 to 21, and June 22 to July 17 (Sogge et al., 1997; USFWS, 2000b). On June 7, 2005, one possible willow flycatcher was detected near Moabi Regional Park. Although the bird was visually identified as a willow flycatcher, the distinctive "fitz-bew" call required for positive identification was not heard. This bird was possibly a transient since there were no subsequent detections of this species (GANDA, 2005b). Other than this single observation, no other willow flycatchers were seen or heard during the 2005 protocol survey of the APE. (Appendix E).

In 2006, the protocol surveys for the SWFL were repeated within the APE. The methodology was identical to the survey conducted in 2005. Results of the survey reported no detection of SWFLs within the APE during this period (GANDA, 2006b).

Additionally, biological monitors have logged several hundred hours in performing preactivity surveys on the California floodplain in compliance with the mitigation measures

detailed in Section 3.4 and the revised well sampling procedures. These surveys required that a qualified biologist monitor a 200-foot circle for migratory bird nests around the work area prior to construction related activities. This monitoring occurs from March 15 – September 30. To date, no active nests of any migratory birds have been documented.

5.2.1.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Specific actions occurring within or adjacent to suitable habitat in the floodplain have the potential to affect the species. This includes the floodplain groundwater monitoring programs, IM No. 3 floodplain operations, floodplain soil sampling, floodplain well installations, floodplain in-situ pilot study, seismic bedrock studies, slant drilling, activities similar to the pore water study, and floodplain restoration.

The following activities are not expected to have an effect to this species due to unsuitable habitat at the specific project location: IM No. 2 decommissioning, IM No. 3 upland operations, upland soil sampling, *in-situ* upland pilot study, and upland restoration including the MW-20 bench and IM No. 3 staging area. These sites are located within the upland that does not support the riparian vegetation and other characteristics commonly associated with flycatcher habitat.

The project activities proposed by PG&E will occasionally involve the use of heavy equipment including, but not limited to, backhoes and drill rigs that may be used to remove vegetation, grade the ground surface, and drill groundwater monitoring wells within the floodplain. This equipment can create substantial ground disturbance and noise.

Operational activities associated with monitoring the wells include personnel collecting water samples weekly, biweekly, or monthly. A small hand-held generator may be used for power to activate the submersible pumps during water collection. The generators' noise output is minimal enough that a conversation can occur. If these activities are performed within or adjacent to suitable flycatcher habitat, this action may lead to alterations of SWFL behavior. However, the lack of SWFL presence within the APE suggests that the probability of negatively altering SWFL behavior during operations and any future construction-related activities would be low. Further, the magnitude of project effects may be difficult to discern from other potentially impacting transportation activities (i.e., the Interstate-40 and the BNSF Railroad) and recreational activities (e.g., watercraft) that occur with regularity within the APE.

The Colorado River may function as a migration corridor for the SWFL. During migration periods, this species may briefly stop to roost and/or forage within or adjacent to the APE. Potential roosting and foraging habitats include the tamarisk patches located at Bat Cave Wash and an adjacent unnamed wash, under the BNSF railroad and Interstate 40 overpasses, near Park Moabi Regional Park, and the eastern edge of the APE (Figure 6) (CH2M HILL, 2005a-b). Because flycatchers may potentially use the habitat in the APE for roosting and foraging during the spring and fall migration seasons, it is possible that operational activities could alter the behavior of migrating individuals, but as discussed, the potential for impact is considered low. The greatest potential for direct effects to SWFL would be within the short migratory period during arrival (May – June) and departure (July

– September) when individuals could be passing through the APE to/from more suitable nesting locations.

Potentially suitable habitat for SWFL nesting exists within the 42 acres along the eastern edge of the APE located on the HNWR in Arizona. Habitat elements such as patch size, shrub density and the presence and/or location of water provide the appropriate habitat structure and features to allow for this behavior. However, annual surveys conducted in 2005 and 2006 have not documented any nesting or presence of SWFLs utilizing this habitat patch within the APE. Potential sites for additional monitoring wells include the levee road near the eastern shore of the Colorado River, approximately 230 feet from the edge of this suitable habitat. The 10- to 20-foot elevation increase of the topography between the wells and this habitat eliminates any direct line-of-sight and provides a buffer from project activities. Based on the combination of annual survey results, distances of wells to habitat, topography between wells to habitat and the application of conservation measures, any direct effects to nesting or migratory SWFLs would be low to none.

In May 2006, the well access and monitoring procedures were refined to further minimize any potential impacts to this species and reduce the amount of time in the field for sampling techniques due to human health and safety concerns, while maintaining quality control requirements for sample collection (CH2M HILL, 2006b). The duration of the modified sampling procedures is from May 1 through September 30, 2006, during the flycatcher breeding season. Several conservation measures were outlined as part of the revised procedures and will be carried forward under the scope of this PBA. A biologist is assigned to the well sampling teams during the SWFL period. The biologist is responsible for awareness training, preactivity surveys, compliance monitoring, and reporting. In response to informal consultation regarding the revised procedures, a USFWS letter dated 28 April 2006 concurred with a "may affect, not likely to adversely affect" determination made by the BLM for the SWFL (USFWS, 2006).

Project-related construction and operational activities will not occur within cottonwood-willow stands and therefore will have no effect upon the Colorado River's overall balance of remaining cottonwood-willow stands that historically were the native habitat for this species. Over time, tamarisk acreage resulting from human population growth in the Colorado River corridor has significantly increased along the Colorado River and the larger thickets are known to serve as SWFL breeding habitat. Several individual and small stands of tamarisk are expected to be affected as a result of the proposed actions (Table 2). To avoid and minimize habitat disturbance, sparsely vegetated areas within the floodplain have typically been selected in the past and the intent is to continue this practice for implementing future actions. In addition, every effort will be made to avoid dense contiguous stands of tamarisk greater than 1.0 acre and any associated vegetation. Limited riparian vegetation, primarily smaller patches or individual plants of tamarisk and arrowweed, may be crushed or trimmed as a result of the proposed actions. A 2.5-acre disturbance threshold will be followed in an attempt to lessen the potential effects to the species and habitat. Exceeding the 2.5-acre threshold will require consultation with the USFWS and may require possible mitigation.

5.2.1.5 Indirect Effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. The possible actions that may occur will more than likely be extensions of current projects such as the installation and burying of groundwater conveyance pipeline; creation of additional access roads; and construction of additional well sites. These activities would require heavy equipment, trucks, materials, and crews to implement. Any indirect effects are considered to be low.

The decommissioning of the IM No. 3 facilities may begin within the time frame of this PBA (i.e., before the end of 2012). This action will require the use of heavy equipment, trucks and personnel to teardown and remove building material. This is primarily an upland activity and any indirect effect would be low to none.

No changes in land use patterns are foreseen.

5.2.1.6 Cumulative Effects

Cumulative effects include future state and private activities, excluding federal activities, that are reasonably certain to occur within the action area. The interim and remedial actions that may occur within the APE focus on the cleanup of soil and groundwater. It is reasonably certain that additional investigative and remedial activities very similar to the actions that have been implemented to date will occur. The level and use of equipment, materials and personnel will be similar as well. However, the loss or manipulation of floodplain habitat is expected to be required to conduct these and future unspecified activities. This loss may be sufficient enough to reduce the habitat value and thus alter SWFL use and behavior. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities associated with the Colorado River such as boating, camping, and fishing. Additionally, operations and maintenance of existing infrastructure such as the gas pipelines, railroad, Interstate 40 and other nearby roads and utilities are anticipated.

5.2.1.7 Critical Habitat Effects Determination

The nearest critical habitat for the SWFL is located at Big Sandy River located approximately 50 miles east of the APE (USFWS, 2005b). PG&E's activities are located outside designated critical habitat for the SWFL. An effects determination of "no effect" to critical habitat is concluded.

5.2.1.8 Effects Determination

There has been no positive identification of a SWFL during the 2005 and 2006 protocol surveys of the APE (GANDA, 2005b and 2006b). Although the results from two protocol surveys may be limited to determining presence/absence, it does provide the best available science specific to SWFLs within the APE. To date, no take of SWFLs (or any other migratory birds) has occurred within the APE from project activities.

The best opportunity for nesting SWFLs in the APE would occur in the tamarisk thickets along the eastern edge of the APE in Arizona. However, the distance from potential well

locations near the levee road along the eastern shore of the Colorado River in conjunction with the 20 foot increase in the topography would provide a buffer from activities if SWFLs were inclined to attempt to nest in this location. These buffer features would allow for migratory activity to occur unimpeded. Additionally, annual and pre-project surveys will be conducted to identify the presence of SWFLs and adapt operations to minimize any potential for effects. Further, if project activities (primarily those utilizing heavy equipment for the construction and development of wells) occurred before the March 15 migratory bird dates, any potential effects would be a non-issue.

Nesting of SWFLs is considered unlikely west of the Colorado River within the California portion of the APE. This can be attributed to the lack of appropriate vegetation composition, habitat structure, microclimate, and presence of water or moist soils. Negative effects to nesting SWFLs are not anticipated to occur.

Seasonal migratory use of habitat on the floodplains of California and Arizona can be anticipated to occur along the Colorado River as SWFLs move to and from other known breeding locations. Project activities therefore could influence activity during this period. To further the knowledge of SWFLs within the APE and to help guide in the conservation of this species, annual USFWS protocol surveys will be conducted to determine presence or absence of SWFLs and pre-construction surveys will be conducted during the migratory/nesting season by biological monitors.

Future project activities, under guidance of the identified mitigation measures presented in Section 3.21 will help to avoid, reduce, and mitigate operational impacts to the biological environment within the APE. It is estimated that additional Tamarisk habitat may be lost, removed, or manipulated to conduct activities. This may be sufficient to reduce habitat value and alter SWFL behavior. Under this PBA the following conservation measures, not replacing those already identified, will be imposed.

1. The intent of PG&E will be to minimize the net increase of disturbed habitat in the APE.

2. Construction and development activities that use heavy equipment should be completed prior to March 15. The use of any heavy equipment in or near SWFL habitat after March 15 will be required to be reassessed and additional conservation measures considered. Preferably such activities would occur from Oct 1 to March 15.

3. To the extent feasible, future project activities within the sensitive areas identified on Figure 8 (i.e., potential SWFL habitat, wetlands, 100-year floodplain, and a 60-foot buffer from the Colorado River) should be avoided. Further, if greater than 2.5 acres of floodplain habitat is lost or manipulated, specific project consultation with the USFWS will be required and possible mitigation may be required. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.

4. The previously consulted upon modified well access and sampling procedures implemented in 2006 in SWFL habitat will be used under this PBA and will be implemented from May 1 – September 30.

Southwestern willow flycatcher use of the APE cannot be rejected and future project activities are anticipated to occur on the Arizona and California floodplains in or near suitable nesting/migratory habitat along the Colorado River and within the Topock Marsh on the HNWR. However, based on the location of project activities and distance from recorded SWFL nesting habitat; the non-conducive distribution, composition and structure of habitat conditions in or adjacent to the APE; the non-documentation of nesting and/or migratory SWFLs obtained from annual surveys in potentially suitable habitat; and accompanied with the application of the above conservation measures identified in this section, the effects of project activities to the SWFL could not be meaningfully measured, detected or evaluated and are not expected to occur. Therefore, any potential direct or indirect effects from project activities are either insignificant or discountable. An effects determination of "may affect, but not likely to adversely affect" is concluded for this species.

5.2.2 Mojave Desert Tortoise (*Gopherus agassizii*)

5.2.2.1 Status

The desert tortoise was listed as federally threatened on April 2, 1990 (USFWS, 1990b). Critical habitat was designated on February 8, 1994 (USFWS, 1994b). The Desert Tortoise Recovery Plan was released on June 28, 1994 (USFWS, 1994a). The desert tortoise was listed as threatened by the state of California in 1989.

The decline in the desert tortoise population is primarily due to habitat loss, degradation, and fragmentation resulting from increased human population and urbanization in the desert and arid regions of the southwestern United States. The increase in urbanization, collection of tortoises for pets, overgrazing, landfills, subsidized predation, highway mortality, vandalism, agriculture, fire, drought, and offroad vehicle use have all contributed to the decline of the tortoise in the wild. Another important reason for the tortoise decline in the western Mojave Desert is the introduction of an upper respiratory tract disease into many of the wild populations (USFWS, 1990b, 1994a).

5.2.2.2 Natural History, Distribution, Abundance, and Habitat

The desert tortoise is a large herbivorous terrestrial reptile. It has a high-domed shell that can reach a length of 36 centimeters (14 inches). The animal has stocky, elephant-like limbs and a short tail. The carapace (upper shell) is brown, and the plastron (lower shell) is yellow—both exhibiting prominent growth lines. Adult males can be distinguished from females by the concavity toward the rear of their plastron. Adult males also have larger chin glands and a longer tail and gular horn than females (Stebbins, 1985).

The adult desert tortoise is active from mid-March or April to November and, during the winter months, is dormant in underground burrows (Luckenbach, 1982). Desert tortoises will congregate in winter dens during colder weather, and then spread out to nearby areas during moderate weather in the spring and fall and retreat into short individual burrows or under shrubs during more extreme heat in summer (Woodbury and Hardy, 1940). During the summer active period, desert tortoises have home ranges from 12.7 to 72.1 hectares (5-29 acres) (O'Conner et al., 1994). During active periods, tortoises feed on a wide variety of herbaceous plants, including cactus, grasses, and annual flowering plants (USFWS, 1994a).

Desert tortoises may live beyond 80 years and have a relatively slow rate of reproduction. Sexual maturity is reached at 15 to 20 years of age. Mating generally occurs in the spring (mid-March to late-May), with nesting and egg-laying occurring from May to July (Rostral et al., 1994). The female tortoise lays her eggs in a hole approximately 7 to 10 centimeters (2.7 to 3.9 inches) deep dug near the mouth of a burrow (Woodbury and Hardy, 1948). Following egg-laying, the female covers the eggs with soil. Clutch size ranges from 2 to 14 eggs, with an average of 5 to 6 eggs (Luckenbach, 1982). Desert tortoise eggs typically hatch from August through October. These hatchlings are provided a food source in the form of an egg yolk that is assimilated into the underside of the shell. This yolk sac will sustain the animal for up to 6 months. The hatchling desert tortoise will go into hibernation in the late fall but can be active on warm sunny or rainy days (Luckenbach, 1982).

The desert tortoise can be found in desert and arid regions from southern Nevada and extreme southwestern Utah to northern Sinaloa, Mexico, southwestern Arizona west to the Mojave Desert, and eastern side of the Salton Basin, California (Stebbins, 1985). The desert tortoise can be divided into two distinct races, the Mojave and Sonoran, based on morphological and genetic characteristics.

The Mojave race is associated with the Mojave Desert in California, Nevada, and Utah, as well as a portion of Arizona. This race is primarily associated with flats and bajadas (shallow slopes that lie at the base of rocky hills), with soils ranging from sand to sandy-gravel but firm enough for the tortoise to construct burrows. In California, this desert tortoise is most commonly found in association with creosote bush scrub, with inter-shrub space for growth of herbaceous plants (USFWS, 1994a).

The Sonoran race is associated with the Sonoran Desert in Arizona. This race is found predominantly on steep rocky slopes of mountain ranges or sloping foothills primarily in Arizona upland vegetation dominated by palo verde and saguaro cactus (USFWS, 1990b).

5.2.2.3 Recent Findings

In 2004, 2005, and 2006 PG&E contracted CH2M HILL and GANDA to perform USFWS protocol presence/absence surveys for the desert tortoise. No live desert tortoises were detected within the survey area. However, three disarticulated desert tortoise carcasses were observed. Two carcasses were associated with ephemeral drainages. The third carcass was observed on a mesa top. Each carcass was estimated to be more than 4 years old. The carcasses observed in the drainages may have washed in from outside the survey area during a rainstorm. This interpretation is based on the location of the finds, surrounding topography, and the lack of any other desert tortoise sign within the survey area. The desert tortoise carcasses may indicate historical use of the area, however, no live desert tortoises, scats, tracks, or other evidence of recent use was observed. Burrows with entrances large enough to accommodate a desert tortoise were also observed during the surveys. The possible desert tortoise burrows had no scat, tracks, or other signs within or surrounding the burrows and were likely created by a black-tailed jackrabbit or other burrowing mammal species (CH2M HILL, 2005b; GANDA, 2005a, 2006a). The annual reports documenting the desert tortoise survey results may be referenced within Appendix E.

Based on the survey results, desert tortoises were concluded to be absent in the APE. Despite the absence of live tortoise observations, there is a possibility that desert tortoises

could enter the survey area. While it is possible that the desert tortoise could enter the APE from the west, the quality of the present creosote bush scrub habitat is poor, typically lacking of annual vegetation for forage and burrows for shelter. Combined with the presence of steep rocky slopes of the Chemehuevi Mountains and associated deep drainages, these conditions make permanent occupation of the survey area unlikely. Additionally, past disturbances and fragmentation by pipeline corridors, roads, Interstate 40, the BNSF railroad, Topock Compressor Station, evaporation ponds, and other manmade facilities further degrade the habitat (CH2M HILL, 2005b; GANDA, 2005a, 2006a).

5.2.2.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Specific actions occurring within suitable habitat in upland areas have the potential to affect this species. These include upland groundwater monitoring programs, IM No. 3 upland operations, upland soil sampling, upland well installations, *in-situ* upland pilot study, and upland restoration activities.

The following activities, associated with the floodplain, are not expected to have an effect to this species due to unsuitable habitat at the specific project location: IM No. 2 decommissioning, pore water study, seismic bedrock studies, slant drilling, floodplain soil sampling, floodplain well installations, and floodplain restoration.

A large portion of the APE (approximately 988 acres) is located on the uplands within desert habitat that is referred to as creosote bush scrub (Figure 6). Although the area is considered poor desert tortoise habitat, a transient could enter the site. It is intended that project-related construction and operational activities will be designed to have a minimal effect on the creosote bush scrub plant community. No more than 3 acres of creosote bush scrub are expected to be affected by the proposed actions. Under additional protection measures of tribal cultural resources in the uplands, any direct effects to the habitat or landscape will be closely evaluated and minimized.

The project activities proposed by PG&E on the uplands will occasionally involve the use of heavy equipment including but not limited to graders, backhoes, drill rigs, and water trucks that may be used to remove vegetation, grade the ground surface including dirt roads, extract soil samples, drill monitoring wells, and install other facilities. This equipment can create substantial ground disturbance and noise. The project also includes the continued operations of IM No. 1 and IM No. 3 involving vehicles traveling on dirt roads to access sites and associated human activity. Existing routes will be utilized wherever possible. Any direct effects to the creosote bush scrub habitat would be low.

Operational activities associated with monitoring the wells include personnel collecting water samples biweekly, weekly, or monthly. A small hand-held generator typically is used for power to activate the submersible pumps during water collection. The generator's noise output is minimal but may distract this species. These activities will be performed within suitable but poor habitat. The potential for direct effects to the desert tortoise involves the possibility of a transient entering the APE. However, based on past survey findings and a full-time biological monitor onsite conducting preactivity surveys, the probability of potential impact is considered low. Additionally, negative affects to tortoises may be further complicated by nearby natural and manmade barriers such as the Chemehuevi

Mountains, Colorado River, BNSF railroad, and I-40 Interstate fragmenting the landscape. Any direct effects associated resulting from operational activities would be insignificant and discountable.

As with construction and maintenance actions, there is a risk of altering individual tortoise behavior from the restoration of degraded sites (Figure 5). This will involve recontouring, removing structures, driving trucks, using bobcats, and replanting native vegetation, for example. Once established, the restoration will improve the quality of the creosote bush scrub habitat for this species and other wildlife species. Any direct effects associated with restoration will be beneficial to this species and habitat.

5.2.2.5 Indirect Effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. The possible actions that may occur will more than likely be the extension of projects such as the installation and burying of groundwater conveyance pipeline; creation of additional access roads; and construction of additional well sites. These activities would require heavy equipment, trucks, materials and crews to implement. The decommissioning of the IM No. 3 facilities may begin within the time frame of this PBA (i.e., before the end of 2012). This action will require the use of heavy equipment, trucks and personnel to teardown and remove building material.

No changes in land use patterns are foreseen.

5.2.2.6 Cumulative Effects

Cumulative effects are of those future state and private activities, excluding federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation. Any future investigative and remedial actions that may occur within the APE are focused at the cleanup of hexavalent chromium within the groundwater. It is reasonably certain that future investigative and remedial activities beyond, but similar to, those actions that have been implemented to date will occur. The level and use of equipment, materials and personnel will be similar as well. The loss of up to 3.0 acres of creosote bush scrub upland habitat is estimated to be required to conduct these activities. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities associated with the Colorado River such as boating, camping, and fishing. Additionally, operations and maintenance of existing infrastructure such as the gas pipelines, railroad, Interstate 40 and other nearby roads and utilities are anticipated.

5.2.2.7 Critical Habitat Effects Determination

The nearest critical habitat for the Mojave desert tortoise is located within the Chemehuevi Valley located approximately 9 miles west of the APE (USFWS, 1994b). PG&E's activities are located outside designated critical habitat for the Mojave Desert tortoise. An effects determination of "no effect" to critical habitat is concluded.

5.2.2.8 Effects Determination

Recent evidence of desert tortoise presence was not detected during the 2004, 2005, and 2006 protocol surveys of the APE (CH2M HILL, 2005b; GANDA, 2005a, 2006a). However, remains of desert tortoises have been documented in the APE. These remains are highly aged and are not understood to be from those of recent occupation by the desert tortoise. There has been no reported take of this species resulting from investigative and remedial activities to date.

The upland landscape is considered poor habitat for the desert tortoise. It is estimated that no more than 3 acres of creosote bush scrub upland habitat would be affected by future proposed actions. The intent of PG&E will be to use those areas already disturbed by project activities so as to minimize the net increase of affected habitat. It should also be noted that this PBA does not imply the approval of actions and/or the degradation of the landscape at the expense or risk to other resources (e.g., cultural resources).

Under this PBA the following conservation measures, not replacing those already identified, will be imposed.

1. The intent of PG&E will be to minimize the net increase of disturbed habitat in the APE.
2. If future activities require the loss or manipulation of greater than 3.0 acres of upland creosote bush scrub habitat, specific project consultation with the USFWS will need to occur and possible mitigation may be required. Habitat loss is defined as the removal of trees and perennial shrubs. The trimming of vegetation is not considered habitat loss.
3. PG&E is to have a USFWS-certified desert tortoise handler available if and when a tortoise visits the APE and requires relocation.

The documentation of aged desert tortoise remains and the presence of two possible burrows within the APE, although difficult to interpret, do suggest that an individual may have and could potentially visit the APE in the future. However, based on the non-presence of tortoises documented by 3 years of protocol surveys within the APE; the low suitability of tortoise habitat within the APE; the location of project activities and distance from known suitable habitat and tortoise presence; and accompanied by mitigation measures presented in Section 3.4 and in addition to the landscape level protection afforded to Tribal cultural resources, the effects of project activities to the Mohave Desert tortoise could not be meaningfully measured, detected, or evaluated and are not expected to occur. Therefore any potential direct or indirect effects from project activities are either insignificant or discountable. An effects determination of "may affect, but not likely to adversely affect" is concluded for this species.

5.3 Marsh

5.3.1 Yuma Clapper Rail (*Rallus longirostris yumanensis*)

5.3.1.1 Status

The Yuma clapper rail was listed as a federally endangered species on March 11, 1967, under endangered species legislation enacted in 1966. Critical habitat has not been designated for this species. The Yuma Clapper Rail Recovery Plan was released on

February 4, 1983 (USFWS, 1983). The Yuma clapper rail is a fully protected species in California and was listed as threatened by the state in 1978.

Much of the decline of the Yuma clapper rail can be attributed to altered seasonal flow regimes and lost marsh habitat due to the construction of hydro facilities and dredging on the Lower Colorado River. Population changes on a local level have been documented, but these changes may be based on changes in habitat quality. In turn, a decline in habitat quality may be the result of the aging of existing cattail stands to a less suitable condition for rail occupancy. Historically, the marshes seldom accumulated large amounts of dead vegetative material because of floods and changes to the river channel, which washed away cattail stands on a repeating cycle (USBR, 2004).

5.3.1.2 Natural History, Distribution, and Abundance and Habitat

The Yuma clapper rail is a chicken-shaped marsh bird with a long down-curved beak. Both sexes are slate brown above, with light cinnamon underparts and barred flanks. This subspecies is slightly lighter in color and slightly thinner than other clapper rails. The bird measures 14 to 16 inches long once it is fully grown (Eddleman,1989).

Yuma clapper rails are found in emergent wetland vegetation such as dense or moderately dense stands of cattails (*Typha latifolia* and *T. domingensis*) and bulrush (*Scirpus californicus*) (Eddleman, 1989; Todd, 1986). They can also occur, in lesser numbers, in sparse cattail-bulrush stands or in dense reed (*Phragmites australis*) stands (Rosenberg et al., 1991). The most productive clapper rail areas consist of a mosaic of uneven-aged marsh vegetation interspersed with open water of variable depths (Conway et al., 1993). Annual fluctuation in water depth and residual marsh vegetation are important factors in determining habitat use by Yuma clapper rails (Eddleman, 1989).

Yuma clapper rails may begin exhibiting courtship and pairing behavior as early as February. Nest building and incubation can begin by mid-March, with the majority of nests being initiated between late April and late May (Eddleman, 1989). The rails build their nests on dry hummocks, on or under dead emergent vegetation and at the bases of cattail or bulrush. Sometimes they weave nests in the forks of small shrubs that lie just above moist soil or above water that is up to about 2 feet deep. The incubation period is approximately 28 days so the majority of clapper rail chicks should be fledged by August (Eddleman, 1989). Yuma clapper rails nest in a variety of different micro habitats within the emergent wetland vegetation type, with the only common denominator being a stable substrate. Nests can be found in shallow water near shore or in the interior of marshes over deep water. Nests usually do not have a canopy overhead as surrounding marsh vegetation provides protective cover (Eddleman, 1989).

Crayfish (*Procambarus clarki*) are the preferred prey of Yuma clapper rails. Crayfish comprise as much as 95 percent of the diet of some Yuma clapper rail populations (Ohmart and Tomlinson 1977). Availability of crayfish may be a limiting factor in clapper rail populations and is believed to be a factor in the migratory habits of the rail (Rosenberg et al., 1991). However, Eddleman (1989) found that crayfish populations in some areas remain high enough to support clapper rails all year and that seasonal movement of clapper rails cannot be correlated to crayfish availability. New information suggests that selenium levels in crayfish may be high enough to cause reproductive effects. However, due to the species'

secretive nature, nests are difficult to find and reproductive effects are difficult to assess. No adverse effects have been documented (USFWS, 2005a).

5.3.1.3 Recent Findings

The eastern edge of the APE is located within a USFWS study site near the Topock Marina. Several call stations have been surveyed annually for Yuma clapper rail by the USFWS along the South Dike that is located within the HNWR. In past years, this species has been detected south of the new South Dike and north of the Topock Marina (Figure 7) (USFWS, 2005d). A 2004 survey map and data are included in Appendix E. In 2005, seven Yuma clapper rails were detected along the South Dike transect (Fitzpatrick, 2006). Suitable emergent habitat is located approximately 400 feet from potential well locations near the eastern shoreline of the Colorado River, and extends the full length of the northeastern edge of the APE. The emergent habitat type is buffered from the nearest well by a 400-foot distance of tamarisk and a 10- to 20-foot elevation increase of the floodplain to the west and suitable habitat to the east.

On the California-side, there is a small wetland associated with the Colorado River within the APE that is approximately 3 acres in size, located in the vicinity of the Interstate-40 bridge. This wetland is within the HNWR boundary. No reports of rails have been documented at this location and at the request of the USFWS, PG&E has not conducted any rail surveys of this area.

5.3.1.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Specific actions occurring within or adjacent to marsh habitat within the APE located south of the Interstate 40 bridge and along the eastern boundary of the APE have the potential to affect the species. This includes floodplain groundwater monitoring programs, IM No. 3 floodplain operations, floodplain soil sampling, floodplain well installations, slant drilling, seismic bedrock studies, activities similar to the pore water study, and floodplain restoration.

The following activities are expected not to affect this species due to unsuitable upland habitat at the specific project location: upland groundwater monitoring programs, IM No. 2 decommissioning, IM No. 3 upland operations, *in-situ* upland pilot study, upland soil sampling, and upland restoration activities.

Marsh habitat conditions and the associated riparian communities are essential habitat elements for the Yuma clapper rail. PG&E's activities are designed to avoid marshes and wetlands if at all possible. Dense salt cedar adjacent to marshes functions as a cover and buffer element to protect nests from predators (Fitzpatrick, 2006). Approximately 200 feet of dense salt cedar (and an additional 200 feet of open floodplain) would buffer the marsh habitat on the eastern edge of the APE from well construction, development and monitoring on the Arizona floodplain. The salt cedar habitat near the marsh on the California floodplain is also under the modified access and sampling procedures applied for the SWFL from May 1 to September 30.

Operational activities associated with monitoring the wells within the salt cedar habitat include personnel collecting water samples biweekly, weekly, or monthly. A small hand-

held generator typically is used for power to activate the submersible pumps during water collection. The generator's noise output is minimal; however, it may distract this species.

5.3.1.5 Indirect Effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. The possible actions that may occur will more than likely be the extension of projects such as the installation and burying of groundwater conveyance pipeline; creation of additional access roads; and construction of additional well sites. These activities would require heavy equipment, trucks, materials and crews to implement.

It is not anticipated that any additional facilities or buildings will be required to be built. But the decommissioning of the IM No. 3 facilities in time may begin within the time frame of this PBA (i.e., before 2012). This action will require the use of heavy equipment, trucks and personnel to teardown and remove building material. This activity may increase vehicle traffic to the main compressor station on the road overlooking the wetland.

No changes in land use patterns are foreseen.

5.3.1.6 Cumulative Effects

Cumulative effects are those of future state and private activities, excluding federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation. The actions that may occur within the APE are focused at the cleanup of hexavalent chromium within the groundwater. It is reasonably certain that additional investigative and response activities beyond, yet similar to, the actions that have been implemented to date will occur. The level and use of equipment, materials and personnel will be similar as well.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities associated with the Colorado River such as boating, camping, and fishing. Additionally, operations and maintenance of existing infrastructure such as the gas pipelines, railroad, Interstate 40 and other nearby roads and utilities are anticipated.

5.3.1.7 Critical Habitat Effects Determination

Critical habitat has not been designated for the Yuma clapper rail. An effects determination of "no effect" for critical habitat is concluded for this species.

5.3.1.8 Effects Determination

Yuma clapper rails have been documented in suitable nesting habitat along the northeastern boundary of the APE on the HNWR in Arizona. Potential monitoring well locations include the floodplain of the Colorado River in Arizona near the existing levee road. This area is approximately 60 feet from the Colorado River and 400 feet from known occupied habitat (Figure 7). Project activities in this area would be buffered from suitable nesting habitat by approximately 200 feet of tamarisk (about 42 acres total) vegetation and 200 feet of open floodplain, as well as a 10 to 20 foot increase in topography.

There is also 3 acres of potentially suitable habitat under (below/near) the Interstate 40 bridge. However, no Yuma clapper rails have been documented at this location. Past

investigative and response activities have occurred in the tamarisk dominated zone near this wetland. Currently, a slant drilling project to directionally test for potential contaminants under the Colorado River is being proposed. This slant drilling activity will be addressed under a separate biological assessment (CH2M HILL 2006e) prior to the finalization of the PBA. The slant drilling activity is scheduled to be completed before March 15. As well, project activities occurring in this location are limited to well monitoring on a monthly schedule and subject to the 2006 modified well access and sampling procedures consulted upon for the SWFL (USFWS 2006).

Under this PBA the following conservation measures, not replacing those already identified, will be imposed.

1. The intent of PG&E will be to avoid investigative or response actions in or near marshes or wetlands, if at all possible.
2. If future actions are proposed to occur within 300 feet of wetlands or marshes (specifically the eastern boundary of the APE on the Arizona floodplain), project specific review will occur to ensure compliance with this PBA and associated USFWS consultation.
3. Specific to the Arizona portion of the APE, all construction and development activities should be completed prior to March 15. Preferably, such activities would occur from October 1 to March 15.
4. Where feasible, actions should not be proposed within the tamarisk habitat under the Interstate 40 and the BNSF railway bridges that occur on the HNWR unless otherwise agreed to by the USFWS.
5. No more than 2.5 acres of floodplain habitat can be impacted without triggering additional ESA consultation requirements.

Suitable habitat conditions and documented presence of nesting individuals do increase the level of awareness of project activities negatively effecting Yuma clapper rails primarily along the eastern boundary of the APE. However, the distances and locations of potential well sites from occupied habitat; as well as the topographical features and tamarisk densities between potential wells and suitable habitat will provide sufficient cover to buffer this species from any effects caused by project activities. In addition with the application of the above conservation measures, the effects of project activities to the Yuma clapper rail could not be meaningfully measured, detected or evaluated and are not expected to occur. Therefore, any potential direct or indirect effects of project activities are either insignificant or discountable. An effects determination of "may affect, but not likely to adversely affect" is concluded for this species.

5.4 Aquatic

5.4.1 Colorado Pikeminnow (*Ptychocheilus lucius*)

5.4.1.1 Status

The Colorado pikeminnow was listed as a federally endangered species in 1967 and came under protection of the ESA in 1973. The Colorado Pikeminnow Recovery Plan was released in 1991 (USFWS, 1991) and was supplemented with the Colorado Pikeminnow Recovery Goals in 2001 (USFWS, 2001a). The Colorado pikeminnow is a fully protected species in California and was listed as endangered by the state in 1971. It is considered to be extirpated from the lower Colorado River (Minckley, 1973).

5.4.1.2 Natural History, Distribution, Abundance and Habitat

The Colorado pikeminnow is considered the world's largest minnow, reaching lengths up to 5 feet. It has a large long head, somewhat pike-like, with a terminal mouth. It was, historically, the top predator fish in the Colorado River. This species is the only member of the genus *Ptychocheilus* endemic to the Colorado River Basin.

This species was formerly widespread in the Colorado River basin from Wyoming to Arizona and California. Now, native populations are restricted to the upper basin in Wyoming, Colorado, Utah, and New Mexico in the Green, Yampa, White, Gunnison, and Colorado Rivers. Critical habitat was designated for Colorado pikeminnow in the upper basin effective April 20, 1994. No critical habitat was designated in Arizona.

5.4.1.3 Direct Effects

No direct effects will occur.

5.4.1.4 Indirect Effects

No indirect effects will occur.

5.4.1.5 Cumulative Effects

No cumulative effects will occur.

5.4.1.6 Critical Habitat Effects Determination

Critical habitat has not been designated for the Colorado pikeminnow. An effect determination of "no effect" for critical habitat is concluded for this species.

5.4.1.7 Effects Determination

Due to the extirpation of the Colorado pikeminnow in the Lower Colorado River, an effect determination of "no effect" is concluded for this species.

5.4.2 Razorback Sucker (*Xyrauchen texanus*)

5.4.2.1 Status

The razorback sucker was listed as a federally endangered species on October 23, 1991, with an effective date of November 22, 1991. The Razorback Sucker Recovery Plan was released in 1998 (USFWS, 1998). The recovery plan was supplemented with the Upper Colorado River Endangered Fish Recovery Program (USFWS, 2001a) and the Razorback Sucker Recovery Goals (USFWS, 2001b). The razorback sucker is a fully protected species in California and was listed as endangered by the state in 1974.

Critical habitat was designated in 15 river reaches in the historic range of the razorback sucker on March 21, 1994, with an effective date of April 20, 1994 (USFWS, 1994c). This includes Lake Mead to its full pool elevation, the Colorado River and its 100-year floodplain between Hoover Dam and Davis Dam including Lake Mohave to its full pool elevation, and the Colorado River and its 100-year floodplain from Parker Dam to Imperial Dam (USFWS, 1994c).

The trend for the razorback sucker is for a continued rangewide decrease in wild populations due to lack of sufficient recruitment of young adults, with the loss of old adults due to natural mortality. The primary limiting factor for the razorback sucker appears to be non-native fish predation of the early life stages (USFWS, 2005a).

5.4.2.2 Natural History, Distribution, Abundance and Habitat

The razorback sucker is a large fish, measuring over 2 feet long and weighing 8 pounds. Sexual dimorphism is present, with males being smaller, slimmer, and having larger fins than females. During the breeding season males have nuptial tubercles covering posterior fins and portions of the body. Females tend to be larger, heavier-bodied, and have fins that are somewhat smaller in proportion to their body size (Minckley, 1973).

The razorback sucker is endemic to large rivers of the Colorado River Basin from Wyoming to Mexico. Present distribution of natural populations is limited to Lake Mohave, Green River Basin, and the Upper Colorado River Basin. Historically razorback suckers inhabited the Colorado, Gila, Salt, Verde, and San Pedro rivers.

Presently, natural adult populations exist only in Lake Mohave, Lake Mead, and Lake Havasu. This species uses a variety of habitat types from mainstem channels to slow backwaters of medium and large streams and rivers, sometimes around cover. In impoundments they prefer depths of 1 meter or more over sand, mud, or gravel substrates. (AGFD, 2002b). Early explorers report the fish as extremely abundant (Gilbert and Scofield, 1898). In central Arizona it was abundant enough to be commercially harvested for human and animal food and for fertilizer in the late 1800s. Similar abundances have been noted for the upper basin (Bestgen, 1990). Today the species occupies only a small portion of its historical range, and most occupied areas have very low numbers of fish. Between Davis Dam and Lake Havasu, observations of razorback suckers are extremely rare (USBR, 2004).

Spawning occurs from late winter through spring along gravelly shorelines or bays. Evidence suggests that suckers migrate from larger rivers to smaller tributaries prior to spawning. A single female is attended by 2 to 12 males, and the group moves in tight circles

over the bottom. The eggs are adhesive and attach to the interstitial spaces within the gravel substrate. The young hatch in a few days and live along the shoreline for a time. Females will spawn repeatedly with several males. Hatching success is highly dependant on water temperature with complete mortality in temperatures less than 10 degrees Celsius (50 degrees Fahrenheit) (AGFD, 2002b).

5.4.2.3 Recent Findings

The Lower Colorado River supports the largest remaining populations of razorback sucker. The population consists primarily of subadults. In 2005, razorback suckers were documented near Needles, California. In 2006, 236 suckers were captured and released at that spawning site. The likelihood of this species being in the area around Park Moabi and Topock Marina is very high (Fitzpatrick, 2006).

Extinction of the species in the wild throughout the historic range is being forestalled by stocking of subadult fish into the remaining wild populations (USBR, 2002). Where natural recruitment is occurring (i.e., spawning and survival of young), it is not known whether the current level of recruitment will sustain the existing population levels. Where natural recruitment is not occurring, loss of the remaining wild populations is expected.

Stocking efforts in the Upper Colorado River Basin and in Lakes Mohave and Havasu and the Lower Colorado River below Parker Dam are ongoing, with the 30,000-fish requirement for Lake Havasu completed in 2001. The most critical of these efforts is the replacement of the Lake Mohave population using wild-caught larvae from the lake. By the end of 2001, the initial goal to stock 50,000 subadult fish into Lake Mohave was achieved. The Lake Mohave efforts will continue to meet the second goal, which is to establish a population of 50,000 adults.

5.4.2.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Activities that may occur in the Colorado River include seismic bedrock studies and pore water studies. The 2005 pore water study was issued a no effect determination (USFWS, 2005e).

Activities that may occur within the 100-year floodplain include floodplain groundwater monitoring programs, IM No. 3 floodplain operations, flood plain soil sampling, slant drilling, floodplain well installations, activities similar to the pore water study, and floodplain restoration.

Seismic studies will be similar to the 2005 pore water study that was issued a no effect determination by the USFWS (USFWS, 2005e). The seismic studies involve a small boat that will be used to submerge the seismic equipment within a portion of the Colorado River. The equipment that will be used for the study creates an acoustical pulse that is similar to that used by a recreational fish finder. The seismic studies will be performed during the winter season and completed before February 1, when feasible. Up river migration, spawning, and down river migration of adult and fry razorback suckers are expected to occur between February 1 and May 31; therefore, seismic studies between June 1 and January 31 will have no affect upon this species (Adams, 2006). Conversely, activities within the Colorado River that are conducted during the spawning and migration period may affect this species.

The project activities proposed by PG&E will occasionally involve the use of heavy equipment including but not limited to backhoes and drill rigs that may be used to remove vegetation, grade the ground surface, and drill groundwater monitoring wells within the floodplain. Smaller equipment such as bobcats and quad-runners are also used to transport personnel and well sampling tools. This equipment can create disturbance to the ground and vegetation that may reduce the function of the riparian zone to contribute nutritional attributes to the river. However, the magnitude of riparian function that may be reduced by the proposed action is not expected to impact the razorback sucker due to limited project-related activities and associated minor footprints directly adjacent to the Colorado River. Additionally, a 2.5 acre floodplain vegetation removal threshold has been established to minimize any reduced function of the riparian zone.

5.4.2.5 Indirect effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. All proposed activities will take place outside the Colorado River with the exception of activities similar to the prior pore water study, which in 2005 received a no effect determination (USFWS, 2005e). No changes in land use patterns are foreseen. No indirect effects are anticipated.

5.4.2.6 Cumulative Effects

Cumulative effects are of those future state and private activities, excluding federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation. The interim and remedial actions that may occur within the APE are focused at the cleanup of hexavalent chromium within the groundwater. It is reasonably certain that additional investigative and remedial activities beyond, but similar to, those actions that have been implemented to date will occur.

These actions will occur within the 100-year floodplain and involve heavy equipment including but not limited to backhoes and drill rigs that may be used to remove vegetation, grade the ground surface, and drill groundwater monitoring wells on the California and Arizona floodplains within the APE. Smaller equipment such as bobcats and quad-runners are also used to transport personnel and well sampling tools. This equipment can create disturbance to the ground and vegetation that may reduce the function of the riparian zone to contribute nutritional attributes to the river. However, the magnitude of riparian function that may be reduced by the proposed action is not expected to impact the razorback sucker due to limited project-related activities and associated minor footprints directly adjacent to the Colorado River. Additionally, a 2.5 acre floodplain vegetation removal threshold has been established to minimize any reduced function of the riparian zone.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities associated with the Colorado River such as boating, camping, and fishing. Additionally, operations and maintenance of existing infrastructure such as the gas pipelines, railroad, Interstate 40 and other nearby roads and utilities are anticipated.

No changes in land use or water use are foreseen.

5.4.2.7 Critical Habitat Effects Determination

Critical habitat for the razorback sucker does not occur within the APE. An effect determination of "no effect" for critical habitat is concluded for this species.

5.4.2.8 Effects Determination

Under this PBA the following conservation measures, not replacing those already identified, will be imposed.

1. The intent of PG&E will be to minimize the net increase of disturbed habitat in the APE.
2. If greater than 2.5 acres of habitat within the general and 100-year floodplain is destroyed or manipulated, specific project consultation with the USFWS will be required and possible mitigation may be required.
3. If additional actions are proposed within the Colorado River beyond those described for the pore water study, consultation will be required to be reinitiated at that time.
4. Proposed project activities within the Colorado River should preferably occur between June 1 and January 31. Project activities that differ from the pore water study and which are proposed to occur between February 1 and May 31 will require further consultation.
5. In the event an emergency situation (e.g., a spill into the Colorado River), where actions to abate the problem are to occur along the shoreline/river interface or in the water, a negative impact to this species may occur. Those actions which may adversely affect this species and constitute a taking, are not covered within this scope of this determination in this PBA. If an emergency situation occurs, immediate consultation with the USFWS will be required.

Razorback suckers have been documented north of the APE near Needles, California. There is a high likelihood for this species to utilize the mainstem Colorado River as will as the backwater areas of Park Moabi and the Topock Marina. Future project activities are anticipated to occur in the Colorado River and within the 100-year floodplain. However, the light magnitude of small scale projects in the River; the minimal amount of riparian habitat altered in the 100-year floodplain; and accompanied by the conservation measures described above, the effects of project activities to the razorback sucker could not be meaningfully measured, detected or evaluated and are not expected to occur. Therefore, any potential direct or indirect effects from project activities are either insignificant or discountable. An effects determination of "may effect, but not likely to adversely affect" is concluded for this species.

5.4.3 Bonytail Chub (*Gila elegans*)

5.4.3.1 Status

The bonytail chub was listed as a federally endangered species on April 24, 1980, with an effective date of May 23, 1980. The Bonytail Chub Recovery Plan was updated in 1990 (USFWS, 1990a). The recovery plan was supplemented with the Upper Colorado River Endangered Fish Recovery Program (USFWS, 2001a) and the Bonytail Chub Recovery goals (SWCA, 2001). The bonytail chub was listed as endangered by the state of California in 1974.

Critical habitat was designated in six river reaches in the historic range of the bonytail chub on March 21, 1994, with an effective date of April 20, 1994, in designated portions of the Colorado, Green, and Yampa Rivers in the Upper Basin and the Colorado River in the Lower Basin (USFWS, 1994c). In relation to the APE, critical habitat includes the Colorado River and the 100-year floodplain (see Figure 8) from Parker Dam to the northern boundary of the HNWR just south of Needles, CA.

The trend for the bonytail chub is for a continued rangewide decrease in wild populations due to lack of sufficient recruitment of young adults with the loss of old adults due to natural mortality. Like the razorback sucker, the primary limiting factor for bonytail appears to be nonnative fish predation of the early life stages (USFWS, 2005a).

5.4.3.2 Natural History, Distribution, Abundance and Habitat

In appearance, bonytail are gray to gray-green on the dorsal, with silvery sides fading to a white ventral surface. The fish is elongated and somewhat laterally compressed with a narrow caudal peduncle. Adults are from 11 to 13 inches in length, although larger individuals (up to 24 inches) are occasionally identified. A smooth predorsal hump is present in the adult form. Breeding males can be distinguished by reddish marks on the paired fins and the presence of tubercles anterior on the body (Vanicek, 1967).

In Lake Mohave, spawning has been observed during the month of May, while in the upper Green River, spawning occurs in June and July at water temperatures of about 18 degrees Celsius (64 degrees Fahrenheit) (Minckley, 1973). Eggs are scattered over the bottom; no parental care occurs. Cold water released below dams precludes successful hatching of eggs (Bagley, 1989).

The bonytail was once widely distributed throughout the Colorado River and its main tributaries, to include the Green River in Utah and Wyoming, and the Colorado, Gila, Salt, and Verde rivers in Arizona. Currently, this species is found only in isolated populations in the Yampa River, Green River, Colorado River at the Colorado/Utah border, and at the confluence of the Green and Colorado Rivers. In the lower basin, the bony tail is found only in Lake Mohave with possible individuals between Parker Dam and Davis Dam (AGFD, 2001). They were still abundant in Lake Mead after the completion of Hoover Dam; however, by 1950 they were considered rare. By the time concern was raised for this fish, it had disappeared from much of its range. Loss of the extant wild populations is expected.

Extinction of this fish in the wild throughout its historic range is being forestalled by the stocking of subadult fish into the Upper Colorado River Basin and Lakes Mohave and Havasu in the Lower Colorado River (USFWS, 2005a). These stockings are intended to create populations of young adults that may be expected to persist for 40 to 50 years. While it is expected that these young adults will reproduce, the successful recruitment of wild born young fish to the population may not occur without additional management of habitat and biological factors. Management and research on these populations will be critical to provide for the survival and recovery of the species. Of vital importance to the stocking program is maintenance and enhancement of the existing bonytail broodstock (USFWS, 2005a).

5.4.3.3 Recent Findings

A portion of APE is within the 100-year floodplain of the Colorado River that delineates critical habitat for the bonytail chub (Figure 8). From south to north, this area extends from a river-associated wetland (described in the Yuma clapper rail section 5.3.1) to a deep sand and drier environment of dredge spoils deposited by the Army Corps of Engineers from excavating the river channel. The gradient ranges from river level to possibly 20 feet created by the dredge spoils. The dredge spoils environment can be described as sand, tamarisk and arrowweed. This is detailed in greater depth within the SWFL section 5.2.1. The mouths of the washes have channels and bridges that would allow water to flood these areas if a larger event was to occur. The lower ends of the washes are composed of tamarisk and water. Normally, except for isolated rain events, there is no overland flow connectivity to the river.

The Lower Colorado River supports the largest remaining populations of bonytail chub. The populations consist primarily of sub-adults. In 2005, eight individuals were captured and released near Park Moabi (Fitzpatrick, 2006), increasing the likelihood of individuals being present in the APE.

5.4.3.4 Direct Effects

Direct effects are those that are caused by the proposed action and occur at the same time and place. Activities that may occur in the Colorado River include seismic bedrock studies and pore water studies. The 2005 pore water study was issued a no effect determination (USFWS, 2005e).

Activities that may occur within the 100-year floodplain and critical habitat include floodplain groundwater monitoring programs, IM No. 3 floodplain operations, floodplain soil sampling, slant drilling, floodplain well installations, activities similar to the pore water study, and floodplain restoration.

Seismic studies will be similar to the 2005 pore water study that was issued a no effect determination by the USFWS (USFWS, 2005e). The seismic studies involve a small boat that will be used to submerge the seismic equipment within a portion of the Colorado River. The equipment that will be used for the study creates an acoustical pulse that is similar to that used by a recreational fish finder. The seismic studies will be performed during the winter season and completed before February 1 when feasible. Up river migration, spawning, and down river migration of adult and fry bonytail chubs are expected to occur between February 1 and May 31; therefore, seismic studies between June 1 and January 31 will have no affect upon this species (Adams, 2006). Conversely, activities within the Colorado River that are conducted during the spawning and migration period may affect this species.

The project activities proposed by PG&E will occasionally involve the use of heavy equipment including but not limited to backhoes and drill rigs that may be used to remove vegetation, grade the ground surface, and drill groundwater monitoring wells within the general and 100-year floodplain. Smaller equipment such as bobcats and quad-runners are also used to transport personnel and well sampling tools. This equipment can create disturbance to the ground and vegetation that may reduce the function of the riparian zone to contribute nutritional attributes to the river. However, the magnitude of riparian function that may be reduced by the proposed action is not expected to impact the bonytail chub due

to limited project-related activities and associated minor footprints directly adjacent to the Colorado River. Additionally, a 2.5 acre floodplain vegetation removal threshold has been established to minimize any reduced function of the riparian zone.

5.4.3.5 Indirect Effects

Indirect effects are those that are caused by the proposed action and are later in time, but reasonably certain to occur. All proposed activities will take place outside the Colorado River with the exception of activities similar to the prior pore water study, which in 2005 received a no effect determination (USFWS, 2005e). No changes in land use patterns are foreseen. No indirect effects are anticipated.

5.4.3.6 Cumulative Effects

Cumulative effects are of those future state and private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation. It is expected that all the activities will take place outside the Colorado River with the exception of those similar to the prior pore water study, which in 2005 received a no effect determination (USFWS, 2005e).

The project actions that may occur within the APE are focused at the cleanup of hexavalent chromium within the groundwater. It is reasonably certain that additional investigative and remedial activities beyond, yet similar to, those actions that have been implemented to date will occur. These actions will occur within the 100-year floodplain, designated as critical habitat, and involve heavy equipment including but not limited to backhoes and drill rigs that may be used to remove vegetation, grade the ground surface, and drill groundwater monitoring wells on the California and Arizona floodplains. Smaller equipment such as bobcats and quad-runners are also used to transport personnel and well sampling tools. This equipment can create disturbance to the ground and vegetation that may reduce the function of the riparian zone to contribute nutritional attributes to the river. However, the magnitude of riparian function that may be reduced by the proposed action is not expected to impact the bonytail chub due to limited project-related activities and associated minor footprints directly adjacent to the Colorado River. Additionally, a 2.5 acre floodplain vegetation removal threshold has been established to minimize any reduced function of the riparian zone.

Future state and private actions separate from PG&E that are reasonably certain to occur within the project vicinity include continued recreational activities associated with the Colorado River such as boating, camping, and fishing. Additionally, operations and maintenance of existing infrastructure such as the gas pipelines, railroad, Interstate 40 and other nearby roads and utilities are anticipated.

No changes in land use or water use patterns are foreseen.

5.4.3.7 Critical Habitat Effects Determination

Critical habitat in relationship to the APE includes the 100-year floodplain of the Colorado River (see Figure 8) from Parker Dam to the northern boundary of the HNWR south of Needles, CA. Project activities will be occurring within this designation. However, based on the small footprint of project activities; the limited amount of vegetation removal within the

100-year floodplain; and accompanied by the below conservation measures, no appreciable diminishment to critical habitat function is expected nor could be meaningfully measured, detected or evaluated. Therefore, any potential direct or indirect effects of project activities to critical habitat for the bonytail chub are either insignificant or discountable. An effects determination of "may affect, but not likely to adversely affect" is concluded for critical habitat of this species.

5.4.3.8 Effects Determination

Under this PBA the following conservation measures, not replacing those already identified, will be imposed.

1. The intent of PG&E will be to minimize the net increase of disturbed habitat in the APE.
2. If greater than 2.5 acres of habitat within the general and 100-year floodplain is destroyed or manipulated, specific project consultation with the USFWS will be required and possible mitigation may be required.
3. If additional actions are proposed within the Colorado River beyond those described for the pore water study, consultation will be required to be reinitiated at that time.
4. Proposed project activities within the Colorado River should preferably occur between June 1 and January 31. Project activities that differ from the pore water study and which are proposed to occur between February 1 and May 31 will require further consultation.
5. In the event an emergency situation (such as a spill into the Colorado River), where actions to abate the problem are to occur along the shoreline/river interface or in the water, a negative impact to this species may very well occur. Those actions that may adversely affect this species and constitute a taking, are not covered within this scope of this determination in this PBA. If an emergency situation occurs, immediate consultation with the USFWS will be required.

Bonytail chubs have been captured and released near Park Moabi making the likelihood for this species to utilize the mainstem Colorado River and backwater areas (near Park Moabi and Topock Marina) within and near the APE a possibility. Future project activities are anticipated to occur in the Colorado River and within the 100-year floodplain. However, the light magnitude of the small scale projects in the River; the minimal amount of riparian habitat altered in the 100-year floodplain; and accompanied by the conservation measures described above, the effects of project activities to the bonytail chub could not be meaningfully measured, detected, or evaluated and are not expected to occur. Therefore, any potential direct or indirect effects from project activities are either insignificant or discountable. An effects determination of "may affect, but not likely to adversely affect" is concluded for this species.

6.0 Effects Determination Summary

6.1 Southwestern Willow Flycatcher

An effects determination of "may affect, but not likely to adversely affect" is concluded for the southwestern willow flycatcher.

A critical habitat effects determination of "no effect" is concluded for this species.

6.2 Mojave Desert Tortoise

An effects determination of "may affect, but not likely to adversely affect" is concluded for the Mojave desert tortoise.

A critical habitat effects determination of "no effect" is concluded for this species.

6.3 Yuma Clapper Rail

An effects determination of "may affect, but not likely to adversely affect" is concluded for the Yuma clapper rail.

A critical habitat effects determination of "no effect" is concluded for this species.

6.4 Colorado Pikeminnow

An effects determination of "no effect" is concluded for the Colorado pikeminnow.

A critical habitat effects determination of "no effect" is concluded for this species.

6.5 Razorback Sucker

An effects determination of "may affect, but not likely to adversely affect" is concluded for the razorback sucker.

A critical habitat effects determination of "no effect" is concluded for this species.

6.6 Bonytail Chub

An effects determination of "may affect, but not likely to adversely affect" is concluded for the bonytail chub.

A critical habitat effects determination of "may affect, but not likely to adversely affect" is concluded for this species.

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Tables

TABLE 1
Planned Remedial and Investigative Actions in the APE

Planned Actions [a]	Estimated Short-Term Area Affected (Acres) [b]	Estimated Long-Term Area Affected (Acres) [b]
Soil Sampling [c]	0.5	0.00
Groundwater Wells [d]	4.5	<0.1
In Situ Pilot Study (Upland)	0.25	<0.1
Maintenance and Other	<1.0	<1.0
Unspecified	6.0	4.0
Pipelines	2.0	<1.0
Restoration Activities [e]	10.0	0.0

Notes:

[a] Access to planned activity areas will occur mainly along existing access routes and/or preapproved travel corridors.
[b] Because planned activities will be sited in previously used areas to the extent possible, total impacts to vegetation communities would be less than the affected acreage noted above; no more than 2.5 acres of salt cedar (on the floodplain) and 3 acres of creosote bush scrub (in uplands) are anticipated to be impacted by planned activities.
[c] Up to 200 samples, each within a 10-foot-diameter area.
[d] Up to 30 groundwater well clusters installed, each requiring a 0.15-acre area during construction and occupying 100 square feet thereafter (CH2M HILL, 2005c, 2005d, 2005h).
[e] Restoration activities will restore designated areas to preconstruction conditions.

TABLE 2
Salt Cedar Thickets

Location	Contiguous Acreage	Percent of APE [a]
BNSF Railway and I-40	5.8	0.4
Bat Cave Wash	5.1	0.4
Unnamed Wash	2.7	0.2
Park Moabi Marina	6.9	0.5
Arizona Portion of HNWR	30.7	2.2

[a] Percent of APE does not include aquatic habitats (e.g., Colorado River) in total area.

Figures

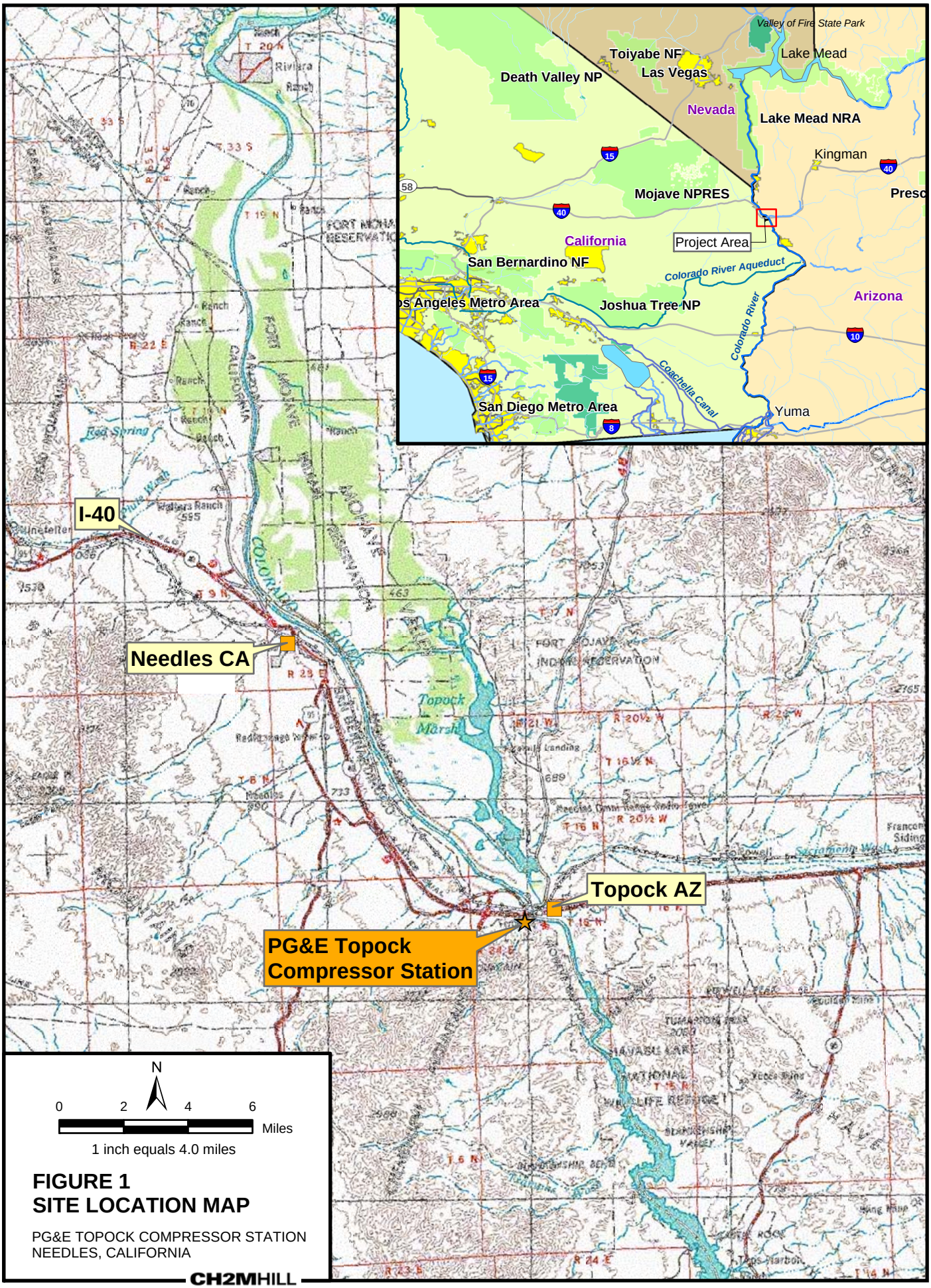

FIGURE 1
SITE LOCATION MAP

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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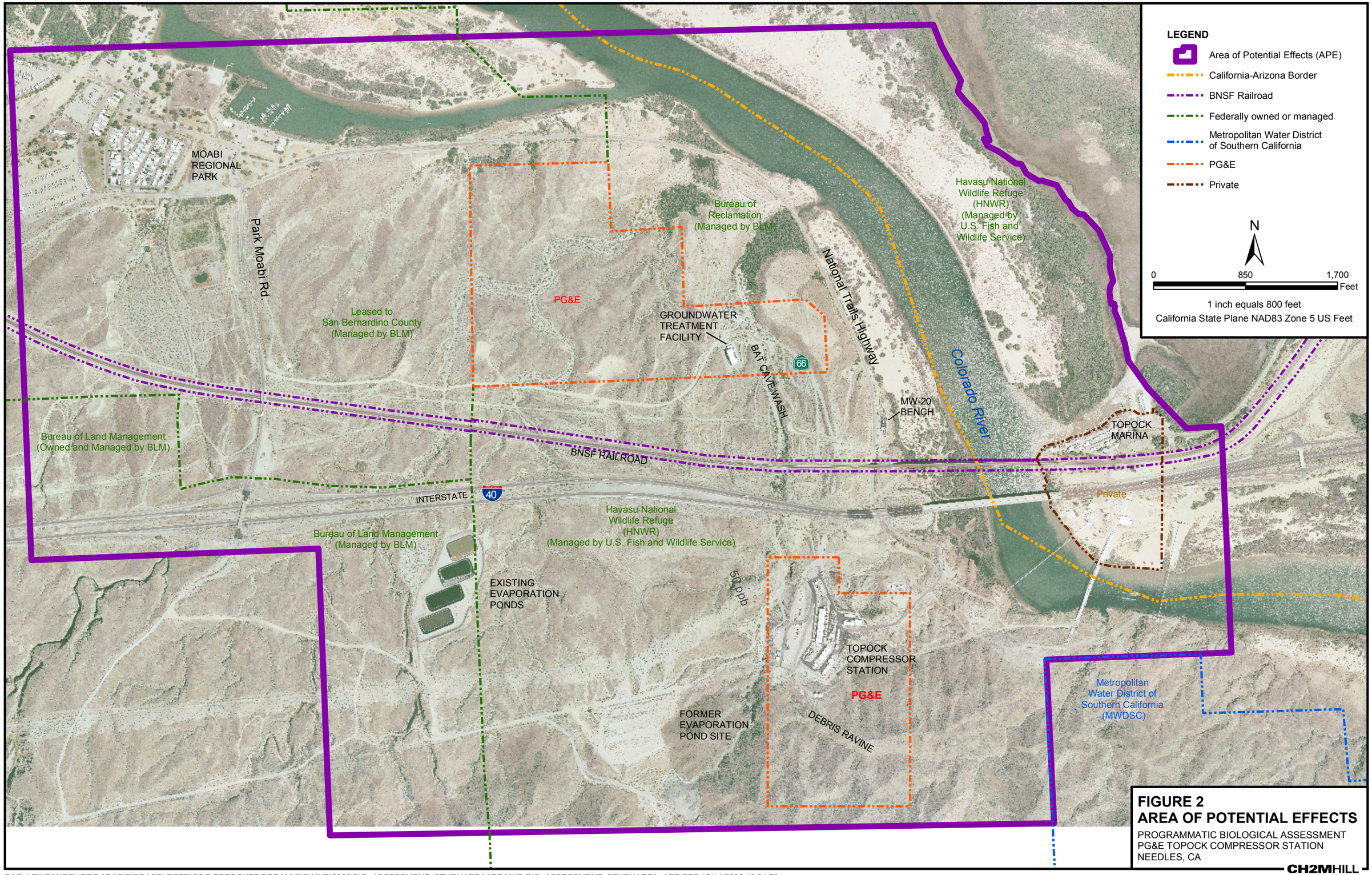

FIGURE 2
AREA OF POTENTIAL EFFECTS
PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CA

CH2MHILL

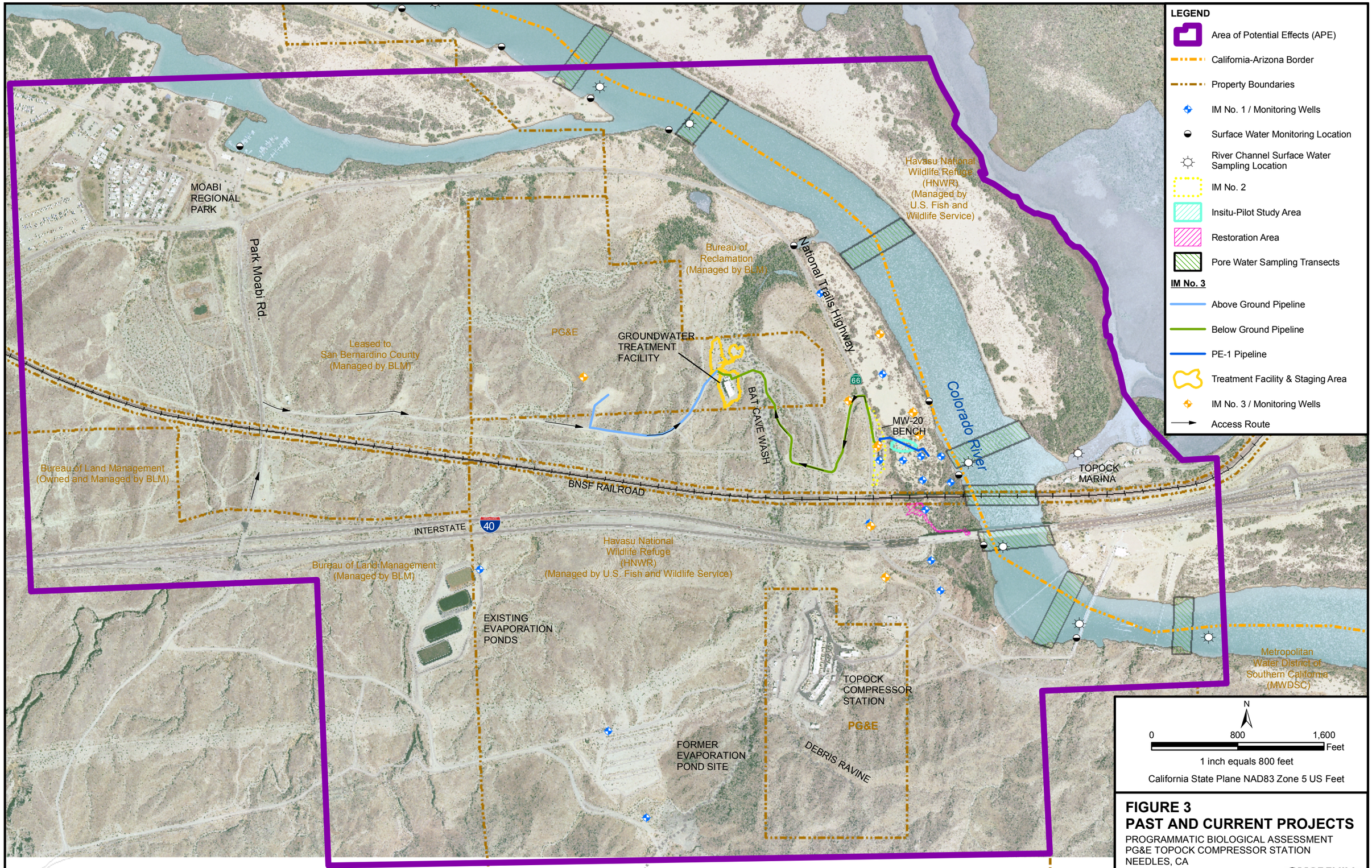

FIGURE 3
PAST AND CURRENT PROJECTS

PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CA

CH2MHILL

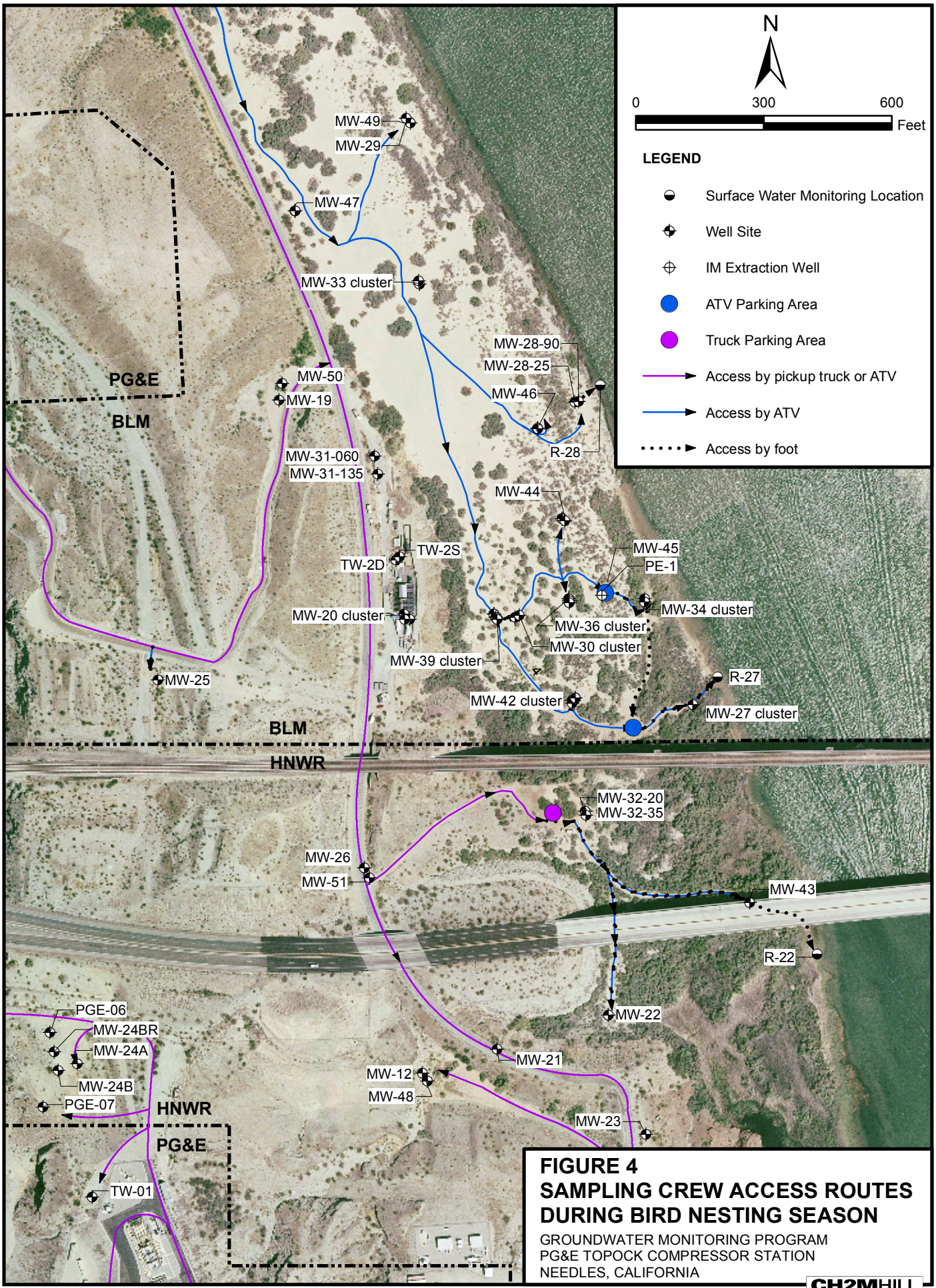

FIGURE 4
SAMPLING CREW ACCESS ROUTES DURING BIRD NESTING SEASON

GROUNDWATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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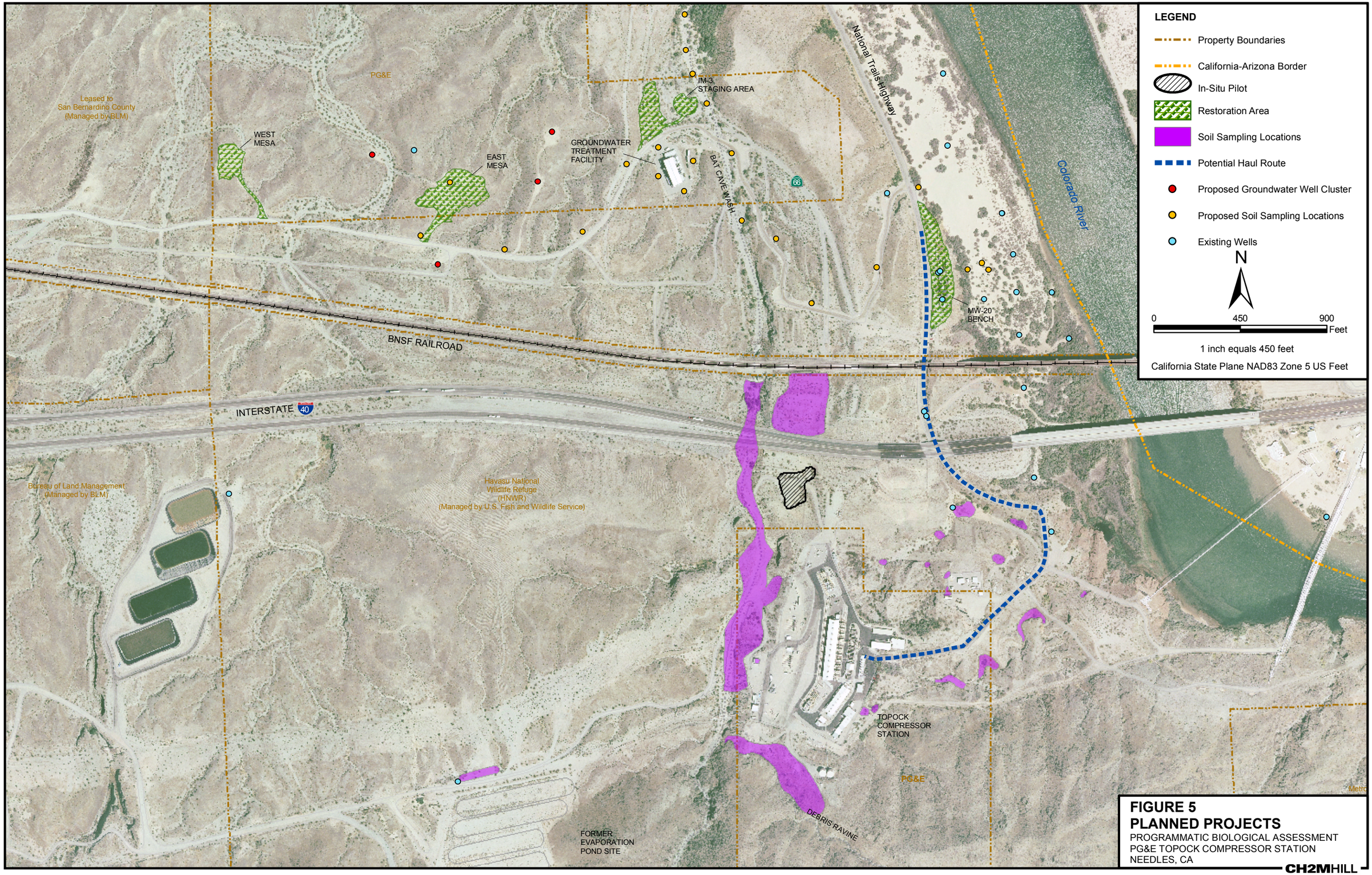
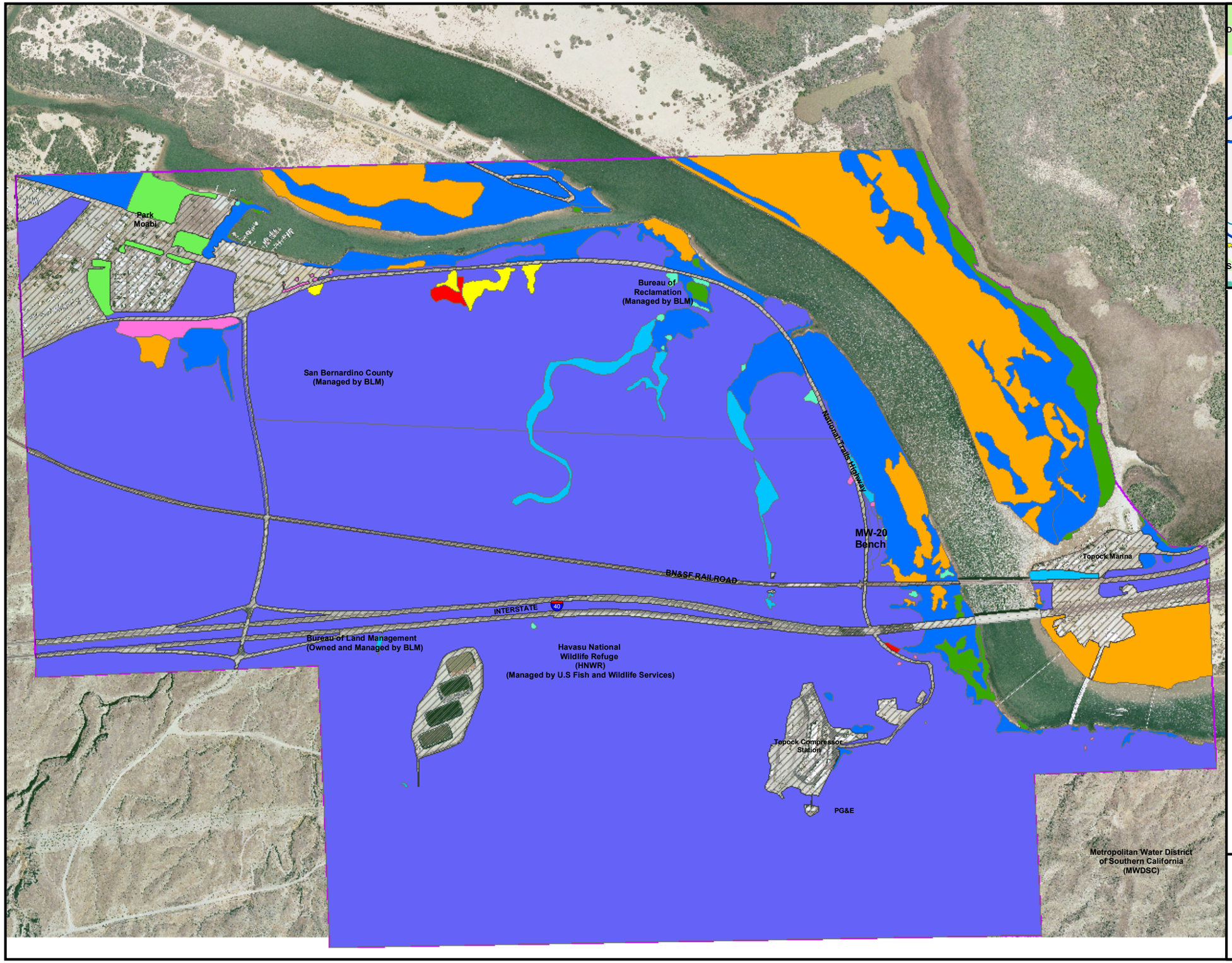
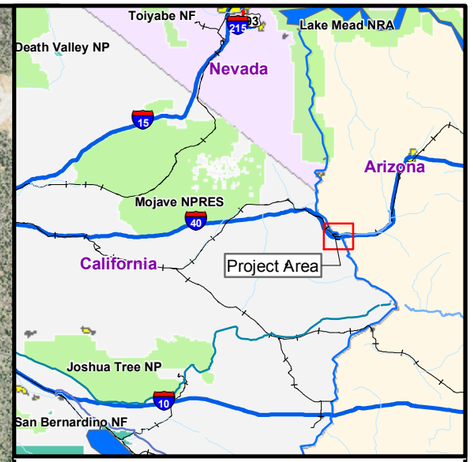


FIGURE 5
PLANNED PROJECTS
PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CA

CH2MHILL





N

0 450 900 1,800 Feet

1 inch equals 900 feet

LEGEND

Area of Potential Effects

	Approximate Acreage	Approximate % Composition
Developed	130	9.5
Vegetation Communities		
Arrow Weed	114	8.3
Creosote Bush Scrub	973	70.9
Landscaped	8	0.6
Mesquite	2	0.1
Mesquite/Palo Verde	12	0.9
Palo Verde	4	0.3
Salt Bush	1	0.1
Salt Cedar	111	8.1
Salt Cedar/Mesquite	3	0.2
Wetland/Marsh	15	1.1

FIGURE 6
TOPOCK VEGETATION COMMUNITIES, MAY 2006
PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

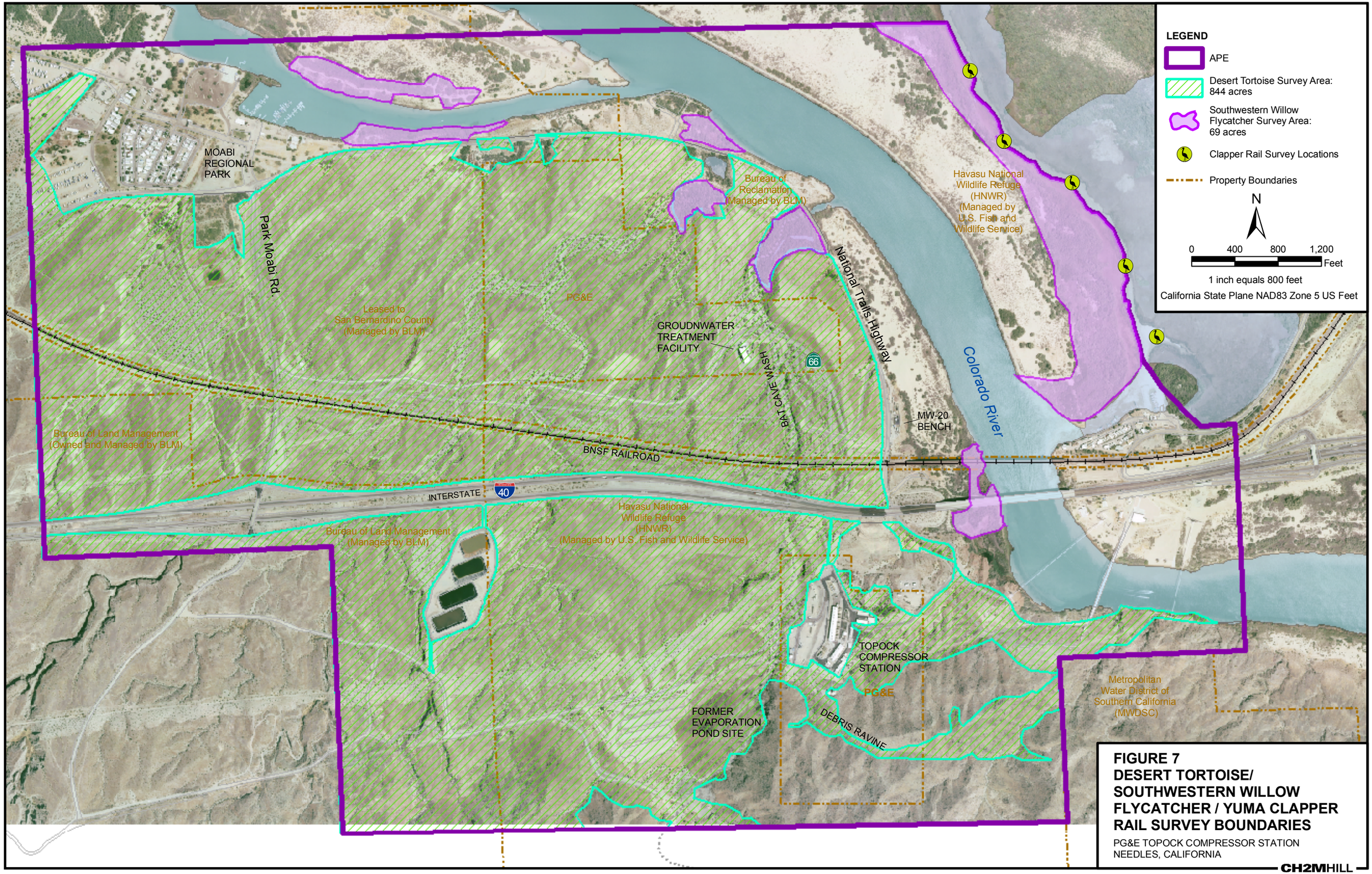


FIGURE 7
DESERT TORTOISE/ SOUTHWESTERN WILLOW FLYCATCHER / YUMA CLAPPER RAIL SURVEY BOUNDARIES

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

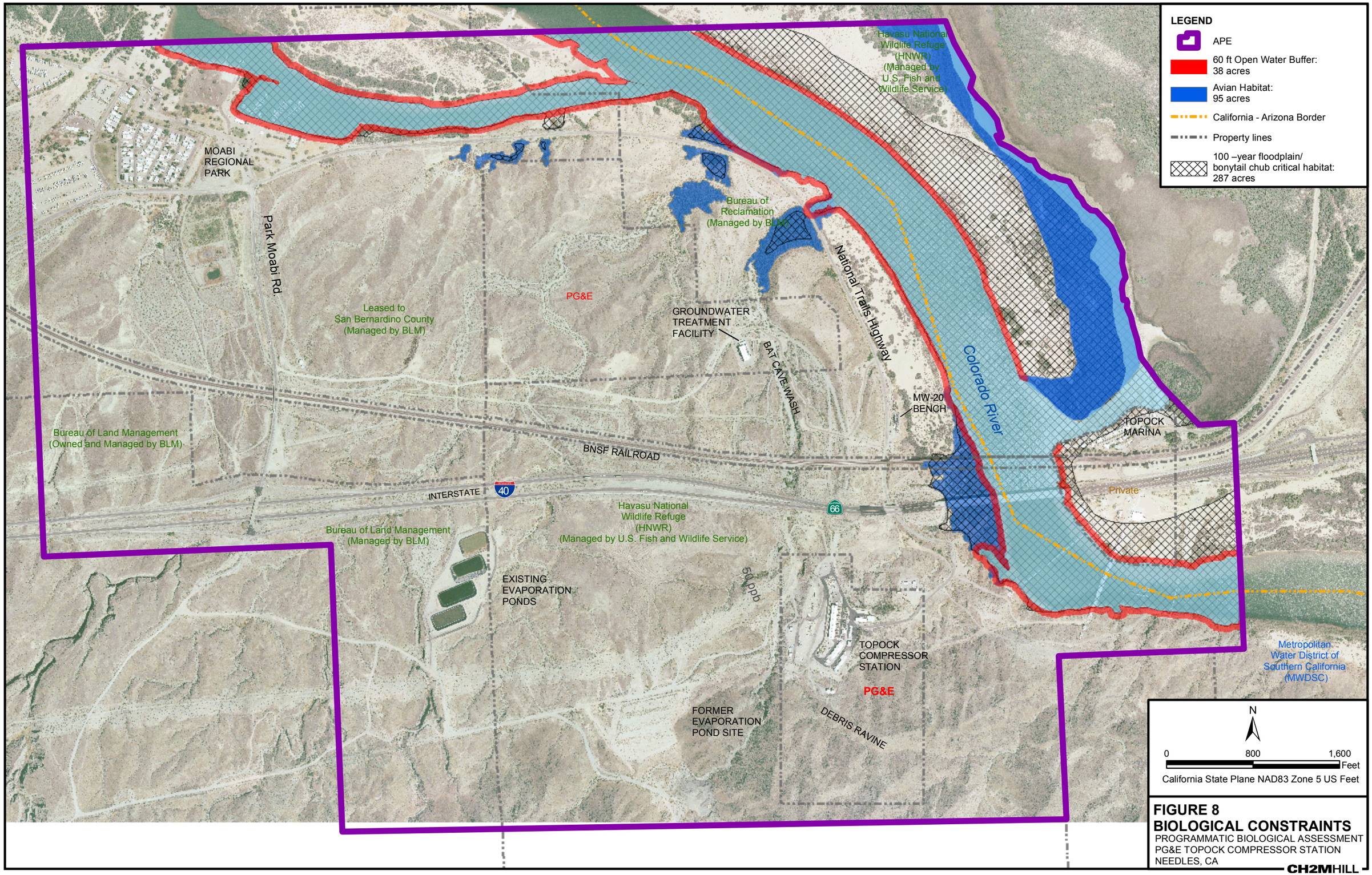


FIGURE 8
BIOLOGICAL CONSTRAINTS
PROGRAMMATIC BIOLOGICAL ASSESSMENT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CA

CH2MHILL

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Appendix A
Past and Present Investigative Activities

Appendix A1:
GMP Sampling and Analysis Plan

Pacific Gas and Electric Company®

Yvonne J. Meeks
Site Remediation - Portfolio Manager
Environmental Affairs

6588 Ontario Road
San Luis Obispo, CA 93405
Mailing Address
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San Luis Obispo, CA 93401

805.546.5243
Internal: 664.5243
Fax: 805.546.5232
E-Mail: YJM1@pge.com

April 11, 2005

Mr. Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

Subject: Monitoring Plan for Groundwater and Surface Water Monitoring Program, PG&E Topock Compressor Station, Needles, California

Dear Mr. Shopay:

This letter transmits the Monitoring Plan for Groundwater and Surface Water Monitoring Program, Revision 0. The monitoring plan has been prepared in conformance with your letter dated January 25, 2005.

If you have any questions, please do not hesitate to contact me at (805) 546-5243.

Sincerely,

Terri Hesson
for Yvonne Meeks

Monitoring Plan for Groundwater and Surface Water Monitoring Program PG&E Topock Compressor Station Needles, California

Prepared for

Pacific Gas and Electric Company

Revision 0
April 2005

Prepared by
CH2MHILL
155 Grand, Suite 1000
Oakland, CA 94604-2681

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Acronyms and Abbreviations

µS/cm	microSiemens per centimeter
^{18}O	oxygen 18
AOC	Area of Concern
bgs	below ground surface
CACA	Corrective Action Consent Agreement
CCR	California Code of Regulations
CMS	corrective measures study
COC	constituents of concern
COI	constituents of interest
COPC	constituents of potential concern
Cr(III)	trivalent chromium
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
CRBRWQCB	Colorado River Basin Regional Water Quality Control Board
DTSC	Department of Toxic Substances Control
GMP	groundwater monitoring program
HSP	Health and Safety Plan
IM	Interim Measure
MCL	maximum contaminant level
mg/L	milligrams per liter
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
PMP	Performance Monitoring Program
PMR	Performance Monitoring Report
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act

RFI	RCRA Facility Investigation
SAP	Sampling and Analysis Plan
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TDS	total dissolved solids
TPH	total petroleum hydrocarbon
TWG	Technical Work Group
VOC	volatile organic compound
WDR	Waste Discharge Requirement

1.0 Introduction

The Pacific Gas and Electric Company (PG&E) Topock Compressor Station is located in eastern San Bernardino County about 15 miles southeast of the city of Needles, California (Figure 1-1). In February 1996, PG&E and the California Department of Toxic Substances Control (DTSC) entered into a Corrective Action Consent Agreement (CACA) pursuant to Section 25187 of the California Health and Safety Code. Under the terms of the CACA, PG&E was directed to conduct a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) and implement corrective measures at the site to address constituents of concern (COCs) associated with discharges of chromium-bearing wastewater in the Bat Cave Wash area adjacent to the compressor station. Since 1997, groundwater investigation and monitoring have been conducted at the site under the RFI and an ongoing groundwater and surface water monitoring program (GMP). The DTSC is the lead agency directing and overseeing the GMP and related programs at the site.

CH2M HILL prepared this Monitoring Plan for PG&E to present the current groundwater and surface water monitoring program for the Topock Compressor Station. This Monitoring Plan provides description of the site COCs for groundwater monitoring, analytical methods and reporting limits, groundwater and surface water monitoring locations, sampling frequency, and the field methods and procedures used for the current Topock GMP. This Monitoring Plan is submitted by PG&E in response to DTSC requirements for a revised and updated water quality sampling and analysis plan (SAP) (DTSC 2005a).

1.1 Site Corrective Action Program

In February 1996, PG&E began to implement the RCRA corrective action process at the Topock site, based on the requirements of the CACA. The CACA describes the required actions and submittals that PG&E must complete at the Topock Compressor Station under the RCRA corrective action process. Under the terms of the CACA, PG&E agreed to conduct an RFI to identify and evaluate the nature and extent of all hazardous waste and constituents releases at the compressor station. The results of the RFI are used to define the release and determine the cleanup objectives. The *Draft RCRA Facility Investigation and Remedial Investigation Report* (CH2M HILL 2005a) presents the results of the RFI from February 1996 through June 30, 2004.

In addition to the RFI activities implemented by PG&E, DTSC directed PG&E to take actions, called Interim Measures (IM), pursuant to Section IV.A of the CACA. Beginning in March 2004, PG&E initiated groundwater extraction from the MW-20 monitoring wells at the MW-20 bench as part of IM No. 2. The purpose of IM No. 2 is to maintain a landward (westward) gradient in the floodplain groundwater zone. In May 2004, the groundwater extraction was transitioned to the newly-completed wells TW-2S and TW-2D and, subsequently, to TW-2D alone to maximize pumping influence in the deeper aquifer zone. In December 2004 and January/February 2005, new injection wells were installed in the East Mesa Area under IM No. 3. The IM No. 3 injection system is scheduled to begin operation in mid-2005.

Long-term cleanup options for the site will be evaluated and summarized in a corrective measures study (CMS). The CMS will identify technologies, evaluate the technologies using selection criteria, and recommend a cleanup approach for the site. The CMS will define cleanup levels for groundwater and soil/sediment (as applicable) that are protective of human health and the environment. The CMS will focus on the evaluation of potential cleanup technologies and the selection of an alternative that is both protective and consistent with remedial objectives. The CMS will be evaluated by stakeholder agencies and the public before a final cleanup plan is implemented.

Since July 2004, as part of the DTSC-required groundwater pumping and hydraulic containment interim measure, PG&E has conducted further site characterization activities for the design and evaluation of the IMs. Several of these groundwater investigation activities have been initiated or are planned to support the IMs and CMS.

1.2 GMP Background

Routine groundwater and surface water monitoring activities were initiated in 1998 as a continuation of the RFI groundwater investigation. The program initially consisted of quarterly sampling of the monitoring wells and surface water stations established during the RFI, as well as periodic sampling of inactive supply wells. Beginning in November 2003, at DTSC's request, the GMP expanded to monthly sampling of 11 wells; in January 2004, the GMP expanded to include weekly well sampling of six wells. In February 2004, surface water sampling of the Colorado River (nine locations) was incorporated into the monthly sampling events. In mid-May 2004, an additional monitoring well, installed during IM hydrogeologic investigations, was added to the weekly sampling activity.

In July 2004, at the request of DTSC (DTSC 2004), PG&E submitted a *Sampling and Analysis Plan, Groundwater and Surface Water Monitoring* (CH2M HILL 2004a) that describes the scope, schedule, and sampling and analysis procedures for the ongoing GMP. In addition, the SAP presented recommended modifications to the monitoring locations, analyses, and sampling frequency for the GMP. On August 26, 2004, PG&E received DTSC approval to:

- Incorporate 22 new IM investigation wells into the GMP.
- Expand of monthly well sampling to include 11 of the new IM investigation wells in the floodplain.
- Replace the weekly well sampling activity with biweekly well sampling of four selected floodplain wells.
- Adjust the sampling frequency of specific wells, as supported by data trends.

According to the July 2004 SAP, samples have been collected from groundwater wells and surface water stations according to the following schedule:

- Fifty-five groundwater wells and nine surface water stations along the Colorado River are sampled quarterly.

- Twenty-four groundwater wells and the nine surface water stations are sampled monthly.
- Four groundwater wells on the floodplain are sampled biweekly.
- One test well and two background monitoring wells are sampled annually.
- Three inactive supply wells are sampled every 2 years (December events).

Prior to August 26, 2004, the wells and surface water monitoring locations were sampled for the site COCs defined in the 1996 CACA. The site COCs listed in the CACA include hexavalent chromium [Cr(VI)], total dissolved chromium [Cr(T)], copper, nickel, zinc, electrical conductivity (also referred to as specific conductance), and pH.

As described in the July 2004 SAP, the parameters sampled in the quarterly GMP have included the primary site COCs Cr(VI) and Cr(T), specific conductance, pH, and the California Code of Regulations (CCR) Title 22 full list of metals (including copper, nickel, and zinc) at selected groundwater monitoring wells. Groundwater and surface water elevation data and field water quality data are also measured during the monitoring events.

Beginning in March 2004, as directed by DTSC, PG&E initiated groundwater extraction at the MW-20 bench, located adjacent to the floodplain area of the site, as part of the IM program. One of the provisions requested by DTSC for the IM activity was the collection of chemical data from selected sampling locations in the vicinity of the pumping operation (CH2M HILL 2004b). The chemical parameter performance monitoring initiated under the IM is currently being conducted as part of the GMP quarterly monitoring activity.

During January and February 2005, new groundwater monitoring wells were installed in the floodplain area of the site under the IM program. In late February 2005, weekly sampling of selected floodplain monitoring wells and surface water stations was resumed at DTSC direction and in accordance with the approved IM *Contingency Plan for Sentry Well Groundwater Monitoring* (DTSC 2005b). Groundwater monitoring of sentry wells in the floodplain area will continue in 2005 under the GMP in support of the IM performance monitoring requirements.

Under the GMP, a comparison test is being conducted to evaluate and compare field filtration and laboratory filtration of groundwater samples to be analyzed for chromium. Sampling is occurring during the March and April 2005 quarterly and monthly monitoring events to support the comparison test. The *Final Work Plan for the Chromium Filtration Comparison Test* is a separate document (CH2M HILL 2005b). The findings of the comparison test will be presented in a report to be submitted to DTSC in May 2005. These findings will be evaluated by the Topock Technical Work Group (TWG), and any revisions to the GMP will be addressed in a subsequent revision to this Monitoring Plan.

This GMP Monitoring Plan is now being prepared to incorporate the new wells into the GMP. Further, it is appropriate, as part of preparing an updated monitoring plan, to review and re-assess the major components of the current GMP, specifically monitoring locations, analytical parameters, and sampling frequency. Based on the review of the GMP and new site investigation data, recommended modifications to the Topock GMP are presented in this Monitoring Plan (Sections 4.0 and 5.0).

The GMP project team organization is described and points of contact are identified in Appendix A.

1.3 Associated Monitoring Programs

PG&E is implementing several projects at the site that include a groundwater monitoring component:

- Under the IM program (IM No. 2), groundwater quality is evaluated to assess the performance of the IM and to monitor water quality in the floodplain area of the site. IM Performance Monitoring Reports are prepared and submitted monthly. Water quality data used in preparation of the Performance Monitoring Reports is collected through the GMP field effort. Evaluation of groundwater quality in the floodplain area of the site is conducted under the IM performance monitoring program (PMP). The Performance Monitoring Plan for Interim Measures in the Floodplain Area will be submitted in April 2005 and describes the design of the floodplain monitoring program and the rationale for use of specific data in the floodplain assessment.
- Planned IM No. 3 activities at the Topock site include the operation of a subsurface injection system as a proposed water management option for treated groundwater. Waste Discharge Requirements (WDRs) adopted by the Colorado River Basin Regional Water Quality Control Board (CRBRWQCB) regulates the injection system design and implementation. The proposed injection system includes a network of injection wells, observation wells, and compliance wells that will be used to monitor changes in water levels and water quality in the immediate vicinity of the injection wells. A Compliance Monitoring Plan is in preparation and will describe the data collection associated with monitoring compliance of the injection system; the Compliance Monitoring Plan will be submitted in April 2005.
- PG&E is currently implementing a background study to more completely evaluate the range of naturally-occurring metals concentrations, including Cr(VI), in groundwater in the vicinity of the Topock site. This study is being conducted in association with the CMS for the site. The background study is being conducted in accordance with the *Draft Work Plan for Assessing Background Metals Concentrations in Groundwater* (CH2M HILL 2004c).
- In association with WDRs issued by the CRBRWQCB for the Topock Compressor Station evaporation ponds, PG&E conducts groundwater monitoring at seven wells (MW-1 and MW-3 through MW-8). These wells are not included in the GMP.

For programs that have a WDR-compliance monitoring well network (i.e., the IM No. 3 injection area compliance monitoring and the new evaporation pond programs), these dedicated well networks are not incorporated in the GMP. However, if a specific need arises, these non-GMP wells may be used for collection of supplemental groundwater data.

The July 2004 SAP contained descriptions of the field methods and procedures to be used in association with the GMP. With the initiation of other Topock programs that incorporate groundwater and surface water sampling, described above, DTSC requested that field methods and procedures that are applicable to the GMP and other Topock sampling

programs be presented in a separate field procedures manual. To ensure consistency among these various groundwater monitoring programs, PG&E prepared the *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* (Field Procedures Manual CH2M HILL 2005c). The Field Procedures Manual contains procedures for water quality sampling, analysis, and monitoring; and hydrogeologic investigation, hydraulic data collection, and aquifer testing.

This GMP Monitoring Plan, along with the associated Field Procedures Manual, defines the sampling and analysis procedures to be used in all groundwater monitoring at the site. However, this GMP Monitoring Plan presents the monitoring design/rationale for only the GMP. Design and rationale for groundwater sampling associated with the other PG&E Topock programs are identified in the separate program documents identified above.

Two companion documents, a Quality Assurance Project Plan (QAPP) for Water Quality Sampling and Analysis and a Health and Safety Plan (HSP), have also been prepared to support the Topock laboratory analyses and field sampling activities, respectively. The QAPP was submitted to DTSC as Appendix D of the Field Procedures Manual and reflects an update of the QAPP provided with the July 2004 *Sampling and Analysis Plan* (CH2M HILL 2004a). The QAPP for Water Quality Sampling and Analysis is used in conjunction with the *PG&E Program Quality Assurance Project Plan* (Program QAPP; CH2M HILL 2004d). The HSP was submitted as a stand-alone document in June 2004 (CH2M HILL 2004e). This Monitoring Plan, the Field Procedures Manual, the QAPP, and the HSP will be used in conjunction to guide and direct all groundwater and surface water sampling activities at the Topock site.

1.4 GMP Program Objectives

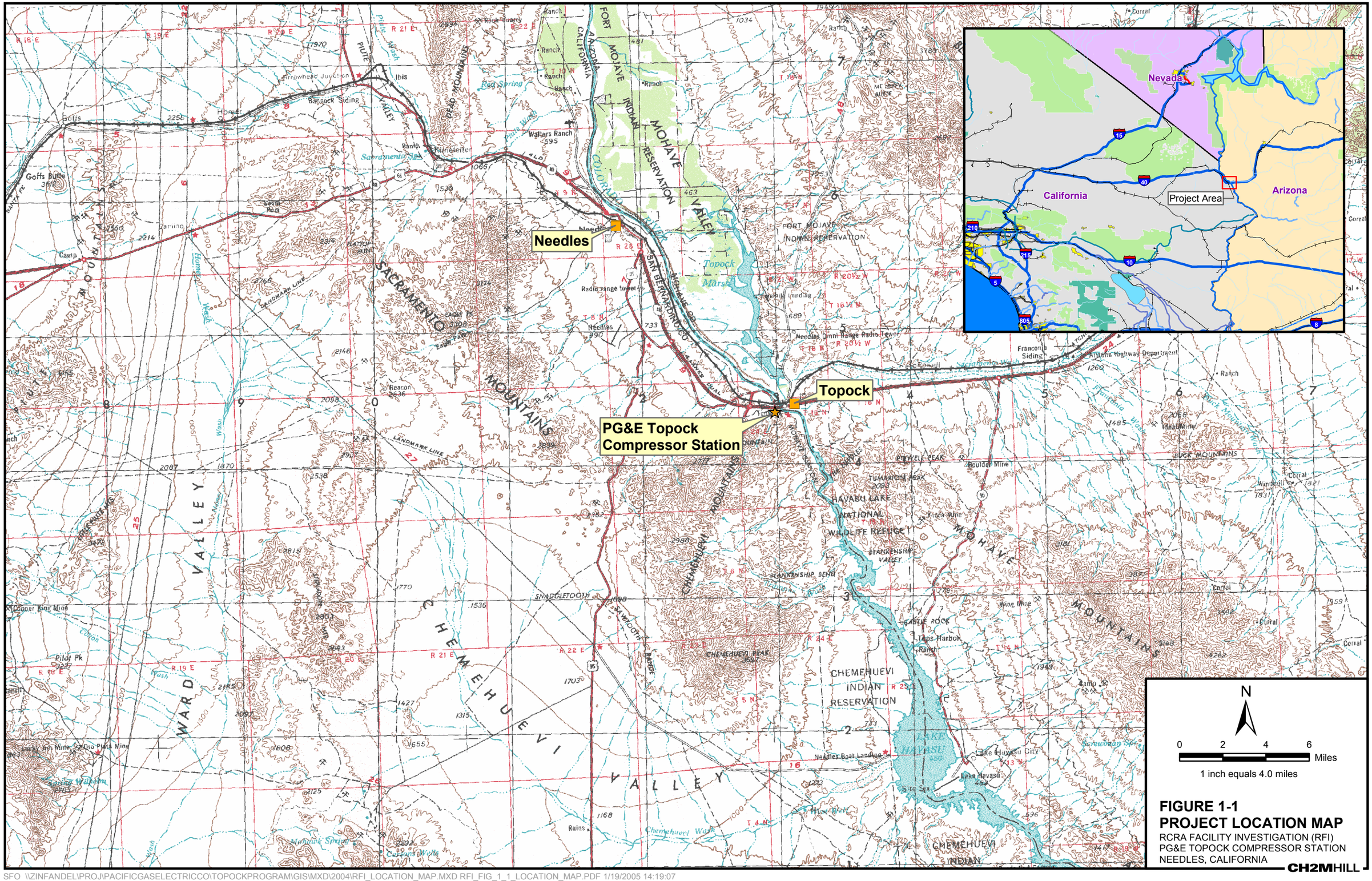
The primary purpose of the GMP is to monitor concentrations of Cr(VI), Cr(T), and other site parameters in groundwater and surface water so that changes in the distribution or concentration of the COCs can be identified and used in project decision-making and remedial planning and monitoring. Additionally, the GMP collects groundwater elevation and general chemistry data to support site characterization and other studies.

The general program data quality objectives developed for the GMP include:

- Collection of spatially-appropriate chemical data representative of the site.
- Collection of groundwater data on an appropriate frequency to assess changes in the distribution and concentration of site COCs.
- Collection of data for use in identifying whether other constituents associated with historic site disposal practices have impacted site groundwater.
- Maintenance of a sitewide database to ensure that there is a current, accurate, secure repository of site data for use among all Topock programs.
- Use of appropriate State-certified laboratory methods for chemical analyses and data quality control measures to support decision-making.

- Achieving laboratory reporting limits at levels below screening criteria (i.e., drinking water maximum contaminant levels [MCLs]).

These general data quality objectives are sufficient to support data needs for the current and future GMP and IM activities at the Topock site. Specific objectives for groundwater monitoring and surface water monitoring under the GMP are defined in Sections 4.0 and 5.0.



N

0 2 4 6 Miles

1 inch equals 4.0 miles

FIGURE 1-1
PROJECT LOCATION MAP
RCRA FACILITY INVESTIGATION (RFI)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

650-151-01

Park Moabi

Colorado River

Havasu National Wildlife Refuge
(Managed by USFWS)

650-151-02

Bureau of Reclamation
(Managed by BLM)

650-151-04

San Bernardino County
(Managed by BLM)

650-151-03

Section 5

650-151-06

650-151-05

Section 6

650-161-02

PG&E

66

650-161-14

Bureau of Reclamation
(Managed by BLM)

40

Privately Owned

650-161-11

Havasu National Wildlife Refuge
(Managed by USFWS)

650-161-09

650-161-12

Bureau of Land Management
(Owned & managed by BLM)

650-161-03

PG&E

650-161-08

Metropolitan Water district of Southern California (MWDSC)

Section 7

Section 8

650-161-06
Section 18

650-161-05
Section 17

Legend

- Parcel Boundary
- Stream
- Railroad
- Highway
- Paved Road
- Dirt or Gravel Road
- Building

Owner

- BN & SF Railroad
- Bureau of Land Management (Owned and Managed by BLM)
- Bureau of Reclamation (Managed by BLM)
- Havasu National Wildlife Refuge (HNWR)
- Metropolitan Water District of Southern California (MWDSC)
- PG&E
- Privately Owned
- San Bernardino County (Managed by BLM)

Note: The boundary lines shown are approximate and for reference only.

Source: San Bernadino County Assessor, Parcel quest, State Board of Equalization, Pacific Gas and Electric Company, Ecology and Environment and Plat maps provided by BLM.

N

0 500 1,000 2,000 Feet

1 inch equals 1,000 feet

FIGURE 1-2
SURROUNDING PROPERTIES
RCRA FACILITY INVESTIGATION (RFI)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

2.0 Background

2.1 Site Description

The Topock Compressor Station is located in eastern San Bernardino County, California, about 15 miles southeast of Needles (Figure 1-1). The compressor station occupies approximately 65 acres of PG&E-owned land. However, the study area for RCRA corrective action activities covers additional surrounding land owned and managed by a number of federal and state government agencies (Figure 2-1). The closest communities are Moabi Regional Park, California; Topock, Arizona; and Golden Shores, Arizona. There are also three Indian reservations located within 35 miles of the facility: Chemehuevi Indian Reservation, the Fort Mojave Indian Reservation, and the Colorado River Indian Reservation.

2.2 Prior Investigations

From 1997 through June 2004, five phases of RFI investigations were completed at the Topock site. A summary of the site history and results of the RFI investigations are presented in the Draft RFI Report (CH2M HILL 2005a). Additional well drilling, groundwater sampling, and a testing program were conducted during September 2004 through March 2005 to characterize the hydrogeology and groundwater quality conditions in the IM No. 3 injection area. Results are summarized in the *Draft Groundwater and Hydrogeologic Report for Interim Measures No. 3 Injection Area* (CH2M HILL 2005d). The report documents the baseline hydrogeologic and water quality conditions of the injection area.

For background to this Monitoring Plan, Figure 2-2 shows average groundwater elevations and hydraulic gradient for the Upper zone of the Alluvial Aquifer in the GMP area. Based on the average groundwater elevations measured in shallow wells during 2001 to 2003, the natural groundwater gradient in the study area is relatively flat and towards the northeast. More detailed discussion of the site hydrogeologic setting and groundwater and surface water conditions is presented in the Draft RFI Report (CH2M HILL 2005a).

2.3 Previous Groundwater and Surface Water Monitoring Program

As of March 2005, the GMP involves the collection of samples from groundwater wells and surface water stations according to the following schedules:

- Fifty-five groundwater wells and nine surface water stations are sampled quarterly.
- Twenty-four groundwater wells and nine surface water stations are sampled monthly.
- Four groundwater wells in the floodplain are sampled biweekly.
- Three inactive supply wells are sampled every 2 years (December events).

Figure 2-3 shows the locations of the groundwater wells and surface water stations that have been monitored in the Topock GMP to date. Figure 2-3 also indicates the frequency of sampling for the groundwater wells and surface water locations in the GMP to date. Table 2-1 provides a summary of groundwater monitoring wells at the site and a brief summary of Cr(VI) sampling results. Appendix B presents more a more detailed summary of Cr(VI) sampling results.

In association with the IMs being implemented at the site, DTSC defined criteria for evaluating the performance of the IMs to hydraulically contain the chromium plume in the floodplain area of the Topock site (DTSC 2005b). As part of the performance criteria, DTSC specified response actions that PG&E must initiate if Cr(VI) is newly detected in a floodplain sentry well or if an increasing Cr(VI) trend is noted in a sentry well. Response actions include implementation of the *Contingency Plan for Sentry Well Groundwater Monitoring* (DTSC 2005b).

In response to elevated levels of Cr(VI) and Cr(T) in one of the sentry wells (new monitoring well MW-34-100, installed in February 2005), DTSC directed PG&E to initiate the contingency plan for sentry well groundwater monitoring and begin weekly sampling of four monitoring wells (MW-34-80, MW-34-100, MW-27-85, and MW-27-65), as well as four consecutive weekly surface water sampling events at three surface water sampling stations (R-22, R-27, and CON) (DTSC 2005c). The weekly contingency sampling was initiated during the week of February 21, 2005. The four consecutive weekly surface water sampling events were completed during the week of March 14, 2005. Weekly contingency sampling of the four monitoring wells continues to date, and the need for continued weekly contingency sampling of these wells is currently being evaluated. Reinitiation of the contingency sampling may be directed by the DTSC if warranted by site conditions.

TABLE 2-1
Summary of Groundwater Wells and Sampling Events
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

Well ID	GMP Monitoring Frequency (March 2005)	Site Area	Monitored Zone	Date Installed	Cr(VI) Sampling Summary[1] through February 2005		Well Notes
					Number of Sampling Events	Average[2] Cr(VI) Concentration (mg/L)	
GMP Monitoring Wells							
MW-9	Q	Bat Cave Wash	UA	01-Jul-97	26	0.347	
MW-10	Q	Bat Cave Wash	UA	27-Jun-97	26	1.83	
MW-11	Q	Bat Cave Wash	UA	29-Jun-97	26	0.661	
MW-12	Q	East of Station	UA	08-Jul-97	25	0.966	
MW-13	Q	Bat Cave Wash	UA	09-Jul-97	26	0.0196	
MW-14	Q	Bat Cave Wash	UA	14-Jul-97	25	0.0353	
MW-15	Q	Bat Cave Wash	UA	10-Jul-97	24	0.0172	
MW-16	A	Near New Ponds	UA	09-Apr-98	22	0.0149	
MW-17	A	Bat Cave Wash	UA	17-May-98	19	0.00805	
MW-18	Q	West Mesa	UA	08-Apr-98	24	0.0308	
MW-19	Q	Bat Cave Wash	UA	26-Mar-98	23	0.717	
MW-20-70	Q	MW-20 bench	UA	24-Mar-98	26	10.6	
MW-20-100	Q	MW-20 bench	MA	28-Apr-99	25	3.29	
MW-20-130	Q	MW-20 bench	LA	25-Apr-99	25	6.26	
MW-21	Q	East of Station	UA	19-May-98	30	0.02	
MW-22	Q	Floodplain	UA	23-Apr-98	25	ND	
MW-23	Q	East of Station	MC	08-Apr-98	24	0.00532	
MW-24A	Q	MW-24 Bench	UA	12-May-98	24	3.19	
MW-24B	Q	MW-24 Bench	LA	13-May-98	24	4.24	
MW-24BR	Q	MW-24 Bench	BR	22-Apr-98	24	0.346	
MW-25	Q	Near Bat Cave Wash	UA	20-Apr-99	23	2.53	
MW-26	Q	Near Bat Cave Wash	UA	24-Apr-99	25	3.02	
MW-27-20	Q - M	Floodplain	UA	13-Apr-99	59	ND	
MW-27-60	---	Floodplain	MA	11-Feb-05	1	ND	Contingency plan well
MW-27-85	---	Floodplain	LA	11-Feb-05	3	ND	Contingency plan well
MW-28-25	Q - M	Floodplain	UA	13-Apr-99	59	ND	
MW-28-90	Q - M - BW	Floodplain	LA	17-Apr-04	16	ND	
MW-29	Q - M	Floodplain	UA	12-Apr-99	34	ND	
MW-30-30	Q - M	Floodplain	UA	12-Apr-99	57	ND	
MW-30-50	Q - M	Floodplain	MA	05-Mar-03	41	1.40	
MW-31-60	Q	MW-20 Bench	UA	22-Apr-99	26	3.68	
MW-31-135	Q	MW-20 Bench	LA	26-Mar-04	4	0.328	
MW-32-20	Q - M	Floodplain	UA	10-Mar-03	21	ND	
MW-32-35	Q - M	Floodplain	MA	10-Mar-03	21	ND	
MW-33-40	Q - M	Floodplain	UA	08-Mar-03	19	ND	
MW-33-90	Q - M - BW	Floodplain	MA	08-May-03	38	0.0151	
MW-33-150	---	Floodplain	LA	---	2	ND	
MW-33-210	---	Floodplain	LA	16-Feb-05	1	ND	
MW-34-55	Q - M	Floodplain	MA	06-Jun-03	41	ND	
MW-34-80	Q - M - BW	Floodplain	LA	06-Jun-03	50	0.0248	Contingency plan well
MW-34-100	---	Floodplain	LA	30-Jan-05	3	0.376	Contingency plan well
MW-35-60	Q	North Area	UA	30-Mar-04	4	0.0197	
MW-35-135	Q	North Area	LA	31-Mar-04	4	0.0117	
MW-36-20	Q - M	Floodplain	UA	03-May-04	8	0.0026	

TABLE 2-1
Summary of Groundwater Wells and Sampling Events
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

Well ID	GMP Monitoring Frequency (March 2005)	Site Area	Monitored Zone	Date Installed	Cr(VI) Sampling Summary[1] through February 2005		Well Notes
					Number of Sampling Events	Average[2] Cr(VI) Concentration (mg/L)	
GMP Monitoring Wells							
MW-36-40	Q - M	Floodplain	UA	03-May-04	8	ND	
MW-36-50	Q - M	Floodplain	MA	01-May-04	8	ND	
MW-36-70	Q - M	Floodplain	MA	03-May-04	8	ND	
MW-36-90	Q - M	Floodplain	LA	03-May-04	8	2.79	
MW-36-100	Q - M - BW	Floodplain	LA	01-May-04	16	2.16	
MW-37D	Q	Bat Cave Wash	LA	22-Apr-04	4	1.15	
MW-37S	Q	Bat Cave Wash	MA	23-Apr-04	4	0.0046	
MW-38D	Q	Bat Cave Wash	LA	10-Apr-04	4	0.165	
MW-38S	Q	Bat Cave Wash	UA	12-Apr-04	4	0.675	
MW-39-40	Q - M	Floodplain	UA	29-Apr-04	8	ND	
MW-39-50	Q - M	Floodplain	UA	28-Apr-04	8	2.29	
MW-39-60	Q - M	Floodplain	MA	22-Apr-04	8	2.83	
MW-39-70	Q - M	Floodplain	MA	29-Apr-04	8	6.33	
MW-39-80	Q - M	Floodplain	LA	28-Apr-04	8	9.12	
MW-39-100	Q - M	Floodplain	LA	22-Apr-04	9	11.1	
MW-40D	Q	I-40 Median	LA	02-May-04	4	0.0339	
MW-40S	Q	I-40 Median	UA	03-May-04	4	0.00567	
MW-41D	Q	Bat Cave Wash	LA	05-Nov-04	2	ND	
MW-41M	Q	Bat Cave Wash	MA	07-Nov-04	2	0.0047	
MW-41S	Q	Bat Cave Wash	UA	08-Nov-04	2	0.0096	
MW-42-30	---	Floodplain	UA	01-Feb-05	1	ND	
MW-42-55	---	Floodplain	MA	01-Feb-05	1	ND	
MW-42-65	---	Floodplain	LA	01-Feb-05	2	ND	
MW-43-25	---	Floodplain	UA	---	2	ND	
MW-43-75	---	Floodplain	LA	---	2	ND	
MW-43-90	---	Floodplain	LA	---	2	ND	
IM Compliance Wells							
CW-1D	---	East Mesa	LA	13-Jan-05	2	ND	
CW-1M	---	East Mesa	MA	18-Jan-05	2	0.0141	
CW-2D	---	East Mesa	LA	08-Feb-05	2	ND	
CW-2M	---	East Mesa	MA	05-Feb-05	2	0.0139	
CW-3D	---	East Mesa	LA	26-Jan-05	2	ND	
CW-3M	---	East Mesa	MA	07-Feb-05	2	0.006	
CW-4D	---	East Mesa	LA	15-Jan-05	2	ND	
CW-4M	---	East Mesa	MA	17-Jan-05	2	0.0133	
IM Observation Wells							
OW-1D	---	East Mesa	LA	24-Sep-04	3	ND	
OW-1M	---	East Mesa	MA	25-Sep-04	3	0.0085	
OW-1S	---	East Mesa	UA	18-Nov-04	1	0.0049	
OW-2D	---	East Mesa	LA	30-Dec-99	1	ND	
OW-2M	---	East Mesa	MA	05-Dec-04	1	0.0023	
OW-2S	---	East Mesa	UA	13-Dec-04	1	ND	
OW-3D	---	West Mesa	LA	11-Oct-04	3	ND	
OW-3M	---	West Mesa	MA	19-Oct-04	3	0.0129	

TABLE 2-1
Summary of Groundwater Wells and Sampling Events
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

Well ID	GMP Monitoring Frequency (March 2005)	Site Area	Monitored Zone	Date Installed	Cr(VI) Sampling Summary[1] through February 2005		Well Notes
					Number of Sampling Events	Average[2] Cr(VI) Concentration (mg/L)	
IM Observation Wells							
OW-3S	---	West Mesa	UA	21-Oct-04	3	0.0163	
OW-5D	---	East Mesa	LA	16-Nov-04	1	ND	
OW-5M	---	East Mesa	MA	20-Nov-04	1	0.008	
OW-5S	---	East Mesa	UA	21-Nov-04	1	0.0326	
Other Site Wells not in GMP							
MW-1	---	New Ponds	UA	24-Aug-86	3	0.0046	
MW-3	---	New Ponds	UA	01-Jan-86	3	0.0106	
MW-4	---	New Ponds	UA	01-Jan-86	3	0.0207	
MW-5	---	New Ponds	UA	01-Jan-89	3	0.0144	
MW-6	---	New Ponds	UA	01-Jan-89	3	0.00967	
MW-7	---	New Ponds	UA	01-Jan-89	3	0.012	
MW-8	---	New Ponds	UA	01-Jan-89	3	0.038	
MWP-8	---	Old Ponds		01-Oct-85	---	---	
MWP-10	---	Old Ponds		28-Jan-86	---	---	
MWP-12	---	Old Ponds	LA-BR	---	1	0.00024	
P-2	---	New Ponds		---	---	---	
PGE-9N	---			22-Apr-97	---	---	
PGE-9S	---			---	---	---	
Surface Water							
CON	Q-M	Surface Water		---	41	ND	
I-3	Q-M	Surface Water		---	37	ND	
NR-1	Q-M	Surface Water		---	15	ND	
NR-2	Q-M	Surface Water		---	15	ND	
NR-3	Q-M	Surface Water		---	13	ND	
R-22	Q-M	Surface Water		---	34	ND	
R-27	Q-M	Surface Water		---	36	ND	
R-28	Q-M	Surface Water		---	34	ND	
RRB	Q-M	Surface Water		---	32	ND	
Test and Extraction Wells							
IW-2	---	East Mesa	MA-LA	16-Dec-04	1	0.0064	IM system monitoring
IW-3	---	East Mesa	UA	18-Dec-04	---	---	IM system monitoring
PE-1	---	Floodplain		---	---	---	
TW-1	A	Plan B Test	UA-LA	11-Nov-03	4	4.63	
TW-2D	IM system monitoring	MW-20 bench	LA	30-Mar-04	5	7.09	IM system monitoring
TW-2S	IM system monitoring	MW-20 bench	UA	05-Apr-04	5	6.69	IM system monitoring
Water Supply Wells							
PGE-6	2A	MW-24 Bench	MA	01-Jan-64	16	0.907	
PGE-7	2A	MW-24 Bench	LA-BR	01-Jan-64	14	4.16	
PGE-8	2A	Station	BR	01-Jan-69	15	ND	
Park Moabi	Q	Park Moabi	MA	---	23	0.00474	

TABLE 2-1
Summary of Groundwater Wells and Sampling Events
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

Notes:

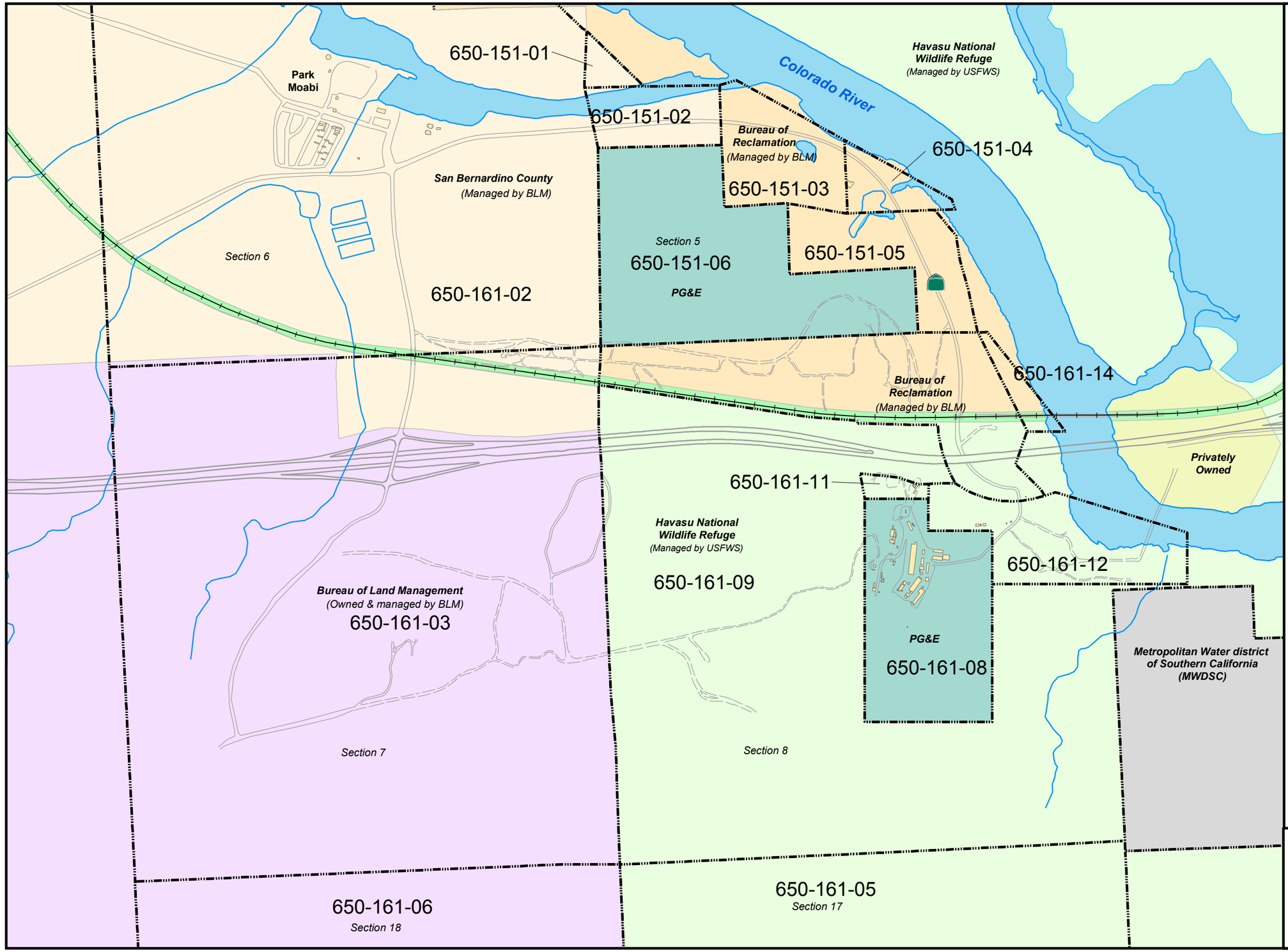
[1] Groundwater sampling data through February 2005 except MW-43 cluster and MW-33-150, sampling data through March 2005.

[2] Average of detected values

IW-2 and IW-3 wells are grab samples during injection test.

ND not detected
Q quarterly
M monthly
BW biweekly
A annually

UA upper alluvial aquifer
MA middle alluvial aquifer
LA lower alluvial aquifer
BR metamorphic bedrock
MC miocene conglomerate



Legend

- Parcel Boundary
- Stream
- Railroad
- Highway
- Paved Road
- Dirt or Gravel Road
- Building

Owner

- BN & SF Railroad
- Bureau of Land Management (Owned and Managed by BLM)
- Bureau of Reclamation (Managed by BLM)
- Havasu National Wildlife Refuge (HNWR)
- Metropolitan Water District of Southern California (MWDSC)
- PG&E
- Privately Owned
- San Bernardino County (Managed by BLM)

Note: The boundary lines shown are approximate and for reference only.

Source: San Bernadino County Assessor, Parcel quest, State Board of Equalization, Pacific Gas and Electric Company, Ecology and Environment and Plat maps provided by BLM.

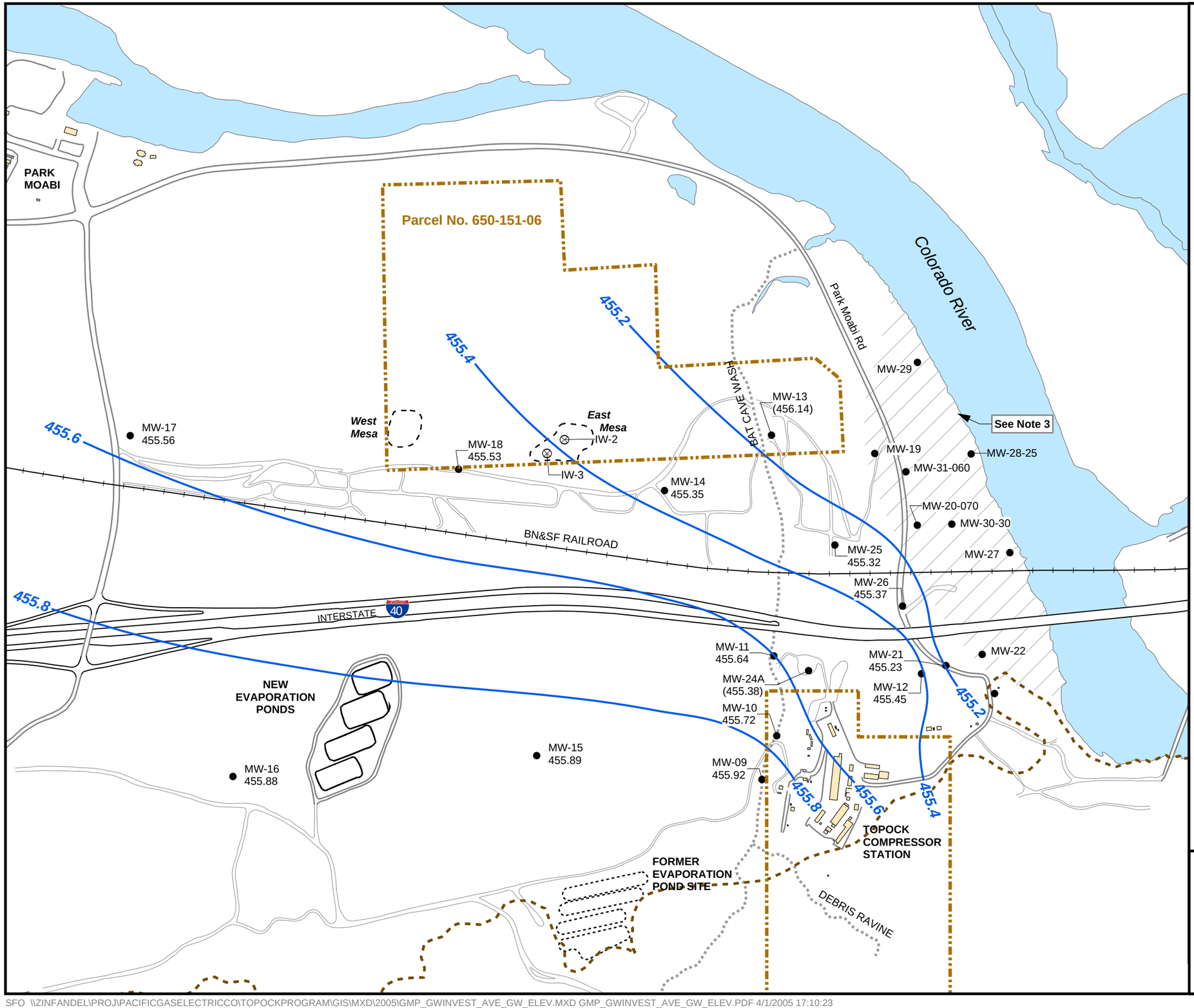
N

0 500 1,000 2,000 Feet

1 inch equals 1,000 feet

FIGURE 2-1
PROJECT AREA & LAND OWNERSHIP
MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



LEGEND

- Groundwater Monitoring Well
- IM-3 Injection Well
- Groundwater Elevation Contours (ft MSL)
- Bedrock Contact
- MW-29 455.04 — Average groundwater elevation at wells (ft MSL)
- (454.50) — Not used for contouring

Note:

1. Figure shows groundwater elevations and hydraulic gradient for Upper Zone of Alluvial Aquifer using averages of manual water level measurements between 2001 and 2003.
2. Data and contours are considered approximate. Measured elevations were subject to seasonal variation, river fluctuations, and measurement error.
3. For groundwater elevations in floodplain, see Figures 2-22a, 2-22b, and 2-22c in Draft RFI Report, Volume I (CH2M Hill, 2005)
4. Average groundwater elevations for new IM-3 wells in preparation (see text).

N

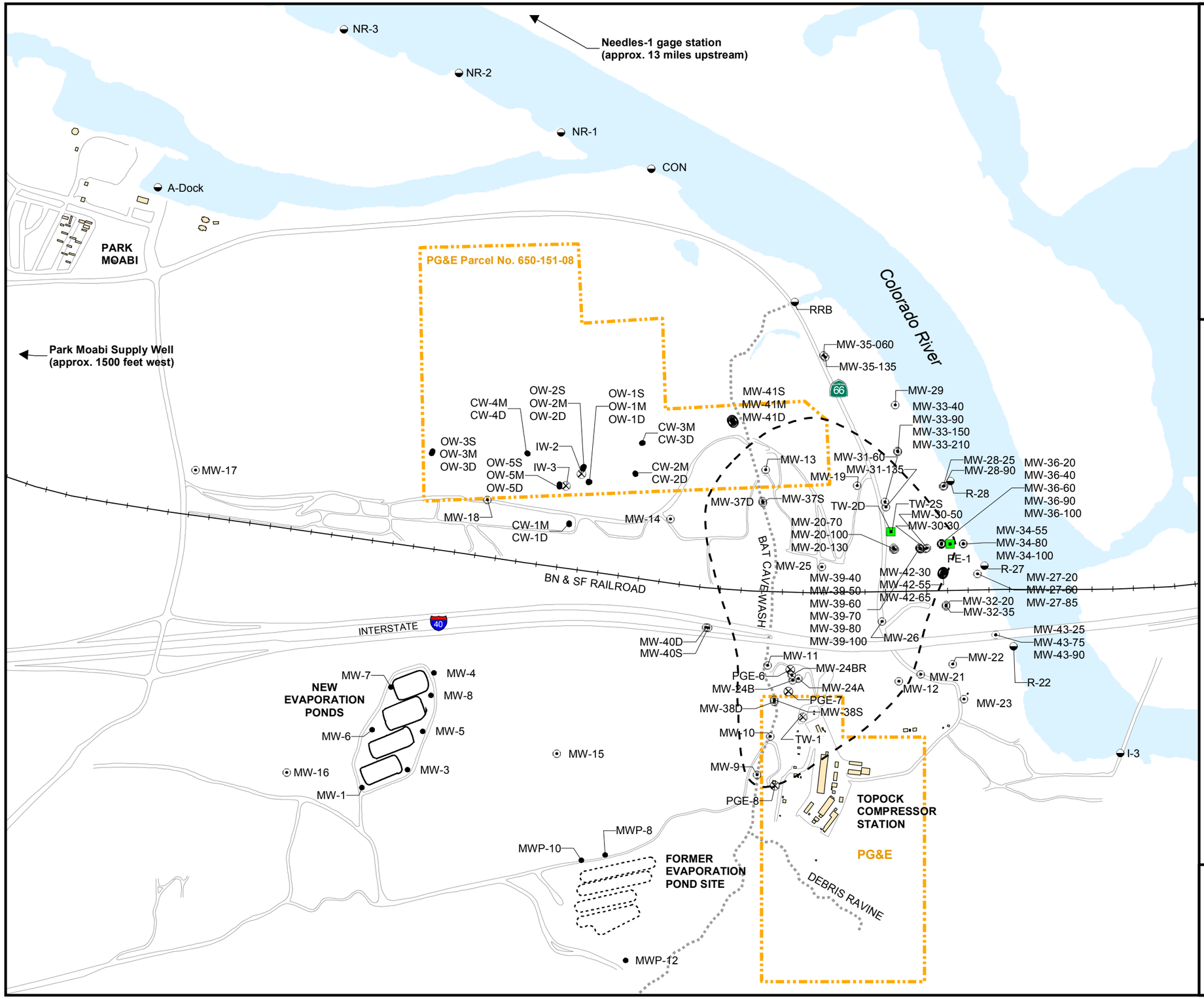
0 700 1,400 Feet

1 inch equals 700 feet

FIGURE 2-2
AVERAGE SHALLOW GROUNDWATER ELEVATIONS 2001 - 2003 (QUARTERLY MONITORING DATA)

MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



N

0 800 1,600

Feet

LEGEND

- Groundwater monitoring well
- Surface water sampling location
- Injection, test or supply well
- Interim Measure extraction well
- Groundwater monitoring well sampled in other monitoring program
- Approximate limits of hexavalent chromium greater than 50 ppb in Alluvial Aquifer, Dec. 2004

Groundwater and Surface Water Monitoring Program (GMP) Locations February 2005

Quarterly Monitoring

55 wells (all Monthly wells and MW-09, MW-12, MW-13, MW-14, MW-15, MW-18, MW-19, MW-20 cluster, MW-21, MW-22, MW-23, MW-24 cluster, MW-25, MW-26, MW-31-60, MW-31-135, MW-35-60, MW-35-135, MW-37S, MW-37D, MW-38S, MW-38D, MW-40S, MW-40S, MW-40D, Park-Moabi)

9 Surface Water Locations (NR-1, NR-2, NR-3, CON, RRB, R-22,R-27, R-28, I-3)

Monthly Monitoring

24 Wells (MW-27-20, MW-28-25, MW-28-90, MW-29, MW-30-30, MW-30-50, MW-32-20, MW-32-35, MW-33-40, MW-33-90, MW-34-55, MW-34-80, MW-36 cluster, MW-39 cluster)

9 River Locations (NR-1, NR-2, NR-3, CON, RRB, R-22, R-27, R-28, I-3)

Bi-weekly Sampling

4 Wells (MW-28-90, MW-33-90, MW-34-80, MW-36-100)

Contingency Plan (Weekly) Sampling, Feb-March 2005

4 Wells (MW-27-60, MW-27-85, MW-34-80, MW-34-100)
3 River Locations (CON, R-27, R-22)

FIGURE 2-3
GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS, FEBRUARY 2005

MONITORING PLAN FOR GROUNDWATER &
SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

3.0 Results of Groundwater and Surface Water Monitoring

3.1 Site Constituents of Concern

Chemical constituents included in the Topock GMP can be categorized as COCs, constituents of potential concern (COPCs), or constituents of interest (COIs):

- COCs are defined as constituents that are associated with historic site disposal practices and, through the RFI process or subsequent groundwater monitoring, have been shown to have impacted the site groundwater.
- COPCs are chemical constituents that, based on site history and the types of products and/or wastes present at the site, could *potentially* be present in affected media (e.g., soil, sediment, groundwater, etc.).
- COIs are constituents that do not warrant inclusion as a COC or COPC but are of interest for use in assessing or monitoring groundwater conditions and for monitoring the performance and effects of IM pumping.

This section presents the rationale for identification of site COCs, COPCs, and COIs.

3.1.1 Constituents of Concern

The primary COCs for groundwater at the Topock site are Cr(VI) and Cr(T), derived from salts used historically as a corrosion inhibitor in the station's cooling towers. Based on historical disposal practices and on data from previous investigations, the CACA also identified copper, nickel, zinc, pH, and electrical conductance as site COCs (DTSC 1996). This list of seven COCs has been the focus of the Topock groundwater investigations to date.

A review of dissolved copper, nickel, and zinc groundwater concentrations for the GMP wells over the period of 1997 to 2004 was presented in the July 2004 SAP (CH2M HILL 2004a) to demonstrate that continued monitoring for copper, nickel, and zinc in the site groundwater wells as COCs is not warranted. Over this 7-year period, no groundwater samples contained detectable concentrations of copper or zinc that exceeded MCLs. In addition, over that same time period, only three groundwater samples contained nickel at concentrations slightly above the MCL. Figure B-1 in Appendix B presents the geographic distribution of detected concentrations of dissolved copper, nickel, and zinc from the March 2004 quarterly sampling event. Figure B-2 in Appendix B presents the detected concentrations of copper, nickel, and zinc from sampling events conducted from 1997 to early 2004. These data indicate that detected concentrations of copper, nickel, and zinc in groundwater are spatially variable, suggesting that the presence of these metals in groundwater is not related to activities at the compressor station.

Based on these data trends, the July 2004 SAP presented the recommendation for removing copper, nickel, and zinc from the list of site COCs sampled during the ongoing quarterly monitoring program. Further, the Draft RFI Report (CH2M HILL 2005a) also recommended that copper, nickel, and zinc not be considered groundwater COCs. Copper, nickel, and zinc will continue to be monitored under the GMP but will now be considered COIs. Analysis for copper, nickel, and zinc will occur as part of the full-list Title 22 metals suite of analyses that is conducted at selected wells on a quarterly basis.

Specific conductance and pH were identified in the 1996 CACA as site COCs. In the Draft RFI Report, specific conductance and pH are considered to be COPCs for groundwater. Specific conductance and pH warrant being considered COPCs rather than COCs because it has not been demonstrated that specific conductance and pH have impacted the site groundwater, one of the criteria for establishing a constituent as a COC. Further, pH and specific conductance are parameters that are useful in monitoring general water quality conditions and indicating anomalous or changing site conditions. Therefore, it is proposed that pH and specific conductance be considered COPCs in the GMP.

In summary, on the basis of GMP data collected to date, and the objectives and requirements of GMP and IM activities, Cr(VI) and Cr(T) are considered primary parameters that require continued monitoring at the Topock site and are therefore defined as the groundwater COCs for the Topock GMP.

3.1.2 Constituents of Potential Concern

Based on analytical data collected during the RFI process, the COPC list for the GMP can be developed and refined. Only those COPCs that are found to be present in site groundwater, are shown to have been associated with historic site disposal practices and, through the RFI process or subsequent groundwater monitoring, have been shown to have impacted site groundwater, will be considered COCs.

3.1.2.1 Previously-identified Groundwater COPCs

Groundwater COPCs identified in the Draft RFI Report are Cr(T), Cr(VI), copper, lead, nickel, zinc, electrical conductivity, pH, and total petroleum hydrocarbons (TPH). As described above, Cr(T) and Cr(VI) are already considered to be COCs for the GMP. In addition, historical groundwater sampling indicates that detected concentrations of copper, nickel, and zinc in groundwater are not related to activities at the compressor station; therefore, copper, nickel, and zinc no longer meet the definition of a groundwater COPC. Specific conductance, pH, lead, and TPH are retained as groundwater COPCs.

3.1.2.2 Soil/Sediment COPCs

Additional COPCs were identified in the Draft RFI Report for soil and sediment media for specific Solid Waste Management Unit (SWMUs)/Area of Concern (AOCs) that are proposed to be further addressed in the RCRA corrective action process at the Topock site. These constituents were identified through the RFI process as COPCs for soil/sediment, but were not identified as groundwater COPCs due to either an incomplete groundwater pathway or it being unlikely that a release of the COPC would impact groundwater.

The discussion regarding these soil/sediment COPCs is based upon the comprehensive review of historic facility operations, development of conceptual site models, and soil, sediment, and air characterization results presented in the Draft RFI Report (CH2M HILL 2005a). For each SWMU or AOC identified in the Draft RFI Report for further investigation, the soil/sediment COPCs are:

- SWMU 1/AOC 1 – Former Percolation Bed: Cr(T), Cr(VI), copper, lead, nickel, zinc, pH, and TPH
- AOC 4 – Debris Ravine: metals (including Cr(T), Cr(VI)), polycyclic aromatic hydrocarbons (PAHs), semivolatile organic compounds (SVOCs), and asbestos
- AOC 5 and AOC 6 – Cooling Towers A and B: Cr(T), Cr(VI), copper, lead, nickel, zinc, and soil pH
- AOC 9 - Southeast Fenceline (Outside Visitor Parking Lot): Cr(T) and Cr(VI)
- AOC 10 – East Ravine: metals (including Cr(T) and Cr(VI)), SVOCs, and TPH
- AOC 13 – Unpaved Areas within the Compressor Station: metals (including Cr(T) and Cr(VI)), SVOCs, TPH motor oil, and soil pH
- Railroad Debris Site: metals (including Cr(T) and Cr(VI)), SVOCs, PAHs, TPH, and asbestos
- Auxillary Jacket Water Cooling Pumps: metals, including Cr(T) and Cr(VI)

A conceptual site model is presented in the Draft RFI Report for each of these areas. The conceptual site model for AOC 5/AOC 6, AOC 9, AOC 10 and AOC 13 indicates that the groundwater pathway is incomplete for these soil/sediment COPCs. The conceptual site model for AOC 4, the Railroad Debris Site, and the Auxillary Jacket Water Cooling Pumps indicates that releases to groundwater are unlikely due to the nature of the disposed waste, depth to groundwater, low annual precipitation, and high rates of evapotranspiration. Therefore, soil/sediment COPCs at the Topock site identified through the RFI process are eliminated as groundwater COPCs for the GMP.

3.1.2.3 Additional Constituents Analyzed at the Request of DTSC

During the RFI, at the request of DTSC, PG&E conducted groundwater sampling for perchlorate, volatile organic compounds (VOCs), SVOCs, and polychlorinated biphenyls (PCBs). Results of these additional analyses are presented in the Draft RFI Report (CH2M HILL 2005a). Perchlorate was never used or stored at the PG&E site; however, perchlorate from sources near Las Vegas has been detected in water samples from the Colorado River and Lake Havasu. DTSC was interested in determining whether perchlorate from the upstream sources had impacted the site groundwater. In June 2003, at the request of DTSC, PG&E sampled eight monitoring wells and two surface water locations for perchlorate. In June and July 2004, at DTSC request, seven selected wells, including the new IM groundwater extraction wells TW-2D and TW-2S, were sampled for perchlorate. In both the 2003 and 2004 sampling, perchlorate was not detected in any of the water samples collected at the selected groundwater wells and the two surface water locations. Due to matrix interference from the TDS levels in most of the groundwater samples, the laboratory

reporting limits for perchlorate were elevated above the reporting limits achieved for the relatively low TDS river water samples

In June 2004, at the request of DTSC, nine selected groundwater wells were sampled and analyzed for VOCs, SVOCs, and PCBs. In May 2004, DTSC collected samples for VOC, SVOC, and PCB analyses from the MW-20 cluster wells after these wells were used for interim groundwater extraction. The results of the organic compound sampling are summarized as follows:

- Except for trace concentrations of chloroform (a common laboratory contaminant) in four samples, VOCs were not detected in any of the groundwater samples collected at the 12 wells sampled.
- SVOCs were not detected in any of the groundwater samples collected at the 12 wells sampled.
- PCBs were not detected in any of the groundwater samples collected at the nine wells sampled.

VOCs, PCBs, and perchlorate were not identified during the RFI process as soil or groundwater COPCs, and the results of the groundwater sampling conducted at DTSC's request confirm that VOCs, PCBs, and perchlorate are not groundwater COPCs. SVOCs, though considered to be soil/sediment COPCs, have been shown to not be present in site groundwater; therefore, SVOCs are not considered groundwater COPCs.

3.1.2.4 Summary of Groundwater COPCs

Based on the COPC discussion above, specific conductance, pH, lead, and TPH are groundwater COPCs identified during the RFI process.

3.1.3 Constituents of Interest

As described in Section 3.1.1, copper, nickel and zinc were originally identified in the 1996 CACA as site COCs; however, these parameters have been shown to meet the definition of site COIs and are now considered to be COIs for the GMP.

Full-list CCR Title 22 trace metals analysis of select groundwater samples has been conducted quarterly since September 2004, as reported in the *Groundwater and Surface Water Monitoring Report, Third Quarter 2004* (CH2M HILL 2004f) and *Groundwater and Surface Water Monitoring Report, Fourth Quarter 2004* (CH2M HILL 2005e). Trace metals analysis of select groundwater samples will continue as part of the Topock GMP. Through this continued periodic analysis and the background study being conducted to evaluate naturally-occurring metals in site groundwater (CH2M HILL 2004c), PG&E will determine whether any trace metals are shown to have impacted site groundwater and therefore warrant inclusion as a groundwater COPC or COC. Until that determination is made, trace metals will be considered groundwater COIs (with the exception of chromium, which is a COC, and lead, which is a COPC).

The field water quality parameters of specific conductance, oxygen-reduction potential, dissolved oxygen, pH, temperature, TDS, and turbidity provide screening-level information regarding water quality, including the redox conditions of the aquifer, and are routinely

measured during groundwater and surface water monitoring events. These field water quality parameters are included as COIs for the GMP.

3.2 Distribution of COCs in Groundwater and Surface Water

This section summarizes the distribution of chromium in groundwater and surface water at the Topock site. As described in Section 3.1, Cr(T) and Cr(VI) are the only constituents that currently meet the definition of a COC for the Topock site. The distribution in groundwater of other constituents, defined as COPCs or COIs, are discussed in Section 3.3. The information provided here is summarized from the Draft RFI Report (CH2M HILL 2005a) and the *Groundwater and Surface Water Monitoring Report, Fourth Quarter 2004* (CH2M HILL 2005e).

Figure 3-1 presents recent Cr(VI) results for all wells installed at the site through the end of February 2005. Cr(VI) results presented in Figure 3-1 represent the highest value reported between December 2004 and February 2005, which captures analytical results from the fourth quarter 2004 sampling event as well as more recent results for the wells installed during the January–February 2005 period (wells that were not captured in the fourth quarter 2004 sampling event). Figure 3-1 also shows the approximate outline of Cr(VI) in groundwater greater than 0.050 mg/L (the California MCL for total chromium) based on the December 2004 sampling results.

Figures B-3, B-4, and B-5 in Appendix B present the vertical distribution of Cr(VI) results from the December 2004 quarterly sampling event, showing wells that monitor the upper, middle, and lower zones of the Alluvial Aquifer, respectively, and surface water locations. Figures B-3 through B-5 also show the approximate outline of Cr(VI) in groundwater greater than 0.050 mg/L based on the December 2004 quarterly event sampling results for the upper, middle, and lower zones of the Alluvial Aquifer. The distribution and concentrations of Cr(VI) shown in Figures B-3 through B-5 are consistent and comparable with the pre-December 2004 quarterly monitoring data (CH2M HILL 2005e).

In the Draft RFI Report, data assessing the vertical distribution of chromium in the Alluvial Aquifer were presented for 15 monitoring well clusters. The maximum detected and average concentrations of Cr(VI) observed in groundwater sampling at seven of the well clusters show a wide range in concentration and no uniform trend of Cr(VI) concentration with depth in the aquifer.

As describe in the Draft RFI Report, the chromium plume is defined as chromium-bearing groundwater exceeding the State of California MCL for Cr(T) of 0.05 mg/L. The chromium plume is confined to the more permeable alluvial/fluvial deposits that comprise the Alluvial Aquifer. The plume exceeding the MCL underlies an area of approximately 70 acres. The groundwater chromium plume extends over a distance of approximately 2,800 feet from the southern portion of the Alluvial Aquifer (upper Bat Cave Wash) to the Colorado River floodplain.

Since initiation of surface water sampling, Cr(VI) has not been detected in samples of Colorado River water collected at multiple locations both upstream and downstream from the Topock site. During the RFI, samples of interstitial water from shallow drive points installed at eight locations in the river bottom were also non-detect for Cr(VI).

3.3 Distribution of Other Constituents in Groundwater and Surface Water

Since initiation of the RFI and routine monitoring at the Topock site, several other constituents besides chromium have been monitored in groundwater and surface water. This section summarizes the distribution of these other constituents in groundwater and surface water at the site.

3.3.1 Inorganic Constituents

Several general water quality parameters have been measured at the Topock site from 1998 through June 2004. Parameters monitored include TDS, total organic carbon, anions, cations, general minerals, stable isotopes (deuterium and ^{18}O), pH, specific conductance, and field parameter measurements. In the Draft RFI Report (CH2M HILL 2005a), the groundwater analytical results for inorganic parameters were compared to the California primary and secondary MCL water quality standards, where applicable. A summary of exceedences to these MCL values is presented here.

As presented in the Draft RFI Report, the average TDS concentrations in the RFI wells range from maximum of 43,600 mg/L to less that 1,000 mg/L (recommended secondary MCL for TDS is 500 mg/L with an upper level of 1,000 mg/L). Only two monitoring wells in the well network have average TDS concentrations below the secondary MCL.

The following inorganic constituents have been detected at least once in concentrations in groundwater exceeding the state drinking water MCLs:

- Chloride, secondary MCL 250 mg/L (89 percent of the RFI wells)
- Fluoride, secondary MCL 2.0 mg/L (64 percent of the RFI wells)
- Nitrate as N, primary MCL 10.0 mg/L (three RFI wells sampled 2003-2004)
- Nitrite, primary MCL 1.0 mg/L (slight exceedances in wells MW-11, MW-24BR)
- Sulfate, secondary MCL 250 mg/L (78 percent of the RFI wells)
- Iron, secondary MCL 0.3 mg/L (31 percent of the RFI wells)
- Manganese, secondary MCL 0.05 mg/L (70 percent of the RFI wells)

3.3.2 Perchlorate

Groundwater sampling and analysis for perchlorate was conducted in June 2003 (eight monitoring wells and two surface water locations) and June and July 2004 (seven groundwater monitoring wells) at the request of the DTSC during the RFI process. As presented in the Draft RFI Report (CH2M HILL 2005a), in both the 2003 and 2004 sampling, perchlorate was not detected in any of the samples collected at the selected groundwater wells and surface water locations.

3.3.3 Other Trace Metals

Copper, nickel, and zinc were identified as site COPCs in the 1996 CACA and have been analyzed in groundwater during the RFI and subsequent site monitoring. Figures B-1 and B-2 in Appendix B summarize the maximum concentrations and frequency of detection for the dissolved copper, nickel, and zinc analyses from the RFI groundwater wells. As

presented in the July 2004 SAP (CH2M HILL 2004a), over 5 years of sampling data indicate these trace metals are either infrequently detected (copper, nickel) and/or are detected consistently at low concentrations below the drinking water MCL (zinc).

Full-list CCR Title 22 trace metals analysis was conducted in June 2004 for groundwater samples from nine wells as part of the RFI. CCR Title 22 trace metals analysis has also been included in quarterly GMP events since September 2004. In the June 2004 groundwater sampling event, in addition to Cr(T), the only dissolved trace metals detected above primary drinking water MCLs are antimony and arsenic (each exceeded its primary MCL in one location); the concentrations of the other detected metals, excluding Cr(T), were below drinking water standards. In the September 2004 sampling event, only antimony and arsenic were detected at concentrations above their respective drinking water standards, at only one well location; the concentrations of the other detected metals, excluding chromium, were below drinking water standards. In the December 2004 groundwater sampling event, excluding Cr(T), the dissolved concentrations of the trace metals detected were below drinking water standards.

3.3.4 Organic Compounds

Groundwater sampling and analysis for other constituents have been conducted at the request of the DTSC during the RFI process. These other constituents include VOCs, SVOCs, and PCBs. As presented in the Draft RFI Report (CH2M HILL 2005a), VOCs were not detected in any of the groundwater samples collected from 12 wells, except for trace concentrations of chloroform (a common laboratory contaminant) in four samples. SVOCs were not detected in any of the groundwater samples collected from the 12 wells. PCBs were not detected in any of the groundwater samples collected from nine wells.

3.3.5 Specific Conductance and pH

Specific conductance and pH results for surface water were evaluated in the Draft RFI Report (CH2M HILL 2005a). The RFI surface water sampling indicates no discernable difference between specific conductance or pH results collected upstream and downstream of Bat Cave Wash.

3.4 Background Water Quality

PG&E is currently implementing a background study to more completely evaluate the range of naturally-occurring metals concentrations, including Cr(VI), in groundwater in the vicinity of the Topock CMS Measures Study. The *Draft Work Plan for Assessing Background Metals Concentrations in Groundwater* (CH2M HILL 2004c) identifies the process for selecting and evaluating potential background wells in the vicinity of the Topock site, describes the sampling frequency and analytical methods for the background study, and discusses methods to be used to calculate and evaluate background concentrations of metals in groundwater. Groundwater samples are proposed to be collected during six bimonthly sampling events from pre-selected wells in the area that exhibit similar groundwater geochemistry to at the Topock site. Wells to be sampled as part of the background study will include on-site monitoring wells and off-site supply wells located in both California and Arizona.

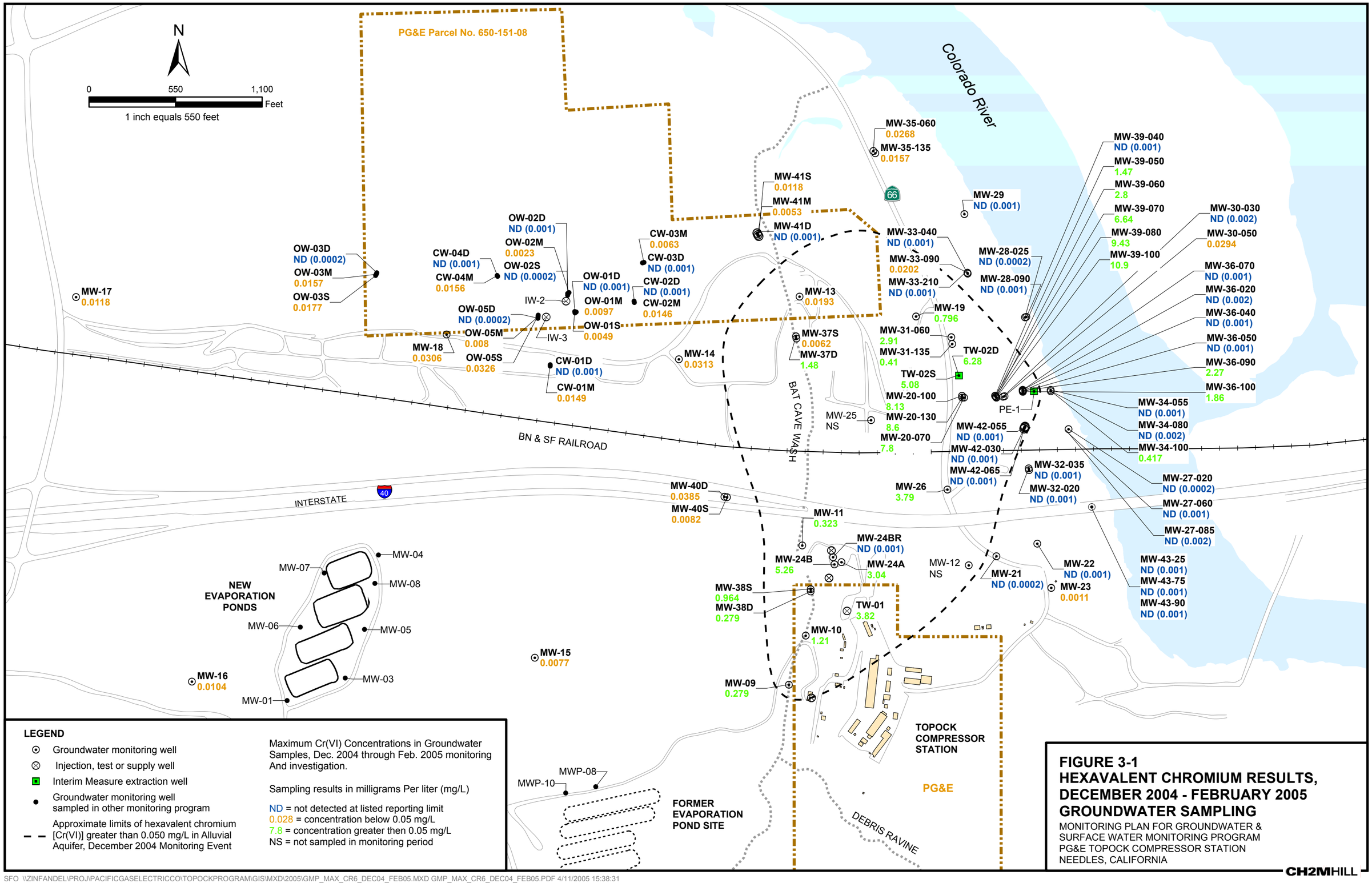


FIGURE 3-1
HEXAVALENT CHROMIUM RESULTS, DECEMBER 2004 - FEBRUARY 2005 GROUNDWATER SAMPLING

MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

4.0 Current Groundwater Monitoring Plan

4.1 Groundwater Monitoring Objectives

In addition to the general GMP program objectives outlined in Section 1.4, the following specific objectives are established for groundwater monitoring at the Topock site:

- Monitor for new detections of Cr(T) and Cr(VI) beyond the leading edge of the plume. These data will be used to identify the need for additional monitoring locations and the need for modifications to the interim remedial measures in operation at the site.
- Monitor for spatial and temporal changes in Cr(T) and Cr(VI) concentrations at the leading edge of the plume. These data will be used to evaluate the effectiveness of the interim remedial measures at controlling the leading edge of the chromium plume.
- Monitor changes in Cr(T) and Cr(VI) concentrations within the plume over long periods of time. These data will be used to evaluate the effectiveness of the interim remedial measures at reducing chromium concentrations in the core of the chromium plume.
- Collect data regarding concentrations of any groundwater COPCs, identified in Section 3.1, in the vicinity of the SWMUs/AOCs for which the COPCs were identified in the Draft RFI Report. These data will be used to determine if any COPC has impacted site groundwater and warrants being included as a site COC.
- Collect general chemistry data to support identification of anomalous or changing groundwater conditions and to increase the understanding of site hydrogeological processes.

4.2 Assessment and Rationale for Groundwater Monitoring

As part of preparing this updated GMP monitoring plan, groundwater data from the existing GMP program and the IM groundwater investigations were reviewed to re-assess the monitoring needs and scope for the ongoing GMP. This review included an evaluation of new monitoring wells installed during January and February 2005 for inclusion in the GMP. (Table C-1 in Appendix C summarizes well depth, monitoring interval, and sampling information for the wells in the current GMP and the new IM investigation wells installed during January and February 2005.) The monitoring needs of the GMP were also re-assessed against the groundwater monitoring objectives outlined in Section 4.1.

For all wells included in the GMP, Table 4-1 summarizes the previous sampling frequency for the GMP wells, the proposed 2005 sampling frequency, the rationale for the proposed 2005 sampling frequency, and any proposed modifications to the analytical parameters for each well.

Based on the available sampling results and the addition of several new GMP and IM wells to the GMP network, several modifications to the sampling locations and frequency for the Topock GMP are proposed at this time and are summarized in Table 4-1. The intent of the modifications proposed in this Monitoring Plan is to optimize the location and collection of water quality data in areas of new and existing wells where IM activities and remediation efforts will be focused and to ensure that the objectives of groundwater monitoring are achieved.

4.2.1 Monitoring Locations

All GMP monitoring wells previously included in the GMP will carry into the revised Monitoring Plan. In addition, new monitoring wells installed during January and February 2005 will be incorporated into the GMP as follows:

- Eleven new floodplain wells will be added to the GMP: MW-27-60, MW-27-85, MW-33-150, MW-33-210, MW-34-100, the MW-42 cluster (MW-42-30, MW-42-55, and MW-42-65), and the MW-43 cluster (MW-43-25, MW-43-75, and MW-43-90).
- Three new wells in Bat Cave Wash will be added to the GMP: MW-41S, MW-41M, and MW-41D.
- Select new IM No. 3 observation wells will be added to the GMP to provide additional areal coverage of the north-central portion of the investigation area. The OW-3 cluster (OW-3S, OW-3M, and OW-3D) will be added to the GMP.

With these additions to the GMP, the number of groundwater wells and surface water sample locations to be monitored is as follows:

- Seventy groundwater wells and nine surface water stations will be sampled quarterly.
- Thirty-five groundwater wells and nine surface water stations will be sampled monthly.
- Four groundwater wells in the floodplain will be sampled biweekly.
- Four groundwater wells will be sampled semi-annually
- Three inactive supply wells and one test well will be sampled every 2 years.

Table 4-1 identifies the wells included in the GMP.

4.2.2 Monitoring Frequency and Parameters

This section presents the rationale for monitoring frequency of selected laboratory analyses. Table 4-2 presents a summary of the groundwater sampling analyses and frequency for each monitoring well in the GMP. Table 4-3 identifies the analytical methods and reporting limits for the COCs, COPCs, and field parameters monitored in the GMP.

All monitoring wells on the floodplain will be monitored monthly, at a minimum, for Cr(T) and Cr(VI), with the exception of MW-22, which will be monitored only quarterly. Four floodplain wells that are in critical sentry locations will be monitored biweekly for Cr(T) and Cr(VI). The wells proposed for monthly or biweekly sampling are identified in Table 4-1, Table 4-2, and Figure 4-1.

Most other GMP monitoring wells will be analyzed quarterly for Cr(T) and Cr(VI). Exceptions to the quarterly monitoring are MW-16 (a background monitoring well located

upgradient of Bat Cave Wash) and the three observation wells (OW-3 cluster), which will be monitored semiannually. Table 4-1, Table 4-2, and Figure 4-1 summarize the wells to be monitored quarterly. Quarterly monitoring of the active water supply well at Park Moabi will also continue.

At the request of DTSC (2005a), quarterly sampling for the full list of CCR Title 22 metals will continue to be conducted at nine specific GMP monitoring well locations: MW-20-70, MW-20-130, MW-34-55, MW-34-80, MW-10, MW-11, MW-12, MW-25, and MW-37D.

Monitoring of inactive test well TW-1 is proposed to continue once every two years under the GMP. This well is located within the chromium plume, and biennial monitoring for COCs will serve to verify water quality in this location. Other test wells (IW-2, IW-3, TW-2D, TW-2S, and PE-1) will be monitored as part of their respective IM system monitoring programs and are not included in the GMP.

Inactive PG&E water supply wells PGE-6, PGE-7, and PGE-8 will continue to be monitored once every 2 years to verify water quality in these locations. These wells are not constructed in the manner of a groundwater monitoring well and therefore do not provide data that are correlative to data from site monitoring wells. Therefore, more frequent monitoring of these wells is not warranted.

Additional COPCs, identified in the RFI, are proposed for periodic monitoring in locations where the COPCs could have the potential to impact site groundwater. COPC analysis is currently proposed only for the selected monitoring wells that are in proximity to the SWMUs or AOCs that were identified in the Draft RFI Report as potential source areas for the COPCs. The following specific COPCs and monitoring locations are proposed:

- Specific conductance and pH. Samples from all GMP monitoring wells will be continue to be analyzed for specific conductance and pH along with COCs during quarterly sampling events. In addition to being groundwater COPCs, these two parameters serve as indicators of potential anomalies or changing groundwater conditions and therefore warrant analysis.

- TPH was identified as a groundwater COPC. TPH analysis has not been previously included in the analytical suite for the GMP. To initially assess whether TPH warrants continued inclusion as a groundwater COPC, sampling of select monitoring wells for TPH is proposed to occur semi-annually for 4 events. MW-9, MW-10, MW-11, and MW-25 are selected for TPH analysis based upon the location of these wells close to the potential source SWMUs/AOCs.

- Lead was identified as a groundwater COPC. The location of wells that are currently monitored quarterly for CCR Title 22 metals (including lead) include several wells within the vicinity of RFI SWMUs and AOC. Therefore, additional monitoring for lead as a groundwater COPC is not currently proposed.

Finally, in late February 2005, weekly sampling of selected floodplain monitoring wells was initiated at DTSC direction and in accordance with the approved IM *Contingency Plan for Sentry Well Groundwater Monitoring* (DTSC 2005b). Weekly monitoring of selected wells will occur only when required in accordance with the Contingency Plan and by the direction of DTSC.

4.3 Sampling, Analysis, and Field Procedures

Standard procedures to be used in association with GMP monitoring events are presented in the Field Procedures Manual (CH2M HILL 2005c). The Field Procedures Manual presents standardized protocol for sample collection, laboratory analysis, and other field investigation and data collection activities for the several investigation, monitoring, and interim measure programs undertaken at the Topock compressor station.

Currently, GMP samples collected for Cr(VI) and Cr(T) analysis are sent to the laboratory unpreserved and unfiltered. Filtration followed by preservation is performed in the laboratory within 12 hours of sample collection, prior to analysis. However, to evaluate whether field filtration may be preferable to laboratory filtration for quality assurance, a chromium sample filtration comparison test is being undertaken at the Topock site. The final *Work Plan for Chromium Sample Filtration Comparison Test* describes the design of the test, sampling methodology, and data evaluation (CH2M HILL 2005b). Because the groundwater matrix is highly variable over the site area, and Cr(VI) concentrations vary spatially and temporally, a carefully planned and implemented comparative test is necessary to ensure the integrity of long-term data and the achievement of data quality objectives. The findings of the comparative test will be incorporated into a subsequent revision of this Monitoring Plan. The proposed field filtering and sample preservation procedures for use in the comparative test are presented as a standard operating procedure (SOP) in the Field Procedures Manual (CH2M HILL 2005c).

GMP samples collected for all metals except Cr(VI) and Cr(T) (pending comparative filtration test results evaluation) will be field filtered and preserved as appropriate.

It should be noted that samples collected from active water supply wells (e.g., the Park Moabi well) will not be filtered in the field or in the laboratory, in accordance with California Department of Health Services guidelines for sampling of water use systems.

4.4 Water Level Measurements

Manual water level measurements will routinely be collected as part of the GMP and are taken prior to purging and sampling of monitoring wells, observation wells, and inactive water supply wells included in the GMP. Groundwater level measurements will not be obtained from active supply wells due to their construction and near constant operation.

As part of the IMs being implemented at the Topock site, transducers have been installed in many of the GMP monitoring wells. Water level data collected using these transducers is downloaded and evaluated under the IM program and is not addressed in the GMP.

In addition to the routine water level measurements taken in association with well purging, a field water level measurement survey will be conducted quarterly to collect data needed to generate and update an average shallow groundwater elevations gradient map for the site. At the beginning of each quarterly event, water levels will be measured manually in approximately 15 selected wells that monitor the upper zone of the Alluvial Aquifer and are not located in the floodplain. (The quantity and/or distribution of monitoring wells in the middle and deeper zones do not provide sufficient coverage of the site to produce a site-wide gradient assessment for these depth zones.) The wells may include MW-9, MW-10,

MW-11, MW-12, MW-13, MW-14, MW-15, MW-16, MW-17, MW-18, MW-21, MW-24A, MW-25, MW-26, MW-38S, MW-40S, and MW-41S. Water level measurements obtained by transducers during the same time period from selected wells in the floodplain and the IM No. 3 well field will be incorporated with the manual water level measurements to produce a quarterly water level dataset.

After four quarters of water level datasets are compiled, average salinity-adjusted groundwater elevations for the shallow well network will be plotted and contoured to produce an average shallow groundwater gradient map. Following two additional quarters of water level measurements, the running-average quarterly groundwater elevations will be updated, and an updated gradient map will be prepared.

4.5 Well Inspection and Maintenance

Each time a monitoring well is sampled, the well will be inspected in accordance with the well inspection and maintenance procedures presented in the Field Procedures Manual (Section 4.10). The Field Procedures Manual describes the specific items to be inspected, documentation of the inspection, and corrective action measures to be taken to ensure that monitoring wells are maintained in good operating condition.

4.6 Groundwater Monitoring Schedule

Table 4-4 presents the schedule for the 2005 Topock GMP, including approximate sampling dates.

In the event the IM *Contingency Plan for Sentry Well Groundwater Monitoring* must be implemented, weekly contingency sampling of select groundwater monitoring wells will be implemented under the GMP. The weekly contingency sampling is not shown in the schedule in Table 4-4.

TABLE 4-1

Rational for Selection of Monitoring Wells for Inclusion in 2005 GMP

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Well ID[1]	Site Area	Well Status	Previous Sampling Frequency	Proposed 2005 Sampling Frequency	Rationale for 2005 Sampling Frequency	Proposed Modifications to Analyses
GMP Monitoring Wells						
MW-9	Bat Cave Wash	existing GMP	Q	Q		Add semi-annual analysis for TPH, an RFI groundwater COPC.
MW-10	Bat Cave Wash	existing GMP	Q	Q		Add semi-annual analysis for TPH, an RFI groundwater COPC. Full-list Title 22 metals analysis per DTSC request.
MW-11	Bat Cave Wash	existing GMP	Q	Q		Add semi-annual analysis for TPH, an RFI groundwater COPC. Full-list Title 22 metals analysis per DTSC request.
MW-12	East of Station	existing GMP	Q	Q		Full-list Title 22 metals analysis per DTSC request.
MW-13	Bat Cave Wash	existing GMP	Q	Q		
MW-14	Bat Cave Wash	existing GMP	Q	Q		
MW-15	Bat Cave Wash	existing GMP	Q	Q		
MW-16	Near New Ponds	existing GMP	A	S	Background monitoring well located upgradient of Bat Cave Wash.	
MW-17	Bat Cave Wash	existing GMP	A	Q	Background monitoring well located upgradient of Bat Cave Wash. Increase monitoring frequency to quarterly to allow for assessment of temporal trends in the western portion of the site.	
MW-18	West Mesa	existing GMP	Q	Q		
MW-19	Bat Cave Wash	existing GMP	Q	Q		
MW-20-70	MW-20 bench	existing GMP	Q	Q		Full-list Title 22 metals analysis per DTSC request.
MW-20-100	MW-20 bench	existing GMP	Q	Q		
MW-20-130	MW-20 bench	existing GMP	Q	Q		Full-list Title 22 metals analysis per DTSC request.
MW-21	East of Station	existing GMP	Q	Q		
MW-22	Floodplain	existing GMP	Q	Q		
MW-23	East of Station	existing GMP	Q	Q		
MW-24A	MW-24 Bench	existing GMP	Q	Q		
MW-24B	MW-24 Bench	existing GMP	Q	Q		
MW-24BR	MW-24 Bench	existing GMP	Q	Q		

TABLE 4-1

Rational for Selection of Monitoring Wells for Inclusion in 2005 GMP

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Well ID[1]	Site Area	Well Status	Previous Sampling Frequency	Proposed 2005 Sampling Frequency	Rationale for 2005 Sampling Frequency	Proposed Modifications to Analyses
GMP Monitoring Wells						
MW-25	Near Bat Cave Wash	existing GMP	Q	Q		Add semi-annual analysis for TPH, an RFI groundwater COPC. Full-list Title 22 metals analysis per DTSC request.
MW-26	Near Bat Cave Wash	existing GMP	Q	Q		
MW-27-20	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-27-60	Floodplain	new IM well	---	Q - M	New monitoring well on floodplain; monthly monitoring.	
MW-27-85	Floodplain	new IM well	---	Q - M - BW	New sentry monitoring well on floodplain. Conduct frequent (biweekly) monitoring in LA near river.	
MW-28-25	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-28-90	Floodplain	existing GMP	Q - M - BW	Q - M	Floodplain sentry well. Water quality trend established; monthly monitoring sufficient.	
MW-29	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-30-30	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-30-50	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-31-60	MW-20 Bench	existing GMP	Q	Q		
MW-31-135	MW-20 Bench	existing GMP	Q	Q		
MW-32-20	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-32-35	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-33-40	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-33-90	Floodplain	existing GMP	Q - M - BW	Q - M	Floodplain sentry well. Water quality trend established; monthly monitoring sufficient.	
MW-33-150	Floodplain	new IM well	---	Q - M	New monitoring well on floodplain; monthly monitoring.	
MW-33-210	Floodplain	new IM well	---	Q - M	New monitoring well on floodplain; monthly monitoring.	
MW-34-55	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	Full-list Title 22 metals analysis per DTSC request.
MW-34-80	Floodplain	existing GMP	Q - M - BW	Q - M - BW	Floodplain sentry well; maintain frequent (biweekly) monitoring in LA near river.	Full-list Title 22 metals analysis per DTSC request.
MW-34-100	Floodplain	new IM well	---	Q - M - BW	New sentry monitoring well on floodplain. Conduct frequent (biweekly) monitoring in LA near river.	

TABLE 4-1
Rational for Selection of Monitoring Wells for Inclusion in 2005 GMP
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

Well ID[1]	Site Area	Well Status	Previous Sampling Frequency	Proposed 2005 Sampling Frequency	Rationale for 2005 Sampling Frequency	Proposed Modifications to Analyses
GMP Monitoring Wells						
MW-35-60	North Area	existing GMP	Q	Q		
MW-35-135	North Area	existing GMP	Q	Q		
MW-36-20	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-36-40	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-36-50	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-36-70	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-36-90	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-36-100	Floodplain	existing GMP	Q - M - BW	Q - M - BW	Floodplain well; maintain frequent (biweekly) monitoring in LA near river for data trends.	
MW-37D	Bat Cave Wash	existing GMP	Q	Q		Full-list Title 22 metals analysis per DTSC request.
MW-37S	Bat Cave Wash	existing GMP	Q	Q		
MW-38D	Bat Cave Wash	existing GMP	Q	Q		
MW-38S	Bat Cave Wash	existing GMP	Q	Q		
MW-39-40	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-39-50	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-39-60	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-39-70	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-39-80	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-39-100	Floodplain	existing GMP	Q - M	Q - M	Monthly monitoring of this floodplain well.	
MW-40D	I-40 Median	existing GMP	Q	Q		
MW-40S	I-40 Median	existing GMP	Q	Q		
MW-41D	Bat Cave Wash	existing GMP	Q	Q		
MW-41M	Bat Cave Wash	existing GMP	Q	Q		
MW-41S	Bat Cave Wash	existing GMP	Q	Q		
MW-42-30	Floodplain	new IM well	---	Q-M	New monitoring well on floodplain; monthly monitoring	
MW-42-55	Floodplain	new IM well	---	Q-M	New monitoring well on floodplain; monthly monitoring	

TABLE 4-1

Rational for Selection of Monitoring Wells for Inclusion in 2005 GMP

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Well ID[1]	Site Area	Well Status	Previous Sampling Frequency	Proposed 2005 Sampling Frequency	Rationale for 2005 Sampling Frequency	Proposed Modifications to Analyses
GMP Monitoring Wells						
MW-42-65	Floodplain	new IM well	---	Q-M	New monitoring well on floodplain; monthly monitoring	
MW-43-25	Floodplain	new IM well	---	Q-M	New monitoring well on floodplain; monthly monitoring	
MW-43-75	Floodplain	new IM well	---	Q-M	New monitoring well on floodplain; monthly monitoring	
MW-43-90	Floodplain	new IM well	---	Q-M	New monitoring well on floodplain; monthly monitoring	
IM Observation Wells						
OW-3D	West Mesa	new IM investigation well	---	S	Add this IM well to GMP to provide improved areal coverage of the north-central portion of the site.	
OW-3M	West Mesa	new IM investigation well	---	S	Add this IM well to GMP to provide improved areal coverage of the north-central portion of the site.	
OW-3S	West Mesa	new IM investigation well	---	S	Add this IM well to GMP to provide improved areal coverage of the north-central portion of the site.	
Test and Extraction Wells						
TW-1	Plan B Test	idle test well	A	(2A)	Long-screen; 2 year sampling frequency, sufficient for verifying water quality.	
Water Supply Wells						
PGE-6	MW-24 Bench	inactive supply	2A	2A		
PGE-7	MW-24 Bench	inactive supply	2A	2A		
PGE-8	Station	inactive injection	2A	2A		
Park Moabi	Park Moabi	active supply	Q	Q		

Notes:

Proposed changes to current sampling frequency are circled.

[1] Wells being monitored under other programs are addressed in their respective monitoring plans.

Q quarterly
M monthly
BW biweekly
A annually
2A every two years
S semi-annually

LA lower alluvial aquifer

TABLE 4-2
Groundwater Sampling Analyses and Frequencies
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

	Analytical Parameters and Frequencies						
	Constituents of Concern		Constituents of Potential Concern				COIs[1]
Well ID	Hexavalent Chromium	Total Chromium	Specific Conductance	pH	Lead	Total Extractable Petroleum Hydrocarbons	Title 22 Metals
GMP Monitoring Wells							
MW-9	Q	Q	Q	Q		S	
MW-10	Q	Q	Q	Q	Q	S	Q
MW-11	Q	Q	Q	Q	Q	S	Q
MW-12	Q	Q	Q	Q	Q		Q
MW-13	Q	Q	Q	Q			
MW-14	Q	Q	Q	Q			
MW-15	Q	Q	Q	Q			
MW-16	S	S	S	S			
MW-17	Q	Q	Q	Q			
MW-18	Q	Q	Q	Q			
MW-19	Q	Q	Q	Q			
MW-20-70	Q	Q	Q	Q	Q		Q
MW-20-100	Q	Q	Q	Q			
MW-20-130	Q	Q	Q	Q	Q		Q
MW-21	Q	Q	Q	Q			
MW-22	Q	Q	Q	Q			
MW-23	Q	Q	Q	Q			
MW-24A	Q	Q	Q	Q			
MW-24B	Q	Q	Q	Q			
MW-24BR	Q	Q	Q	Q			
MW-25	Q	Q	Q	Q	Q	S	Q
MW-26	Q	Q	Q	Q			
MW-27-20	Q - M	Q - M	Q	Q			
MW-27-60	Q - M	Q - M	Q	Q			
MW-27-85	Q - M - BW	Q - M - BW	Q	Q			
MW-28-25	Q - M	Q - M	Q	Q			
MW-28-90	Q - M	Q - M	Q	Q			
MW-29	Q - M	Q - M	Q	Q			
MW-30-30	Q - M	Q - M	Q	Q			
MW-30-50	Q - M	Q - M	Q	Q			
MW-31-60	Q	Q	Q	Q			
MW-31-135	Q	Q	Q	Q			
MW-32-20	Q - M	Q - M	Q	Q			
MW-32-35	Q - M	Q - M	Q	Q			
MW-33-40	Q - M	Q - M	Q	Q			
MW-33-90	Q - M	Q - M	Q	Q			
MW-33-150	Q - M	Q - M	Q	Q			
MW-33-210	Q - M	Q - M	Q	Q			
MW-34-55	Q - M	Q - M	Q	Q	Q		Q
MW-34-80	Q - M - BW	Q - M - BW	Q	Q	Q		Q
MW-34-100	Q - M - BW	Q - M - BW	Q	Q			
MW-35-60	Q	Q	Q	Q			
MW-35-135	Q	Q	Q	Q			
MW-36-20	Q - M	Q - M	Q	Q			
MW-36-40	Q - M	Q - M	Q	Q			

TABLE 4-2
Groundwater Sampling Analyses and Frequencies
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

	Analytical Parameters and Frequencies						
	Constituents of Concern		Constituents of Potential Concern				COIs[1]
Well ID	Hexavalent Chromium	Total Chromium	Specific Conductance	pH	Lead	Total Extractable Petroleum Hydrocarbons	Title 22 Metals
GMP Monitoring Wells							
MW-36-50	Q - M	Q - M	Q	Q			
MW-36-70	Q - M	Q - M	Q	Q			
MW-36-90	Q - M	Q - M	Q	Q			
MW-36-100	Q - M - BW	Q - M - BW	Q	Q			
MW-37D	Q	Q	Q	Q	Q		Q
MW-37S	Q	Q	Q	Q			
MW-38D	Q	Q	Q	Q			
MW-38S	Q	Q	Q	Q			
MW-39-40	Q - M	Q - M	Q	Q			
MW-39-50	Q - M	Q - M	Q	Q			
MW-39-60	Q - M	Q - M	Q	Q			
MW-39-70	Q - M	Q - M	Q	Q			
MW-39-80	Q - M	Q - M	Q	Q			
MW-39-100	Q - M	Q - M	Q	Q			
MW-40D	Q	Q	Q	Q			
MW-40S	Q	Q	Q	Q			
MW-41D	Q	Q	Q	Q			
MW-41M	Q	Q	Q	Q			
MW-41S	Q	Q	Q	Q			
MW-42-30	Q - M	Q - M	Q	Q			
MW-42-55	Q - M	Q - M	Q	Q			
MW-42-65	Q - M	Q - M	Q	Q			
MW-43-25	Q - M	Q - M	Q	Q			
MW-43-75	Q - M	Q - M	Q	Q			
MW-43-90	Q - M	Q - M	Q	Q			
IM Observation Wells							
OW-3D	S	S	S	S			
OW-3M	S	S	S	S			
OW-3S	S	S	S	S			
Test and Extraction Wells							
TW-1	2A	2A	2A	2A			
Water Supply Wells							
PGE-6	2A	2A	2A	2A			
PGE-7	2A	2A	2A	2A			
PGE-8	2A	2A	2A	2A			
Park Moabi	Q	Q	Q	Q			

Notes:

See Table 4-3 for list of methods and reporting limits.

[1] Constituent of Interest. Chromium is a COC and Lead is a COPC.

BW = biweekly
M = monthly
Q = quarterly
A = annually
S = semi-annually
2A = bi-annually

TABLE 4-3

Site Analytical Parameters, Test Methods, and Reporting Limits

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Analytical Parameter	Groundwater		Surface Water		Drinking Water production wells		Drinking Water Maximum Contaminant Levels [4] (mg/L)
	Analytical Method	Minimum Reporting [1] Limit	Analytical Method	Minimum Reporting [1] Limit	Analytical Method	Minimum Reporting [1] Limit	
Constituents of Concern (COCs)							
Chromium							
Hexavalent Chromium	SW 7196 [2]	0.01	NA	---	NA	---	not established
Hexavalent Chromium	SW 7199 [3]	0.0002	SW 7199 [3]	0.0002	EPA 218.6	0.0002	not established
Total Chromium	SW 6010B	0.001	SW 6010B	0.001	EPA 200.7	0.001	0.05
Constituents of Potential Concern (COPCs)							
Water Quality							
pH (pH units)	EPA 150.1	0.1	EPA 150.1	0.1	EPA 150.1	0.1	6.5 - 8.5 (pH units)*
Specific conductance (µmhos/cm)	EPA 120.1	2	EPA 120.1	2	EPA 120.1	2	1600 (µmhos/cm)*
Title 22 Metals							
Lead	SW 6010B	0.005	NA	---	NA	---	not established
Total Petroleum Hydrocarbons (TPH)							
TPH-Extractable (Diesel Range)	EPA 8015M	500	---	---	---	---	not established
TPH-Extractable (Motor Oil Range)	EPA 8015M	500	---	---	---	---	not established
Constituents of Interest (COIs)							
Title 22 Metals							
Antimony	SW 6010B	0.003	NA	---	NA	---	0.006
Arsenic	SW 6010B	0.005	NA	---	NA	---	0.05
Barium	SW 6010B	0.5	NA	---	NA	---	1
Beryllium	SW 6010B	0.001	NA	---	NA	---	0.004
Cadmium	SW 6010B	0.002	NA	---	NA	---	0.005
Cobalt	SW 6010B	0.005	NA	---	NA	---	not established
Copper	SW 6010B	0.01	NA	---	NA	---	1.0*
Mercury	SW 7470A	0.0002	NA	---	NA	---	0.002
Molybdenum	SW 6010B	0.005	NA	---	NA	---	not established
Nickel	SW 6010B	0.02	NA	---	NA	---	0.1
Selenium	SW 6010B	0.005	NA	---	NA	---	0.05
Silver	SW 6010B	0.005	NA	---	NA	---	0.100*
Thallium	SW 6010B	0.001	NA	---	NA	---	0.002
Vanadium	SW 6010B	0.005	NA	---	NA	---	not established

TABLE 4-3

Site Analytical Parameters, Test Methods, and Reporting Limits

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Analytical Parameter	Groundwater		Surface Water		Drinking Water production wells		Drinking Water Maximum Contaminant Levels [4] (mg/L)
	Analytical Method	Minimum Reporting [1] Limit	Analytical Method	Minimum Reporting [1] Limit	Analytical Method	Minimum Reporting [1] Limit	
Constituents of Interest (COIs)							
Title 22 Metals							
Zinc	SW 6010B	0.02	NA	---	NA	---	5.0*
Field Measurements							
Field Parameters							
Temperature	Field Instrumentation		NA	---	Field Instrumentation	---	
Specific Conductivity	SW 9050		NA	---	SW 9050	---	
Dissolved Oxygen	Field Instrumentation		NA	---	Field Instrumentation	---	
Oxidation-Reduction Potential	Field Instrumentation		NA	---	Field Instrumentation	---	
pH	SW 9040		NA	---	SW 9040	---	
Turbidity	EPA 180.1		NA	---	EPA 180.1	---	

Notes:

[1] Minimum reporting limit for undiluted samples. Reporting limits are increased when sample dilution is required.

[2] Method SW 7196A is used for samples collected from monitoring wells where prior monitoring has detected hexavalent chromium [CR(VI)] concentrations above 0.010 milligrams per liter (mg/L). The minimum reporting limit for Method 7196A for undiluted samples is 0.010 mg/L. If hexavalent chromium concentrations at a given well drop below the MRL for two consecutive sampling events, samples from the well will be analyzed by Method 7199 during future events.

[3] Method SW 7199 is used for all surface water samples and all groundwater samples collected from monitoring wells where prior monitoring has not detected Cr(VI) concentrations above 0.010 mg/L.

[4] Drinking water maximum contaminant levels (MCLs) listed are California primary MCLs.

* secondary MCL

TABLE 4-4

Summary Schedule for 2005 Monitoring Activities

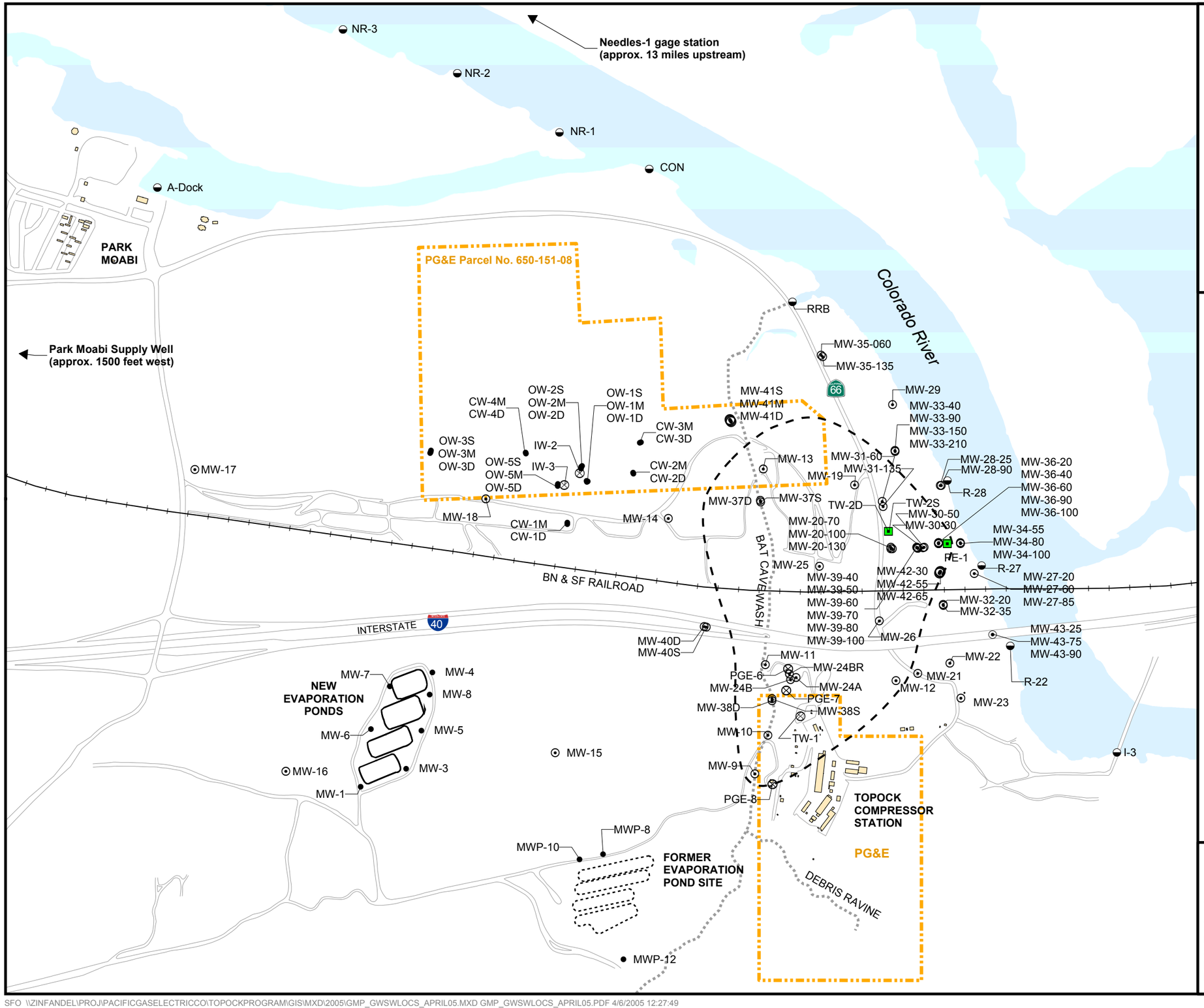
Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Month 2005	Week/Dates	Monitoring Event	Event Type	Notes
January	1/10/2005	2005-051-M01	M	Resample for 4th quarter 2004 event.
	1/25/2005	2005-052-W04	BW	
February	2/7/2005	2005-053-M02	M	
	2/14/2005	2005-MW-27-confirm	W	Confirmation sampling.
	2/23/2005	2005-054-W08	BW	Instituted weekly sampling under Contingency Plan.
March	3/1/2005	2005-055-W09	W	Week 2 contingency sampling.
	3/7/2005	2005-056-Q1	Q	Week 3 contingency sampling. Chromium filtration test round 1.
	3/13/2005	IM1-2005-057	W	Week 4 contingency sampling.
	3/22/2005	2005-058-W12	BW	Week 5 contingency sampling.
	3/29/2005	2005-059-W13	W	Week 6 contingency sampling.
April	4/4/2005	2005-060-M04	M	Chromium filtration test round 2.
	4/12/2005	2005-061-W15	W	
	4/19/2005	2005-062-W16	BW	
May	5/2/2005	2005-063-M05	M	
	5/17/2005	2005-064-W20	BW	
	5/31/2005	2005-065-W22	BW	
June	6/13/2005	2005-066-S1	A	Annual event includes quarterly and semi-annual sampling.
	6/28/2005	2005-067-W26	BW	
July	7/11/2005	2005-068-M07	M	
	7/25/2005	2005-069-W30	BW	
August	8/8/2005	2005-070-M08	M	
	8/22/2005	2005-071-W34	BW	
September	9/5/2005	2005-072-W36	BW	
	9/19/2005	2005-073-Q3	Q	
October	10/3/2005	2005-074-M10	M	
	10/17/2005	2005-075-W	BW	
November	10/31/2005	2005-076-M11	M	
	11/14/2005	2005-077-W46	BW	
	11/28/2005	2005-078-W48	BW	
December	12/12/2005	2005-079-S2	S	Semi-annual event includes quarterly sampling.
	12/27/2005	2005-080-W52	BW	

Notes:

M = monthly
Q = quarterly
W = weekly
BW = biweekly
S = semi-annually
A = annually
Sampling events through April 4, 2005 have been completed
Sampling events from April 4 through December 26, 2005 are scheduled and subject to change



N

0 800 1,600 Feet

Legend

- Groundwater monitoring well
- Surface water sampling location
- Injection, test or supply well
- Interim Measure extraction well
- Groundwater monitoring well sampled in other monitoring program
- Approximate limits of hexavalent chromium greater than 50 ppb in Alluvial Aquifer, Dec. 2004

Proposed Groundwater and Surface Water Monitoring Program (GMP) Locations, April 2005

Quarterly Monitoring

70 wells (All 35 monthly wells and MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, MW-17, MW-18, MW-19, MW-20 cluster, MW-21, MW-22, MW-23, MW-24 cluster, MW-25, MW-26, MW-31-60, MW-31-135, MW-35-60, MW-35-135, MW-37D, MW-37S, MW-38D, MW-38S, MW-40D, MW-40S, MW-41 cluster, Park Moabi well)

9 Surface Water Locations (NR-1, NR-2, NR-3, CON, RRB, R-22, R-27, R-28, I-3)

Monthly Monitoring

35 Wells (All 4 biweekly wells and MW-27-20, MW-27-60, MW-28-25, MW-28-90, MW-29, MW-30-30, MW-30-50, MW-32-20, MW-32-35, MW-33 cluster, MW-34-55, MW-36 cluster, MW-39 cluster, MW-42 cluster, MW-43 cluster)

9 Surface Water Locations (NR-1, NR-2, NR-3, CON, RRB, R-22, R-27, R-28, I-3)

Bi-weekly Sampling

4 Wells (MW-27-85, MW-34-80, MW-34-100, MW-36-100)

Semiannual Sampling
4 Wells (MW-16, OW-3D, OW-3M, OW-3S)

Biennial Sampling
4 Wells (PGE-6, PGE-7, PGE-8, TW-1)

FIGURE 4-1
PROPOSED MONITORING LOCATIONS & SAMPLING FREQUENCY FOR GMP, APRIL 2005

MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

5.0 Current Surface Water Monitoring Plan

5.1 Monitoring Objectives

Surface water monitoring is an important component of the Topock GMP. In addition to the general GMP program objectives outlined in Section 1.4, the following are specific objectives established for surface water monitoring at the Topock site:

- Monitor surface water locations both upgradient and downgradient of the Topock site for concentrations of site COCs.
- Collect general water quality data for surface water locations adjacent to the Topock site. The general water quality parameters of pH and specific conductance, which are considered COPCs under the GMP, will be used to evaluate the hydraulic relationship between site groundwater and the surface water body (Colorado River).
- Collect manual river level elevation data periodically to verify the river gauge data collected under the IM PMP activity using transducers. Collection and evaluation of transducer measurements are not part of the GMP.

5.2 Assessment and Rationale for Surface Water Monitoring

5.2.1 Monitoring Locations

Nine surface water stations were previously established to facilitate collection of surface water samples both upstream and downstream of the Topock site. These stations are shown in Figure 4-1. All nine previously established surface water stations will carry into this revised GMP Monitoring Plan.

5.2.2 Monitoring Frequency

Surface water samples are collected on monthly and quarterly frequencies. The site COCs Cr(T) and Cr(VI) are analyzed monthly at all surface water stations. Specific conductance and pH, both COPCs, are monitored quarterly at all surface water stations. Table 5-1 summarizes the surface water monitoring frequency and analyses.

In late February 2005, weekly sampling at three of the surface water stations (CON, R-27, and R-28) was conducted for four consecutive weeks. This sampling was conducted at the direction of DTSC at the same time the weekly contingency sampling of groundwater monitoring wells was implemented in accordance with the IM *Contingency Plan for Sentry Well Groundwater Monitoring* (DTSC 2005b). Weekly sampling of surface water will occur only when specifically requested by the DTSC.

5.2.3 Monitoring Parameters

Table 5-1 presents a summary of the surface water sampling analyses and frequency for each surface water station in the GMP. Table 4-3 identifies the analytical methods and reporting limits for the GMP COCs, COPCs, COIs, and field parameters.

Monitoring at each surface water station includes the measurement of field parameters using field instrumentation. Surface water is monitored for temperature, specific conductivity, dissolved oxygen, oxidation-reduction potential, pH, and turbidity, using field instrumentation, as described in the Field Procedures Manual (CH2M HILL 2005c).

As part of the IMs being implemented at the Topock site, transducers have been installed at select river gauge stations. Water level data collected using these transducers is downloaded and evaluated under the IM program and is not addressed in the GMP.

Manual surface water level measurements are also routinely collected at three of the surface water stations (RRB, A-Dock, and I-3; other stations as required) as part of the GMP to confirm transducer measurements. Water level measurements are collected as described in the Field Procedures Manual (CH2M HILL 2005c).

5.3 Sampling, Analysis, and Field Procedures

Standard procedures to be used in association with GMP monitoring events are presented in the Field Procedures Manual (CH2M HILL 2005c). The Field Procedures Manual presents standardized protocol for sample collection, laboratory analysis, and other field investigation and data collection activities for the several investigation, monitoring, and interim measure programs performed at the Topock Compressor Station.

Currently, GMP samples collected for Cr(VI) and Cr(T) analysis are sent to the laboratory unpreserved and unfiltered. Filtration followed by preservation is performed in the laboratory within 12 hours of sample collection, prior to analysis. However, to evaluate whether field filtration may be preferable to laboratory filtration for quality assurance, a chromium sample filtration comparison test is being performed at the Topock site. The final *Work Plan for Chromium Sample Filtration Comparison Test* describes the design of the test, sampling methodology, and data evaluation (CH2M HILL 2005b). Although the filtration comparison test addresses only groundwater samples, the findings of the comparative test will be evaluated for applicability to both groundwater and surface water sampling, and recommendations will be incorporated into the subsequent revision of this Monitoring Plan. The proposed field filtering and sample preservation procedures for use in the comparative test are presented as a Standard Operating Procedure in the Field Procedures Manual.

GMP samples collected for all metals except Cr(VI) and Cr(T) (pending comparative filtration test results evaluation) will be field filtered and preserved in accordance with the Field Procedures Manual.

The sampling procedure currently in use at the Topock site calls for collection of surface water samples from approximately 6 inches below the water surface, as outlined in the Field Procedures Manual (CH2M HILL 2005c). The DTSC is presently evaluating the collection of depth-specific surface water samples. The TWG is being asked to discuss whether collection of depth-specific surface water samples would allow surface water sampling objectives to be

better achieved. Depending upon the outcome of the TWG discussions, the surface water sampling procedure currently in use may be subject to revision, which could include modification of the quantity and/or location of surface water sample locations and/or modification of the methodology for collection of surface water samples. The subsequent revision to this GMP Monitoring Plan (Revision 1, to be submitted in May 2005), will reflect any revisions to the surface water sampling procedure.

5.4 Surface Water Monitoring Schedule

Table 4-4 presents the schedule for the 2005 Topock GMP, including approximate sampling dates.

TABLE 5-1
Surface Water Sampling Analyses and Frequencies
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

	Analytical Parameters and Frequencies			
Well ID	**Hexavalent Chromium**	**Total Chromium**	**Specific Conductance**	**pH**
Surface Water				
CON	Q - M	Q - M	Q	Q
I-3	Q - M	Q - M	Q	Q
NR-1	Q - M	Q - M	Q	Q
NR-2	Q - M	Q - M	Q	Q
NR-3	Q - M	Q - M	Q	Q
R-22	Q - M	Q - M	Q	Q
R-27	Q - M	Q - M	Q	Q
R-28	Q - M	Q - M	Q	Q
RRB	Q - M	Q - M	Q	Q

Notes:

See Table 4-3 for list of methods and reporting limits.
M = monthly
Q = quarterly

6.0 Quality Control and Data Management

Quality control procedures will be implemented for both field activities and laboratory work associated with the GMP. Detailed descriptions of quality control procedures specific to water quality sampling and analysis at the Topock site are provided in the *Quality Assurance Project Plan for Water Quality Sampling and Analysis* (Appendix D of the Topock Field Procedures Manual; CH2M HILL 2005c).

6.1 Field Quality Control

The QAPP presents requirements for field quality control sampling and sample handling and custody procedures to be implemented in the field.

6.2 Laboratory Quality Control

The QAPP outlines quality control requirements for laboratory analyses to be conducted under the GMP. The QAPP addresses data quality objectives; method detection limits, reporting limits, and instrument calibration requirements; laboratory quality control samples; laboratory data management procedures; performance evaluations; preventive maintenance; corrective action; and quality assurance reports.

6.3 Data Validation

The analytical results of groundwater and surface water samples will be evaluated to verify whether the data are sufficiently accurate, precise, and representative of site conditions for decision-making purposes in support of ongoing site investigation and remediation activities. Details regarding data validation for the Topock GMP are provided in the QAPP.

6.4 Data Management

Management of data generated from the Topock GMP will be conducted in accordance with the *PG&E Program Data Management Plan* (CH2M HILL 2004g). The Data Management Plan outlines standardized procedures for field data collection and review, analytical data loading into the information system (environmental database), verification of the uploaded data, quality assurance/quality control procedures associated with data management, and reporting formats.

7.0 Reporting

Reporting conducted as part of the Topock GMP includes the preparation of quarterly groundwater and surface water monitoring reports and monthly/weekly well sampling data transmittals.

7.1 Quarterly Monitoring Reports

Groundwater and surface water monitoring reports are generated quarterly for the GMP according to the following schedule:

- First Quarter monitoring period: report issued May
- Second Quarter monitoring period: report issued August
- Third Quarter monitoring period: report issued November
- Fourth Quarter monitoring period: report issued February

The quarterly report summarizes all sampling activities that occurred within the specified quarter. Analytical data from that quarter, as well as historic analytical data, are summarized in tabular format. The analytical results of the quarterly sampling event are also presented graphically. The graphical depiction of the quarterly data includes an isoconcentration line delineating the approximate extent of Cr(VI) concentrations above 0.05 mg/L, the California MCL for Cr(T). Field documentation will be included in the report.

7.2 Annual Monitoring Report

In order to support periodic reevaluation of the GMP, the Fourth Quarter monitoring report will include additional data presentation, such as presentation of COC distribution and concentration trends, monitoring well hydrographs, and the updated average shallow groundwater elevation map.

7.3 Floodplain Wells Monitoring Results Transmittals

Selected monitoring wells in the floodplain area are currently sampled monthly and weekly (Section 4.0). Validated analytical laboratory and field data from these monitoring events are compiled and presented in tabular sampling results reports. The monthly/weekly sampling results data reports are transmitted to the DTSC and the project stakeholders approximately monthly. These floodplain data are then evaluated as part of the IM floodplain monitoring program.

7.4 Program Data Reporting

Data reports for all wells in the GMP will occasionally be prepared to provide project stakeholders with a comprehensive update of groundwater quality data. A full report of

analytical results for all GMP wells will be produced as needed, anticipated to occur approximately once every 2 months.

8.0 References

CH2M HILL. 2004a. *Sampling and Analysis Plan, Groundwater and Surface Water Monitoring. PG&E Topock Compressor Station, Needles, California*. July 14.

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_____. 2004e. *Health and Safety Plan, PG&E Topock Project.* Revision 4. April 2.

_____. 2004f. *Groundwater and Surface Water Monitoring Report, Third Quarter 2004, PG&E Topock Compressor Station, Needles, California*. December 28.

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_____. 2005b. Technical Memorandum. "Final Work Plan for Chromium Sample Filtration Comparison Test, Pacific Gas and Electric Company, Topock Project." March 4.

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Department of Toxic Substances Control (DTSC). 1996. *Corrective Action Consent Agreement (Revised), Pacific Gas and Electric Company's Topock Compressor Station, Needles, California (EPA Identification No. CAT080011729).* February 2.

_____. 2004. Letter to PG&E. "Notification of Required Weekly Sampling and Analysis of Monitoring Well MW-33-90 and Submission of a Revised Water Quality Sampling and Analysis Plan, Pacific Gas & Electric Company, Topock Compressor Station, Needles, California." May 3.

_____. 2005a. Letter to PG&E. "Sampling and Analysis Plan, Groundwater and Surface Water Monitoring, Dated July 14, 2004, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California (EPA ID No. CAT080011729)." January 25.

_____. 2005b. Letter to PG&E. "Criteria for Evaluating Interim Measures Performance Requirements to Hydraulically Contain Chromium Plume in Floodplain Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California (EPA ID No. CAT080011729)." February 14.

_____. 2005c. Letter to PG&E. "Response to Elevated Levels of Hexavalent and Total Chromium Concentrations Reported in Newly Installed Monitoring Well MW-34-100 at Pacific Gas and Electric Company, Topock Compressor Station, Needles, California (EPA ID No. CAT080011729)." February 16.

Appendix A
Project Organization and Contacts

APPENDIX A

Project Organization and Contacts

The Topock Groundwater and Surface Water Monitoring Program (GMP) is being performed for Pacific Gas and Electric Company (PG&E) by CH2M HILL. The GMP is part of a RCRA Facility Investigation (RFI) being performed at the PG&E Topock Compressor Station under a Corrective Action Consent Agreement issued in 1996 by the California Department of Toxic Substances Control (DTSC). The Topock Compressor Station is located in eastern San Bernardino County, 15 miles southeast of the city of Needles, California.

This section identifies and describes the responsibilities of key project positions related to project management, field task management, quality assurance/quality control (QA/QC) management, and data management. Contact information for the CH2M HILL staff is provided in Table A-1.

A.1 Project Manager

The CH2M HILL Project Manager (PM) for the GMP is responsible for:

- Development of the project.
- Technical oversight of groundwater and surface water monitoring and sampling.
- Overall project QA.
- Interfacing with the client, the program manager, and other project staff as needed to support development of the technical approach to GMP issues.
- After independent QA review by a senior review team, the PM and the senior review team will identify the appropriate corrective action to be initiated when QA problems or deficiencies requiring special action are uncovered.

The current CH2M HILL Project Manager for the Topock GMP is Paul Bertucci. He is assisted by the CH2M HILL Project Manager of Record, Ellen Hedfield, who is responsible for the following aspects of GMP project management:

- Implementation of the GMP in accordance with the technical direction provided by the PM and the senior review team.
- Schedule, financial, technical status, and contract management.
- Daily coordination of the GMP project team, including the Field Task Manager, the Reporting Task Manager, the Project Chemist, the Validation Task Manager, and the Data Manager.

A.2 Field Task Manager

The Field Task Manager for the GMP is responsible for:

- Coordinating field sampling schedules.

- Coordinating the organization of the field team and preparation for field activities.
- Developing event-specific field forms used to guide field sampling staff, and compiling sampling binders.
- Distributing sampling event information to the field team and ensuring the field team members understand the specific scope of work to be accomplished during the field effort.
- Notifying laboratory of pending sampling and coordinating courier service for pickup and delivery of collected samples.
- Coordinating CH2M Hill field personnel, subcontractors, and equipment at the site.
- Ensuring proper training of field personnel.
- Maintaining communication with the Project Chemist and laboratory staff regarding scheduled sampling events and coordinating delivery of samples to the laboratory.
- Management of project tasks associated with sampling, general QA oversight of field personnel in sampling activities, coordination of sample collection, and coordinating sample submittal to the analytical lab.
- Collecting and reviewing for completeness all field task related documents, and archiving the documents in the project file.
- Coordinating with field personnel, the Project Chemist, and the Data Manager to facilitate data transfer to the project database.

The current Field Task Manager for the GMP is Matt Ringier.

A.3 Reporting Task Manager

The Reporting Task Manager for the GMP is responsible for:

- Developing report preparation schedules, and planning and coordinating the report preparation effort.
- Coordinating with the Project Chemist and the Validation Task Manager to identify and prioritize data deliverable and validation requirements to ensure that validated data is available to support report preparation.
- Coordinating with the Data Manager to develop required data tables for report submittals.
- Coordinating with GIS staff to develop required figures for report submittals.
- Contributing to the preparation of GMP reports and coordinating the contributions of other GMP and senior technical staff.
- Performing QC review of report submittals.

The current Reporting Task Manager for the GMP is Serena Lee.

A.4 Validation Task Manager

The Validation Task Manager for the GMP is responsible for:

- Identifying and resolving any anomalies or out of control events that arise during the analysis of samples.
- Interpreting field and laboratory data quality issues and developing recommendations for appropriate data usability.
- Coordinating validation of the analytical data.
- Preparing data validation reports and memoranda.
- Performing quality audits and surveillance, preparation of QA reports, and implementation of QC activities and suggesting corrective actions, as necessary.

The current Validation Task Manager for the GMP is Dan Moore.

A.5 Project Chemist

The Project Chemist for the Topock GMP is responsible for:

- Approving and maintaining adherence to QA/QC requirements specified in this Monitoring Plan, the Field Procedures Manual, and the QAPP for Water Quality Sampling and Analysis.
- Providing guidance regarding environmental analytical chemistry methodologies and QC procedures applicable to environmental analytical chemistry.
- Managing project tasks associated with coordination of sample collection and analysis with the Field Task Manager acting as liaison between the Field Task Manager and contract laboratories.
- Managing sample tracking, sample analysis, and data reporting from the laboratory.
- Assisting the Project Manager of Record in preparation of laboratory purchase requests and verification of laboratory billings.
- Communicating QA/QC issues to the PM and Field Task Manager.
- Providing input into resolution of any anomalies or out of control events that arise during the analysis of samples.

The current Project Chemist for the GMP is Shawn Duffy.

A.6 Data Manager

The Data Manager for the GMP is responsible for:

- Overall management and control of all analytical and field data that will be used for decision-making and project reporting purposes.
- Coordinating with the Field Task Manager and the Project Chemist to facilitate data transfer into the project database.

- Coordinating with the Reporting Task Manager regarding the output of data from the database to the data users (e.g., PM and technical staff) and providing QC for all data outputs.

The current Data Manager for the GMP is Tuesdai Powers.

A.7 Site Safety and Health Manager

The site Safety and Health Manager for the Topock GMP is responsible for:

- Site safety and health for CH2M HILL and subcontractor personnel working on the project.
- Implementation of CH2M HILL's site-specific Health and Safety Plan, contractor safety, and training.

The current site Safety and Health Manager is Rick Cavil.

A.8 Field Sampling Team

The Field Team Leader is responsible for:

- Holding daily meetings with the field team to discuss sample handling and event-specific requirements.
- Conducting tailgate safety meetings.
- At the end of each sampling day, reviewing with the field team the samples collected against the planned sampling table to ensure samples were collected, filtered or preserved (as applicable), and labeled accurately.
- Reviewing sampling records at the end of each sampling day to ensure completeness of the records.

Members of the GMP Field Sampling Team are responsible for:

- Reading and understanding the Monitoring Plan and the applicable sections of the Sampling, Analysis, and Field Procedures Manual; signing the Employee Signoff Form acknowledging they have read the Field Procedures Manual.
- Reading and acknowledging the health and safety plan.
- Reviewing and understanding the sampling requirements, as outlined in the planned sampling table, for each specific sampling event.
- Conducting field sampling in accordance with the event-specific planned sampling table, the Monitoring Plan, and the Field Procedures Manual; documenting any field variances or unusual conditions in field notes and sampling logs.
- Fully completing all field notes and sampling logs daily.

TABLE A-1
Key Project Staff
PG&E Topock Groundwater & Surface Water Monitoring Program

Title	Name/Address	Phone	Fax	Email
Project Manager	Paul Bertucci 155 Grand Ave, Suite 1000 Oakland, CA 94612	510-587-7629	510-622-9629	pbertucc@ch2m.com
Project Manager of Record	Ellen Hedfield 2525 Airpark Drive Redding, CA 96001	530-229-3319	530-339-3319	ehedfiel@ch2m.com
Field Task Manager	Matt Ringier 155 Grand Ave, Suite 1000 Oakland, CA 94612	510-587-7510	510-622-9210	mringier@ch2m.com
Reporting Task Manager	Serena Lee 155 Grand Ave, Suite 1000 Oakland, CA 94612	510-587-7525	510-251-2426	slee4@ch2m.com
Validation Task Manager	Dan Moore 6001 Indian School Rd N.E. Suite 350 Albuquerque, NM 87110	505-855-5235	505-883-7507	dmoore4@ch2m.com
Project Chemist	Shawn Duffy 2525 Airpark Drive Redding, CA 96001	530-229-3303	530-339-3303	sduffy@ch2m.com
Data Manager	Tuesdai Powers 155 Grand Ave, Suite 1000 Oakland, CA 94612	510-587-7595	510-622-9595	tpowers@ch2m.com
Health and Safety Manager	Rick Cavil 1737 North First Street Suite 300 San Jose, CA 95112	408-436-4909 ext. 429	408-436-4829	rcavil@ch2m.com

Appendix B
Summary of Chromium and Site COC Sampling Results, 1997-2004

TABLE B-1
Summary of Groundwater Results
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

			Cr(VI) Sampling Summary [1]-- through February, 2005				
Well ID	**Site Area**	**Monitored Zone**	**Number of Sampling Events**	**Number of Events Cr (VI) Detected**	**Minimum Cr(VI) Concentration (mg/L)**	**Maximum Cr(VI) Concentration (mg/L)**	
GMP Monitoring Wells							
MW-9	Bat Cave Wash	UA	26	26	0.265	0.402	
MW-10	Bat Cave Wash	UA	26	26	0.867	3.47	
MW-11	Bat Cave Wash	UA	26	26	0.02	1.71	
MW-12	East of Station	UA	25	25	0.311	1.56	
MW-13	Bat Cave Wash	UA	26	24	0.01	0.028	
MW-14	Bat Cave Wash	UA	25	24	0.01	0.099	
MW-15	Bat Cave Wash	UA	24	16	0.0077	0.05	
MW-16	Near New Ponds	UA	22	15	0.009	0.03	
MW-17	Bat Cave Wash	UA	19	6	0.0023	0.0127	
MW-18	West Mesa	UA	24	23	0.02	0.0461	
MW-19	Bat Cave Wash	UA	23	23	0.557	0.966	
MW-20-70	MW-20 bench	UA	26	26	6.78	13.2	
MW-20-100	MW-20 bench	MA	25	25	1.35	8.13	
MW-20-130	MW-20 bench	LA	25	25	2.74	8.60	
MW-21	East of Station	UA	30	1	0.02	0.02	
MW-22	Floodplain	UA	25	0*	ND (0.0002)	ND (0.01)	
MW-23	East of Station	MC	24	4	0.0011	0.0101	
MW-24A	MW-24 Bench	UA	24	24	2.44	3.87	
MW-24B	MW-24 Bench	LA	24	24	0.741	5.26	
MW-24BR	MW-24 Bench	BR	24	1	0.302	0.346	
MW-25	Near Bat Cave Wash	UA	23	23	1.97	2.98	
MW-26	Near Bat Cave Wash	UA	25	24	0.759	4.06	
MW-27-20	Floodplain	UA	59	0*	ND (0.0002)	ND (0.01)	
MW-27-60	Floodplain	MA	1	0*	ND (0.001)	ND (0.001)	
MW-27-85	Floodplain	LA	3	0*	ND (0.001)	ND (0.002)	
MW-28-25	Floodplain	UA	59	0*	ND (0.0002)	ND (0.01)	
MW-28-90	Floodplain	LA	16	0*	ND (0.0002)	ND (0.001)	
MW-29	Floodplain	UA	34	0*	ND (0.0002)	ND (0.01)	
MW-30-30	Floodplain	UA	57	0*	ND (0.001)	ND (0.01)	
MW-30-50	Floodplain	MA	41	32	0.0262	3.76	
MW-31-60	MW-20 Bench	UA	26	26	2.91	4.52	
MW-31-135	MW-20 Bench	LA	4	4	0.266	0.41	
MW-32-20	Floodplain	UA	21	0*	ND (0.0002)	ND (0.01)	
MW-32-35	Floodplain	MA	21	0*	ND (0.0002)	ND (0.01)	
MW-33-40	Floodplain	UA	19	0*	ND (0.0002)	ND (0.01)	
MW-33-90	Floodplain	MA	38	33	0.012	0.0202	
MW-33-150	Floodplain	LA	2	0*	ND (0.0002)	ND (0.001)	
MW-33-210	Floodplain	LA	1	0*	ND (0.001)	ND (0.001)	
MW-34-55	Floodplain	MA	41	0*	ND (0.0002)	ND (0.01)	
MW-34-80	Floodplain	LA	50	13	0.00084	0.111	
MW-34-100	Floodplain	LA	3	3	0.354	0.417	
MW-35-60	North Area	UA	4	4	0.0048	0.0275	
MW-35-135	North Area	LA	4	3	0.0076	0.0157	
MW-36-20	Floodplain	UA	8	1	0.0026	0.0026	

TABLE B-1
Summary of Groundwater Results
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

			Cr(VI) Sampling Summary [1]-- through February, 2005				
Well ID	**Site Area**	**Monitored Zone**	**Number of Sampling Events**	**Number of Events Cr (VI) Detected**	**Minimum Cr(VI) Concentration (mg/L)**	**Maximum Cr(VI) Concentration (mg/L)**	
GMP Monitoring Wells							
MW-36-40	Floodplain	UA	8	0*	ND (0.0002)	ND (0.001)	
MW-36-50	Floodplain	MA	8	0*	ND (0.0002)	ND (0.001)	
MW-36-70	Floodplain	MA	8	0*	ND (0.0002)	ND (0.001)	
MW-36-90	Floodplain	LA	8	8	1.72	3.66	
MW-36-100	Floodplain	LA	16	16	1.39	2.98	
MW-37D	Bat Cave Wash	LA	4	4	0.93	1.48	
MW-37S	Bat Cave Wash	MA	4	4	0.0018	0.0075	
MW-38D	Bat Cave Wash	LA	4	4	0.0331	0.279	
MW-38S	Bat Cave Wash	UA	4	4	0.332	0.964	
MW-39-40	Floodplain	UA	8	0*	ND (0.0002)	ND (0.001)	
MW-39-50	Floodplain	UA	8	8	0.819	4.14	
MW-39-60	Floodplain	MA	8	8	1.64	3.81	
MW-39-70	Floodplain	MA	8	8	5.04	8.21	
MW-39-80	Floodplain	LA	8	8	7.75	10.9	
MW-39-100	Floodplain	LA	9	9	9.18	12.9	
MW-40D	I-40 Median	LA	4	4	0.0256	0.0385	
MW-40S	I-40 Median	UA	4	4	0.0021	0.0082	
MW-41D	Bat Cave Wash	LA	2	0*	ND (0.001)	ND (0.002)	
MW-41M	Bat Cave Wash	MA	2	2	0.0041	0.0053	
MW-41S	Bat Cave Wash	UA	2	2	0.0074	0.0118	
MW-42-30	Floodplain	UA	1	0*	ND (0.001)	ND (0.001)	
MW-42-55	Floodplain	MA	1	0*	ND (0.001)	ND (0.001)	
MW-42-65	Floodplain	LA	2	0*	ND (0.001)	ND (0.001)	
MW-43-25	Floodplain	UA	2	0*	ND (0.0002)	ND (0.0002)	
MW-43-75	Floodplain	LA	2	0*	ND (0.001)	ND (0.001)	
MW-43-90	Floodplain	LA	2	0*	ND (0.001)	ND (0.001)	
IM Compliance Wells							
CW-1D	East Mesa	LA	2	0*	ND (0.001)	ND (0.001)	
CW-1M	East Mesa	MA	2	2	0.0134	0.0149	
CW-2D	East Mesa	LA	2	0*	ND (0.001)	ND (0.001)	
CW-2M	East Mesa	MA	2	2	0.013	0.0146	
CW-3D	East Mesa	LA	2	0*	ND (0.001)	ND (0.001)	
CW-3M	East Mesa	MA	2	2	0.0057	0.0063	
CW-4D	East Mesa	LA	2	0*	ND (0.001)	ND (0.001)	
CW-4M	East Mesa	MA	2	2	0.0111	0.0156	
IM Observation Wells							
OW-1D	East Mesa	LA	3	0*	ND (0.001)	ND (0.002)	
OW-1M	East Mesa	MA	3	3	0.0075	0.0097	
OW-1S	East Mesa	UA	1	1	0.0049	0.0049	
OW-2D	East Mesa	LA	1	0*	ND (0.001)	ND (0.001)	
OW-2M	East Mesa	MA	1	1	0.0023	0.0023	
OW-2S	East Mesa	UA	1	0*	ND (0.0002)	ND (0.0002)	
OW-3D	West Mesa	LA	3	0*	ND (0.0002)	ND (0.0002)	

TABLE B-1
Summary of Groundwater Results
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

			Cr(VI) Sampling Summary [1]-- through February, 2005				
Well ID	**Site Area**	**Monitored Zone**	**Number of Sampling Events**	**Number of Events Cr (VI) Detected**	**Minimum Cr(VI) Concentration (mg/L)**	**Maximum Cr(VI) Concentration (mg/L)**	
IM Observation Wells							
OW-3M	West Mesa	MA	3	3	0.0103	0.0157	
OW-3S	West Mesa	UA	3	3	0.0135	0.0177	
OW-5D	East Mesa	LA	1	0*	ND (0.0002)	ND (0.0002)	
OW-5M	East Mesa	MA	1	1	0.008	0.008	
OW-5S	East Mesa	UA	1	1	0.0326	0.0326	
Other Site Wells not in GMP							
MW-1	New Ponds	UA	3	1	0.0045	0.0046	
MW-3	New Ponds	UA	3	3	0.01	0.0117	
MW-4	New Ponds	UA	3	3	0.02	0.022	
MW-5	New Ponds	UA	3	3	0.01	0.02	
MW-6	New Ponds	UA	3	3	0.009	0.01	
MW-7	New Ponds	UA	3	3	0.01	0.0159	
MW-8	New Ponds	UA	3	3	0.02	0.0509	
MWP-8	Old Ponds			0*	ND ()	ND ()	
MWP-10	Old Ponds			0*	ND ()	ND ()	
MWP-12	Old Ponds	LA-BR	1	1	0.00024	0.00024	
P-2	New Ponds			0*	ND ()	ND ()	
PGE-9N				0*	ND ()	ND ()	
PGE-9S				0*	ND ()	ND ()	
Surface Water							
CON	Surface Water		41	0*	ND (0.0002)	ND (0.01)	
I-3	Surface Water		37	0*	ND (0.0002)	ND (0.01)	
NR-1	Surface Water		15	0*	ND ()	ND ()	
NR-2	Surface Water		15	0*	ND ()	ND ()	
NR-3	Surface Water		13	0*	ND ()	ND ()	
R-22	Surface Water		34	0*	ND ()	ND ()	
R-27	Surface Water		36	0*	ND ()	ND ()	
R-28	Surface Water		34	0*	ND ()	ND ()	
RRB	Surface Water		32	0*	ND (0.0002)	ND (0.01)	
Test and Extraction Wells							
IW-2	East Mesa	MA-LA	1	1	0.002	0.0064	
IW-3	East Mesa	UA		0*	ND ()	ND ()	
PE-1	Floodplain			0*	ND ()	ND ()	
TW-1	Plan B Test	UA-LA	4	4	0.00055	7.52	
TW-2D	MW-20 bench	LA	5	5	0.0545	8.07	
TW-2S	MW-20 bench	UA	5	5	5.08	8.31	
Water Supply Wells							
PGE-6	MW-24 Bench	MA	16	11	0.16	3.10	
PGE-7	MW-24 Bench	LA-BR	14	14	0.827	5.40	
PGE-8	Station	BR	15	0*	ND (0.0002)	ND (0.01)	
Park Moabi	Park Moabi	MA	23	4	0.00028	0.0094	

TABLE B-1

Summary of Groundwater Results

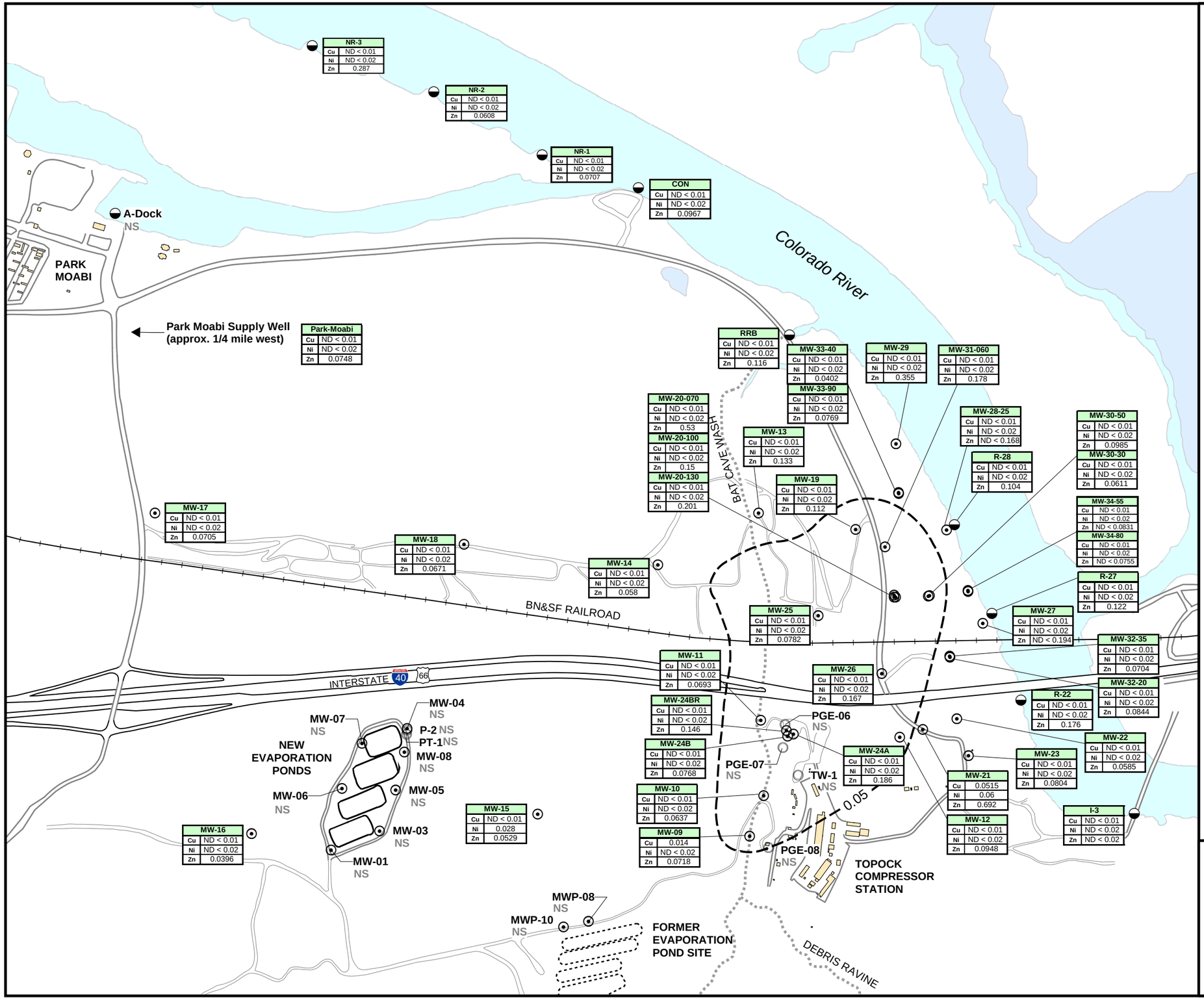
Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Notes:

[1] Groundwater sampling data through February 2005 except MW-43 cluster and MW-33-150, sampling data through March 2005.

UA upper alluvial aquifer
MA middle alluvial aquifer
LA lower alluvial aquifer
BR metamorphic bedrock
MC miocene conglomerate



LEGEND

- Groundwater Monitoring Well
- Groundwater Test Well or Supply Well (Inactive)
- Surface Water Monitoring Location

Sampling conducted March 15-19, 2004

0.144 Concentration in milligrams per liter (mg/L) Results shown are maximum concentrations of primary and duplicate samples

ND < 0.01 Not detected, at analytical detection (Method SW 6010B)

NS Not sampled

0.05 Approximate outline of Cr(VI) in groundwater >= 0.05 mg/L (California drinking water standard for Total Chromium)

N

0 750 1,500 Feet

1 inch equals 750 feet

FIGURE B-1
DISTRIBUTION OF COPPER, NICKEL, AND ZINC, MARCH 2004 QUARTERLY EVENT

MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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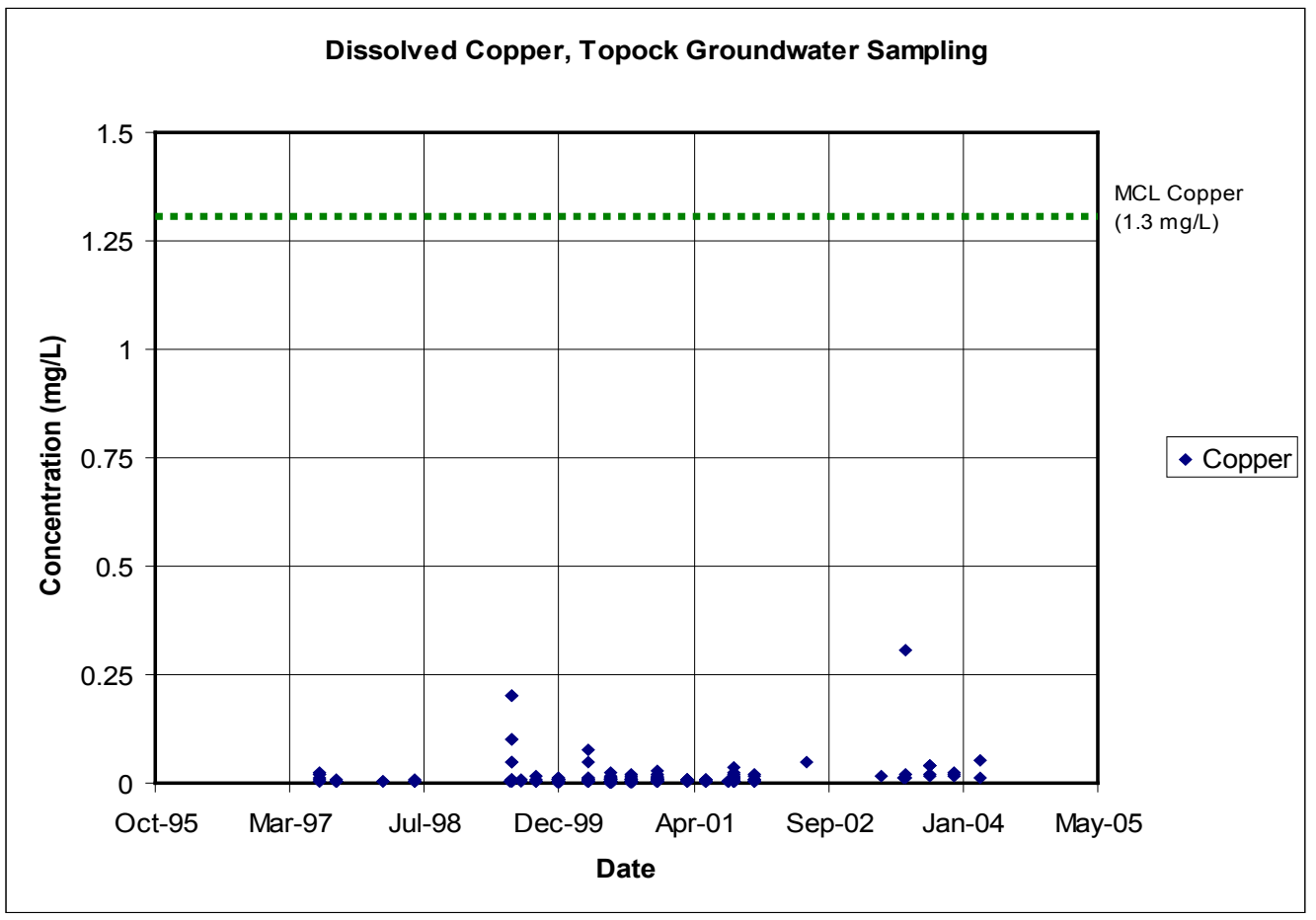
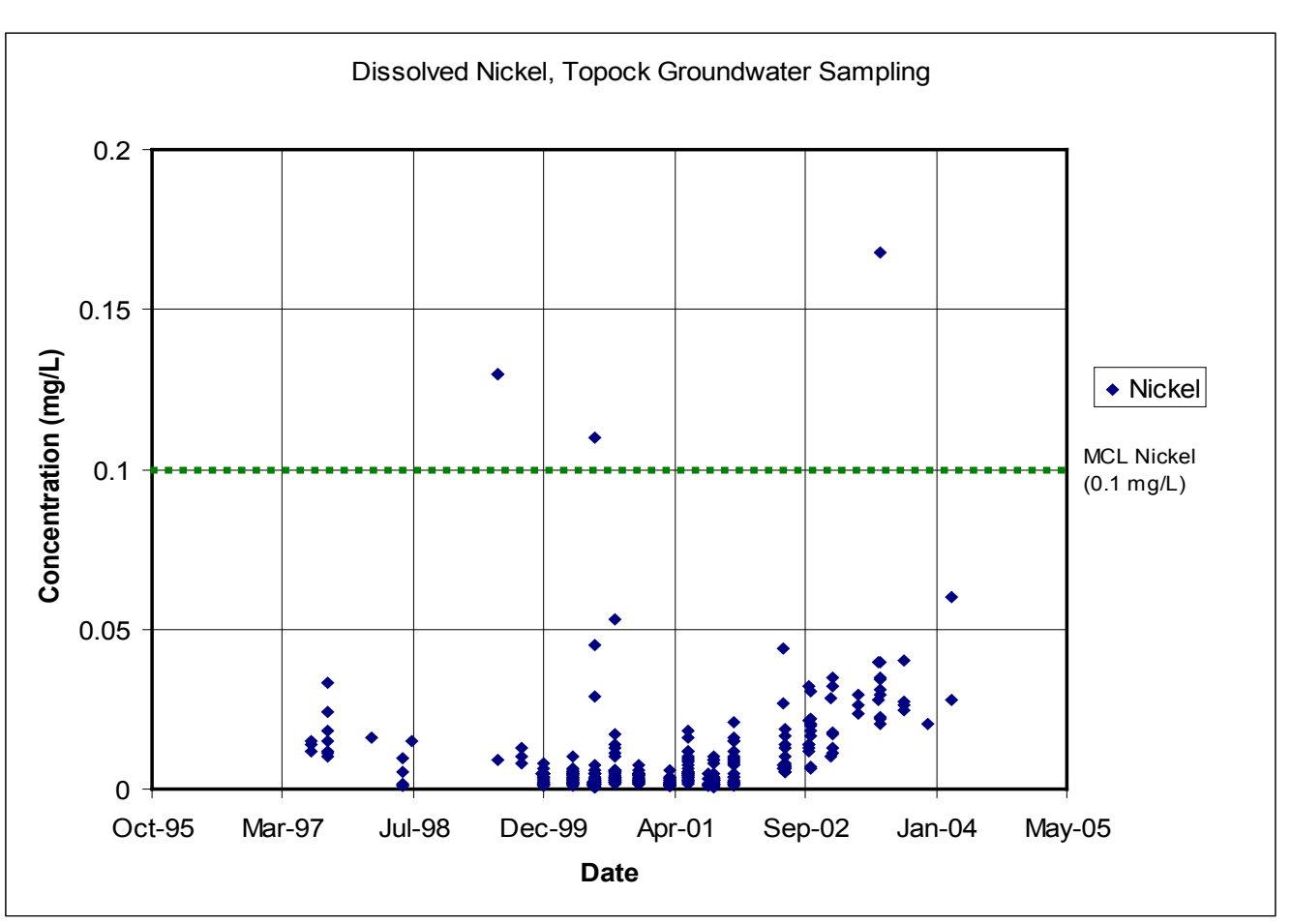




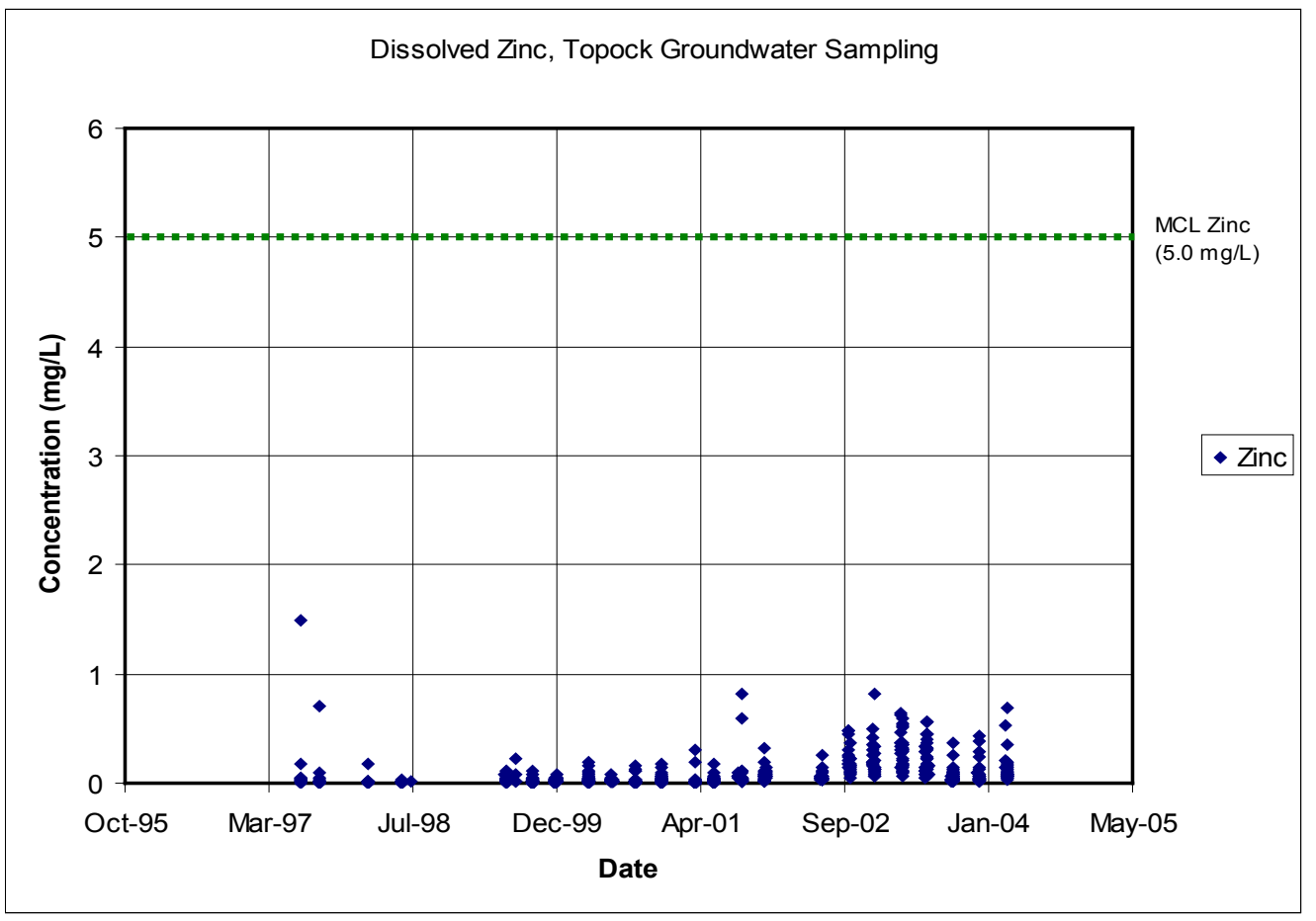
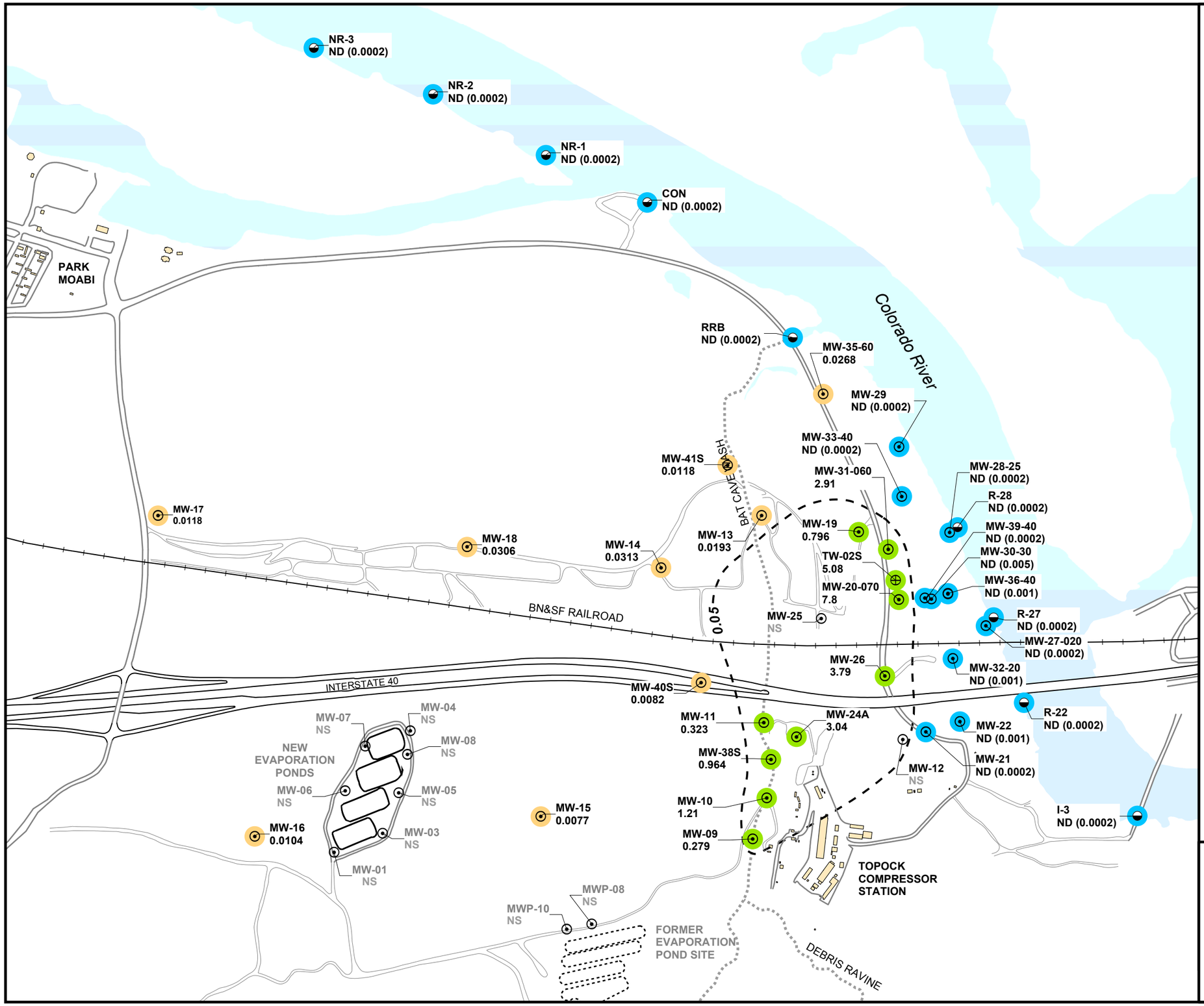


FIGURE B-2
SUMMARY OF COPPER, NICKEL, AND ZINC CONCENTRATIONS 1997 T0 2004
MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA



LEGEND

- Groundwater Monitoring Well
- Groundwater Test or Supply Well
- Surface Water Monitoring Location
- Extraction Well

1.47 Concentration of hexavalent chromium [Cr(VI)] in milligrams per liter (mg/L)

Results shown are maximum concentrations detected in primary and duplicate samples from wells completed in **Upper** zone of Alluvial Aquifer, December 2004 monitoring event. See Table 2 for complete results

ND (0.0002) Cr(VI) not detected, at listed reporting limit

NS Not sampled

Cr(VI) Concentrations in Water Samples

- Not detected at analytical reporting limit
- Concentration between reporting limit and 0.05 mg/L
- Concentration greater than 0.05 mg/L
- - - 0.05 Approximate outline of Cr(VI) in groundwater >= 0.05 mg/L (California drinking water standard for Total Chromium)

N

0 750 1,500 Feet

1 inch equals 750 feet

FIGURE B-3
HEXAVALENT CHROMIUM SAMPLING RESULTS UPPER ZONE OF ALLUVIAL AQUIFER, FOURTH QUARTER 2004 MONITORING EVENT

MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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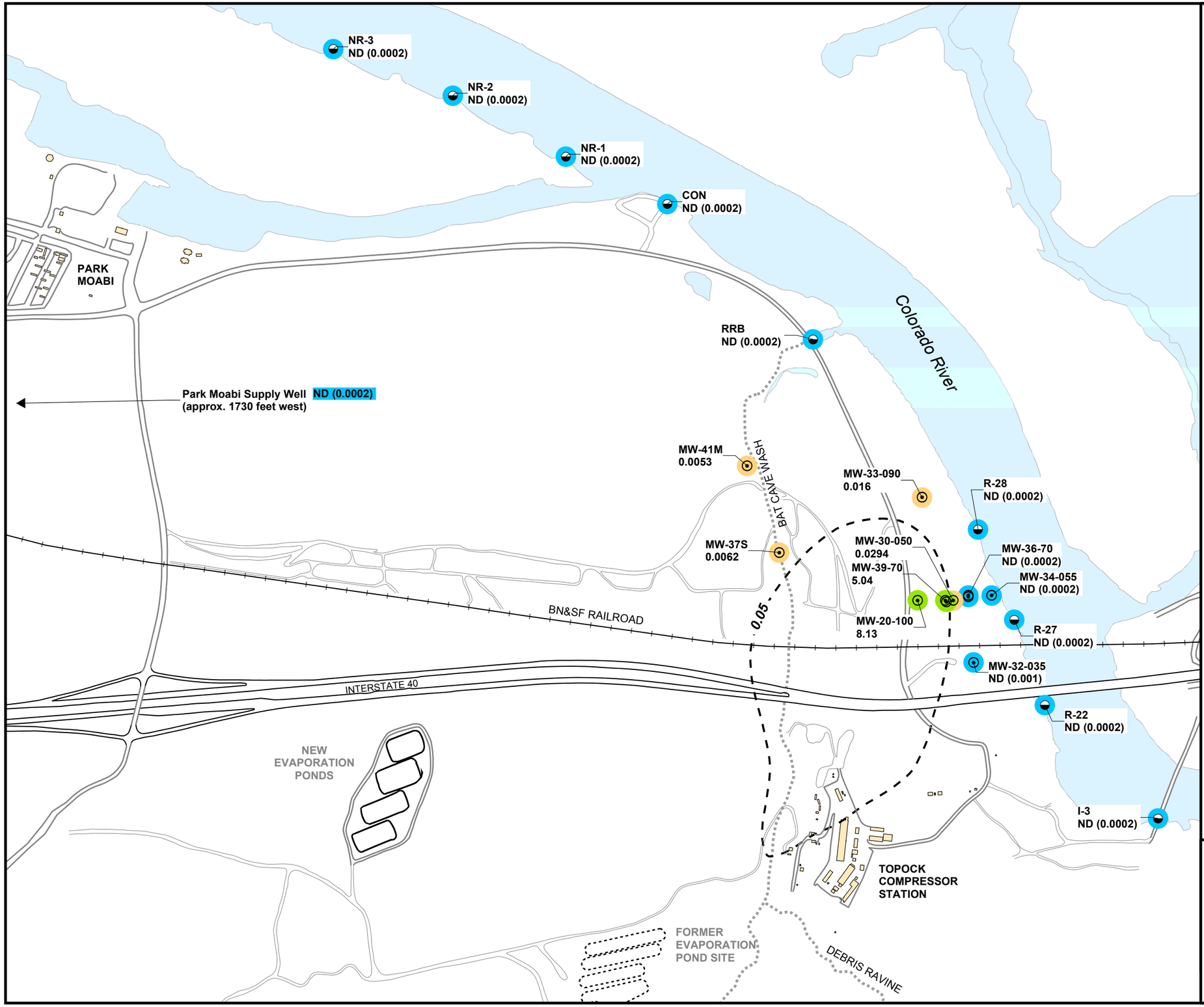

LEGEND

- Groundwater Monitoring Well
- Groundwater Test or Supply Well
- Surface Water Monitoring Location
- Extraction Well

8.13 Concentration of hexavalent chromium [Cr(VI)] in milligrams per liter (mg/L)

Results shown are maximum concentrations detected in primary and duplicate samples from wells completed in **Middle** zone of Alluvial Aquifer, December 2004 monitoring event. See Table 2 for complete results.

ND (0.0002) Cr(VI) not detected, at listed reporting limit

NS Not sampled

Cr(VI) Concentrations in Water Samples

- Not detected at analytical reporting limit
- Concentration between reporting limit and 0.05 mg/L
- Concentration greater than 0.05 mg/L
- - - 0.05 Approximate outline of Cr(VI) in groundwater >= 0.05 mg/L (California drinking water standard for Total Chromium)

N

0 750 1,500 Feet

1 inch equals 750 feet

FIGURE B-4
HEXAVALENT CHROMIUM SAMPLING RESULTSMIDDLE ZONE OF ALLUVIAL AQUIFER, FOURTH QUARTER 2004 MONITORING EVENT

MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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NR-3
ND (0.0002)

NR-2
ND (0.0002)

NR-1
ND (0.0002)

CON
ND (0.0002)

PARK
MOABI

Colorado River

RRB
ND (0.0002)

MW-35-135
0.0157

MW-41D
ND (0.001)

BAT CAVE WASH

0.05

MW-28-090
ND (0.0002)

MW-31-135
0.41

R-28
ND (0.0002)

MW-39-100
10.9

MW-37D
1.48

TW-02D
6.28

MW-20-130
8.6

MW-34-080
ND (0.001)

MW-36-090
2.27

R-27
ND (0.0002)

BN&SF RAILROAD

INTERSTATE

MW-40D
0.0385

MW-24B
5.26

R-22
ND (0.0002)

NEW
EVAPORATION
PONDS

MW-38D
0.279

TW-01
3.82

I-3
ND (0.00

TOPOCK
COMPRESSOR
STATION

FORMER
EVAPORATION
POND SITE

DEBRIS RAVINE

LEGEND

- Groundwater Monitoring Well
- Groundwater Test or Supply Well
- Surface Water Monitoring Location
- Extraction Well

6.28 Concentration of hexavalent chromium [Cr(VI)] in milligrams per liter (mg/L)

Results shown are maximum concentrations detected in primary and duplicate samples from wells completed in **Lower** zone of Alluvial Aquifer, December 2004 monitoring event. See Table 2 for complete results.

ND (0.0002) Cr(VI) not detected, at listed reporting limit

NS Not sampled

Cr(VI) Concentrations in Water Samples

- Not detected at analytical reporting limit
- Concentration between reporting limit and 0.05 mg/L
- Concentration greater than 0.05 mg/L
- 0.05 Approximate outline of Cr(VI) in groundwater >= 0.05 mg/L (California drinking water standard for Total Chromium)

N

0 750 1,500 Feet

1 inch equals 750 feet

FIGURE B-5
HEXAVALENT CHROMIUM SAMPLING RESULTS LOWER ZONE OF ALLUVIAL AQUIFER, FOURTH QUARTER 2004 MONITORING EVENT

MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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Appendix C
Well Construction and Sampling Information for GMP Wells

TABLE C-1

Well Construction and Sampling Summary

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Well ID	Site Area	Measuring Point Elevation (ft MSL)	Screen Interval (ft bgs)	Well Casing (inches)	Well Depth (ft btoc)	Depth to Water (ft toc)	Sampling System	Typical Purge Rate (gpm)	Typical Purge Volume (gallons)	Pump Depth (ft bgs)	Transducer Installed	Remarks
GMP Monitoring Wells												
MW-9	Bat Cave Wash	536.56	77 - 87	4 (PVC)	90.7	82.3	CD pump	3	11	82		
MW-10	Bat Cave Wash	530.65	73.7 - 93.7	4 (PVC)	97.6	76.3	CD pump	5	40	84	Active	
MW-11	Bat Cave Wash	522.61	62.5 - 82.5	4 (PVC)	90.7	68.5	CD pump	5	30	73		
MW-12	East of Station	484.01	27.5 - 47.5	4 (PVC)	51.6	30.1	Ded. Redi-Flo AR	3	40	38	Inactive	
MW-13	Bat Cave Wash	488.64	28.5 - 48.5	4 (PVC)	52.5	35.2	CD pump	4	30	39		
MW-14	Bat Cave Wash	570.99	111 - 131	4 (PVC)	134.9	117.3	CD pump	4	30	121		
MW-15	Bat Cave Wash	641.52	180.5 - 200.5	4 (PVC)	205.1	187.2	CD pump	5	30	191		
MW-16	Near New Ponds	657.31	198 - 218	4 (PVC)	219.6	201.6	CD pump	7	35	208	Inactive	
MW-17	Bat Cave Wash	589.96	130 - 150	4 (PVC)	152.5	134.1	CD pump	5	32	140		
MW-18	West Mesa	545.32	85 - 105	4 (PVC)	111.8	91.1	CD pump	5	30	95	Inactive	
MW-19	Bat Cave Wash	499.92	46 - 66	4 (PVC)	66.5	47.1	CD pump	7	41	56	Active	
MW-20-70	MW-20 bench	500.15	50 - 70	4 (PVC)	70.9	47.1	CD pump	10	53	60	Active	
MW-20-100	MW-20 bench	500.58	89.5 - 99.5	4 (PVC)	101.1	47.8	CD pump	10	110	95	Active	
MW-20-130	MW-20 bench	500.66	121 - 131	4 (PVC)	132.7	72.9	CD pump	10	180	126	Active	
MW-21	East of Station	505.55	36 - 59	4 (PVC)	59.5	51.0	CD pump	10	10	54		low recharge well; purges dry at 1 casing volum
MW-22	Floodplain	460.72	5.5 - 11	2 (PVC)	13.0	7.5	Peristaltic	0.2	4	9	Active	
MW-23	East of Station	507.33	60 - 80	4 (PVC)	82.0	53.0	CD Pump	5	20	70		low recharge well; purges dry at 1 casing volum
MW-24A	MW-24 Bench	567.16	104 - 124.5	4 (PVC)	126.6	113.1	CD pump	3	30	114	Inactive	
MW-24B	MW-24 Bench	564.76	194 - 213	4 (PVC)	218.9	110.8	CD pump	7	210	204	Inactive	
MW-24BR	MW-24 Bench	563.95	378 - 437	4 (PVC)	441.2	109.5	CD pump	8	185	408	Inactive	low recharge well; purges dry at 1 casing volum
MW-25	Near Bat Cave	542.90	84.5 - 104.5	4 (PVC)	107.0	89.5	CD pump	5	32	95	Active	
MW-26	Near Bat Cave	502.22	51.5 - 71.5	2 (PVC)	74.0	49.0	CD pump	7	50	62	Active	
MW-27-20	Floodplain	460.56	7 - 17	2 (PVC)	19.0	8.7	Ded. Redi-Flo AR	1	7	12	Active	
MW-27-60	Floodplain	461.38	47.3 - 57.3	2 (PVC)	59.4	7.3	Redi-Flo AR	2	25	25	Active	
MW-27-85	Floodplain	460.99	77.5 - 87.5	2 (PVC)	80.0	7.0	Redi-Flo AR	2	36	25	Active	
MW-28-25	Floodplain	466.85	13 - 23	2 (PVC)	25.0	14.9	Ded. Redi-Flo AR	1	5	25	Active	
MW-28-90	Floodplain	467.51	70 - 90	2 (PVC)	98.5	13.8	Ded. Redi-Flo AR	2	50	27	Active	
MW-29	Floodplain	485.21	29.5 - 39.5	2 (PVC)	42.0	32.4	Ded. Mini-Monsoon	0.5	6	35	Active	
MW-30-30	Floodplain	468.12	12 - 32	2 (PVC)	34.0	15.8	Ded. Redi-Flo AR	1	10	22	Active	
MW-30-50	Floodplain	468.81	40.5 - 50.5	4 (PVC)	52.4	17.1	Ded. Redi-Flo AR	2	75	46	Active	
MW-31-60	MW-20 Bench	496.81	41.5 - 61.5	4 (PVC)	64.0	44.7	CD pump	10	40	52	Active	
MW-31-135	MW-20 Bench	498.11	113 - 133	2 (PVC)	133.6	46.4	Redi-Flo AR	3	60	123	Active	
MW-32-20	Floodplain	461.51	10 - 19	2 (PVC)	22.0	9.3	Ded. Redi-Flo AR	1.5	6	15	Active	

TABLE C-1

Well Construction and Sampling Summary

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Well ID	Site Area	Measuring Point Elevation (ft MSL)	Screen Interval (ft bgs)	Well Casing (inches)	Well Depth (ft btoc)	Depth to Water (ft toc)	Sampling System	Typical Purge Rate (gpm)	Typical Purge Volume (gallons)	Pump Depth (ft bgs)	Transducer Installed	Remarks
GMP Monitoring Wells												
MW-32-35	Floodplain	461.63	26 - 36	4 (PVC)	39.0	10.1	Ded. Redi-Flo AR	2	60	32	Active	
MW-33-40	Floodplain	487.38	29 - 38	4 (PVC)	42.0	35.5	Ded. Mini-Monsoon	0.5	4	35	Active	
MW-33-90	Floodplain	487.55	69 - 88	4 (PVC)	91.0	33.9	Ded. Redi-Flo AR	2	110	82	Active	
MW-33-150	Floodplain	487.77	132 - 152	2 (PVC)	155.4	35.4	Redi-Flo AR	3	60	50	Active	
MW-33-210	Floodplain	487.25	190 - 210	2 (PVC)	222.8	35.4	Redi-Flo AR	3	90	50	Active	
MW-34-55	Floodplain	460.95	45 - 55	4 (PVC)	56.5	9.2	Ded. Redi-Flo AR	2	100	50	Active	
MW-34-80	Floodplain	461.20	73 - 82	4 (PVC)	83.8	7.1	Ded. Redi-Flo AR	3	150	78	Active	
MW-34-100	Floodplain	460.96	89.5 - 99.5	2 (PVC)	116.5	7.1	Redi-Flo AR	2	55	25	Active	
MW-35-60	North Area	484.19	37 - 57	2 (PVC)	60.2	32.0	Redi-Flo AR	2	18	37	Active	
MW-35-135	North Area	483.57	116 - 136	2 (PVC)	159.2	31.4	Redi-Flo AR	3	66	127	Active	
MW-36-20	Floodplain	469.26	12 - 22	1 (PVC)	22.8	18.0	Peristaltic	0.5	4	15	Active	
MW-36-40	Floodplain	469.61	- 33	1 (PVC)	42.8	18.0	Peristaltic	0.5	4	20	Active	
MW-36-50	Floodplain	469.60	48 - 53	1 (PVC)	53.4	18.0	Peristaltic	0.75	5	20	Active	
MW-36-70	Floodplain	469.25	62 - 72	1 (PVC)	72.6	17.7	Peristaltic	0.5	7	20	Active	
MW-36-90	Floodplain	469.61	82 - 92	1 (PVC)	92.6	18.6	Peristaltic	0.4	10	20	Active	
MW-36-100	Floodplain	469.64	90 - 100	2 (PVC)	110.4	16.7	Ded. Redi-Flo AR	2	45	93	Active	
MW-37D	Bat Cave Wash	486.19	180 - 200	2 (PVC)	226.6	33.2	Redi-Flo AR	3	100	190		
MW-37S	Bat Cave Wash	485.97	64 - 84	2 (PVC)	87.1	33.2	Redi-Flo AR	2	30	74		
MW-38D	Bat Cave Wash	525.31	153 - 173	2 (PVC)	191.0	72.3	Redi-Flo AR	3	60	163		
MW-38S	Bat Cave Wash	525.51	75 - 95	2 (PVC)	98.2	72.1	Redi-Flo AR	1	13	85		
MW-39-40	Floodplain	468.02	32 - 42	1 (PVC)	42.3	16.8	Peristaltic	0.5	3.5	20	Active	
MW-39-50	Floodplain	467.93	50 - 55	1 (PVC)	50.0	16.8	Peristaltic	0.5	5	20	Active	
MW-39-60	Floodplain	468.00	51 - 61	1 (PVC)	66.4	16.9	Peristaltic	0.5	6	20	Active	
MW-39-70	Floodplain	468.02	62 - 72	1 (PVC)	71.8	17.0	Peristaltic	0.5	7	20	Active	
MW-39-80	Floodplain	467.92	72 - 82	1 (PVC)	82.6	17.0	Peristaltic	0.5	9	20	Active	
MW-39-100	Floodplain	468.01	83 - 103	2 (PVC)	117.8	16.8	Ded. Redi-Flo AR	2	45	90	Active	
MW-40D	I-40 Median	566.08	240 - 260	2 (PVC)	266.0	112.7	Redi-Flo AR	3	75	250		
MW-40S	I-40 Median	566.04	115 - 135	2 (PVC)	133.9	112.3	Redi-Flo AR	2	13	125		
MW-41D	Bat Cave Wash	479.42	271 - 291	2 (PVC)	313.0	26.3	Redi-Flo AR	3	145	281		
MW-41M	Bat Cave Wash	479.83	170 - 190	2 (PVC)	192.0	26.3	Redi-Flo AR	3	85	180		
MW-41S	Bat Cave Wash	480.07	40 - 60	2 (PVC)	62.0	26.6	Redi-Flo AR	2	42	50		
MW-42-30	Floodplain	463.81	9.8 - 29.8	2 (PVC)	32.3	12.1	Redi-Flo AR	2	28	20	Active	
MW-42-55	Floodplain	463.87	42.5 - 52.5	2 (PVC)	56.0	12.1	Redi-Flo AR	3	21	37	Active	

TABLE C-1

Well Construction and Sampling Summary

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Well ID	Site Area	Measuring Point Elevation (ft MSL)	Screen Interval (ft bgs)	Well Casing (inches)	Well Depth (ft btoc)	Depth to Water (ft toc)	Sampling System	Typical Purge Rate (gpm)	Typical Purge Volume (gallons)	Pump Depth (ft bgs)	Transducer Installed	Remarks
GMP Monitoring Wells												
MW-42-65	Floodplain	463.37	56.2 - 66.2	2 (PVC)	80.0	11.8	Redi-Flo AR	3	36	37	Active	
MW-43-25	Floodplain	462.54	15 - 25	(PVC)		10.7	Redi-Flo AR	1	9	26	Uncalibrated	
MW-43-75	Floodplain	462.71	65 - 75	(PVC)		10.3	Redi-Flo AR	2	28	26	Uncalibrated	
MW-43-90	Floodplain	462.76	80 - 90	(PVC)		11.1	Redi-Flo AR	2	47	26	Uncalibrated	
IM Compliance Wells												
CW-1D	East Mesa	566.46	250 - 300	(PVC)	321.5	112.4					Planned	
CW-1M	East Mesa	566.07	140 - 190	(PVC)	191.1	112.0					Planned	
CW-2D	East Mesa	549.43	-	(PVC)	355.0	95.7					Planned	
CW-2M	East Mesa	549.45	-	(PVC)	202.0	95.6					Planned	
CW-3D	East Mesa	534.14	270 - 320	(PVC)	342.0	80.6					Planned	
CW-3M	East Mesa	534.10	140 - 190	(PVC)	223.6	80.3					Planned	
CW-4D	East Mesa	518.55	232 - 282	2 (PVC)	305.2	104.2					Planned	
CW-4M	East Mesa	518.55	119.5 - 169.5	2 (PVC)	171.2	64.4					Planned	
IM Observation Wells												
OW-1D	East Mesa	550.36	258 - 278	2 (PVC)	280.8	96.4					Uncalibrated	
OW-1M	East Mesa	550.36	165 - 185	2 (PVC)	189.2	94.6					Uncalibrated	
OW-1S	East Mesa	550.15	84 - 114	2 (PVC)	113.5	96.3					Uncalibrated	
OW-2D	East Mesa	549.01	300 - 330	2 (PVC)	342.0	95.3					Uncalibrated	
OW-2M	East Mesa	548.52	190 - 210	2 (PVC)	211.1	96.4					Uncalibrated	
OW-2S	East Mesa	548.75	70 - 110	(PVC)	120.6	94.9					Uncalibrated	
OW-3D	West Mesa	558.63	243 - 263	2 (PVC)	274.5	62.7					Uncalibrated	
OW-3M	West Mesa	558.90	180 - 200	2 (PVC)	202.0	104.6					Uncalibrated	
OW-3S	West Mesa	558.58	86 - 116	2 (PVC)	118.0	104.3					Uncalibrated	
OW-5D	East Mesa	552.35	300 - 320	2 (PVC)	352.0	98.2					Uncalibrated	
OW-5M	East Mesa	551.75	210 - 250	2 (PVC)	253.6	97.5					Uncalibrated	
OW-5S	East Mesa	551.75	70 - 110	2 (PVC)	113.2	97.7					Uncalibrated	
Other Site Wells not in GMP												
MW-1	New Ponds	661.76	200.5 - 210.5	4 (PVC)	217.0	206.1	air bladder pump					active PG&E pond monitoring well
MW-3	New Ponds	650.51	193 - 203	4 (PVC)	205.0	193.8	air bladder pump					active PG&E pond monitoring well
MW-4	New Ponds	625.73	164.5 - 174.5	4 (PVC)	178.7	168.6	air bladder pump					active PG&E pond monitoring well
MW-5	New Ponds	635.69	175.9 - 185.4	4 (PVC)	189.6	178.9	air bladder pump					active PG&E pond monitoring well
MW-6	New Ponds	642.84	184.5 - 193.5	4 (PVC)	197.9	186.0	air bladder pump					active PG&E pond monitoring well

TABLE C-1

Well Construction and Sampling Summary
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

Well ID	Site Area	Measuring Point Elevation (ft MSL)	Screen Interval (ft bgs)	Well Casing (inches)	Well Depth (ft btoc)	Depth to Water (ft toc)	Sampling System	Typical Purge Rate (gpm)	Typical Purge Volume (gallons)	Pump Depth (ft bgs)	Transducer Installed	Remarks
Other Site Wells not in GMP												
MW-7	New Ponds	631.91	172.7 - 182.7	4 (PVC)	184.7	174.8	air bladder pump					active PG&E pond monitoring well
MW-8	New Ponds	627.54	169 - 178	4 (PVC)	183.4	170.5	air bladder pump					active PG&E pond monitoring well
MWP-8	Old Ponds	677.48	181 - 210	3 (PVC)	213.0	187.8	---					inactive monitoring well
MWP-10	Old Ponds	675.81	195 - 235	3 (PVC)	237.0	208.1	---					inactive monitoring well
MWP-12	Old Ponds	663.49	-	4 (PVC)		109.7	---					inactive monitoring well
P-2	New Ponds	537.60	238.5 - 248.5	4 (steel)	251.0	169.8	---					inactive monitoring well
PGE-9N		462.21	25 - 95	12 (steel)								
PGE-9S		461.99	30 - 100	12 (steel)								
Test and Extraction Wells												
IW-2	East Mesa	550.10	170 - 330	(PVC)	343.0	95.8						
IW-3	East Mesa	554.44	160 - 320	(PVC)	333.0	100.1						
PE-1	Floodplain		-	(steel)		16.6						
TW-1	Plan B Test	620.55	168 - 268	5 (PVC)	269.0	65.8	CD pump	20	200			inactive pilot test well
TW-2D	MW-20 bench	499.57	115 - 150	6 (PVC)	150.0	72.9	CD pump				Active	active IM extraction well
TW-2S	MW-20 bench	499.05	45 - 95	6 (PVC)	90.0	46.2	CD pump				Active	IM extraction well
Water Supply Wells												
PGE-6	MW-24 Bench	563.32	110 - 180	14 (steel)	181.5	108.1	CD pump	24	650			inactive supply
PGE-7	MW-24 Bench	563.89	195 - 330	14 (steel)	331.6	108.8	CD pump	12	600			inactive supply
PGE-8	Station	596.01	405 - 554	8 (steel)	564.3	141.1	CD pump	20	1900			inactive injection
Park Moabi	Park Moabi	518.55	-	8 (steel)	252.0	61.3	active supply well					call Park Ranger to schedule sampling

Notes:

Depth to water shown is the most recently measured depth to water.
Well depth, and screen interval and water level depths rounded-off to whole-foot values.

BGS = below ground surface
MSL = mean sea level
BTOC = below top of polyvinyl chloride (PVC) casing
NA = not known or available
CD pump = dedicated constant-discharge electric submersible pump
Redi-Flo AR = adjustable-rate electric submersible pump

All GMP wells except low recharge wells and Park Moabi well are purged and sampled using well-volume method.

Pacific Gas and Electric Company®

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July 13, 2005

Mr. Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

Subject: Revised Sampling Plan and Standard Operating Procedure for Depth-Specific Surface Water Sampling
Pacific Gas and Electric Company, Topock Project

Dear Mr. Shopay:

This letter transmits the revised Section 5.0 of the *Monitoring Plan for Groundwater and Surface Water Monitoring Program, Revision 0* (GMP Monitoring Plan) describing revisions to the proposed surface water monitoring plan at the Pacific Gas and Electric Company (PG&E) Topock site. In addition, this letter transmits the revised standard operating procedure (SOP) A-12 describing the methods and procedures for collection of depth-specific water sampling. The revised Section 5.0 is intended to replace Section 5.0 in the GMP Monitoring Plan submitted on April 11, 2005. SOP A-12 is intended to supplement *Sampling, Analysis, and Field Procedures Manual, Revision 1* submitted on March 31, 2005.

These documents were originally submitted to DTSC on May 16, 2005, and have been revised in conformance with DTSC's letter dated June 30, 2005. If you have any questions, please do not hesitate to contact me at (805) 546-5243.

Sincerely,

Julie Eakins for Yvonne Meeks

Cc: Kate Burger

Monitoring Plan for Groundwater and Surface Water Monitoring Program PG&E Topock Compressor Station Needles, California

Prepared for

Pacific Gas and Electric Company

Revision 1
July 13, 2005

Includes Revised Section 5 and revised or new applicable figures

Prepared by
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Revised or new sections are shown in italics.

5.0 Proposed Surface Water Monitoring Plan

5.1 Monitoring Objectives

Surface water monitoring is an important component of the Topock GMP. In addition to the general GMP program objectives outlined in Section 1.4, the following are specific objectives established for surface water monitoring at the Topock site:

- Conduct routine monitoring of near-shore surface water locations both upgradient and downgradient of the Topock site.
- Augment the routine surface water monitoring program by collecting depth-specific surface water samples in the river channel.
- Collect general water quality data for surface water locations adjacent to the Topock site. The general water quality parameters of pH and specific conductance, which are considered COPCs under the GMP, will be used to evaluate the hydraulic relationship between groundwater and the surface water body (Colorado River). The water quality parameters of hardness, total dissolved solids (TDS), and total suspended solids (TSS), which are considered COI, will be analyzed at the river channel sampling locations only.
- Collect manual river level elevation data periodically to verify the river gauge data collected under the IM PMP activity using transducers. Collection and evaluation of transducer measurements are not part of the GMP.

5.2 Assessment and Rationale for Surface Water Monitoring

5.2.1 Monitoring Locations

Nine shoreline surface water stations were previously established for routine collection of surface water samples both upstream and downstream of the Topock site. These stations are shown in Figure 5-1. All nine previously-established shoreline surface water stations will continue to be sampled under this revised GMP Monitoring Plan.

This GMP Monitoring Plan, Revision 1 augments the previous surface water sampling program by introducing eight depth-specific surface water sampling stations in the river channel. These depth-specific sampling stations are shown in Figure 5-1.

5.2.2 Monitoring Frequency

The nine shoreline surface water stations are currently sampled monthly and quarterly. The site COCs, Cr(T) and Cr(VI), are analyzed monthly for these shoreline stations, and specific conductance and pH, both COPCs, are monitored quarterly. Table 5-1 summarizes the shoreline surface water monitoring frequency and analyses.

In late February 2005, weekly sampling at three of the shoreline surface water stations (CON, R-27, and R-28) was conducted for four consecutive weeks. This sampling was conducted at the direction of DTSC at the same time the weekly contingency sampling of groundwater monitoring wells was implemented in accordance with the IM *Contingency Plan for Sentry Well Groundwater Monitoring* (DTSC 2005b). Weekly sampling of surface water will occur only when specifically requested by the DTSC.

Depth-specific river channel sampling at eight stations will commence in July 2005. These locations will be sampled quarterly for Cr(T), Cr(VI), specific conductance, pH, hardness, TDS, and TSS. During the seasonal low-water stage of the Colorado River, the depth-specific sampling at river channel locations will occur monthly, with samples analyzed for Cr(T), Cr(VI), and hardness only. Although low-water stage typically occurs between December and March, this low water sampling period will be adjusted depending on the projected river stage, which is calculated based on projected releases from Davis Dam and the projected stage in Lake Havasu.

5.2.3 Monitoring Parameters

Table 5-1 presents a summary of the surface water sampling analyses and frequency for each surface water station in the GMP. Table 4-3 identifies the analytical methods and reporting limits for the GMP COCs, COPCs, COIs, and field parameters.

Monitoring at each surface water station includes the measurement of field parameters using field instrumentation. Surface water is monitored for temperature, specific conductivity, dissolved oxygen, oxidation-reduction potential, pH, and turbidity, using field instrumentation, as described in the Field Procedures Manual (CH2M HILL 2005c).

As part of the IMs being implemented at the Topock site, transducers have been installed at select river gauge stations. Water level data collected using these transducers is downloaded and evaluated under the IM program and is not addressed in the GMP.

Manual surface water level measurements are also routinely collected at three of the surface water stations (RRB, A-Dock, and I-3; other stations as required) as part of the GMP to confirm transducer measurements. Water level measurements are collected as described in the Field Procedures Manual (CH2M HILL 2005c).

5.3 Sampling, Analysis, and Field Procedures

5.3.1 Sample Collection

Standard procedures to be used in association with GMP monitoring events are presented in the Field Procedures Manual (CH2M HILL 2005c). The Field Procedures Manual presents standardized protocol for sample collection, laboratory analysis, and other field investigation and data collection activities for the several investigation, monitoring, and interim measure programs performed at the Topock Compressor Station.

Shoreline surface water samples are collected in accordance with standard operating procedure (SOP) SOP-A4 in the Field Procedures Manual, from a depth of approximately 6 inches below the water surface.

The river channel surface water sampling stations are located in the river approximately one-third of the river width from the California shoreline. In the event a sampling station is too shallow to safely approach by boat, the next closest location to the station with adequate depth will be sampled, and global positioning system (GPS) coordinates will be recorded. Samples will be collected from one foot off the bottom of the river channel, at the mid-point of the water column, and within one foot of the water surface. Sampling will be conducted from an anchored motorized boat with the use of a portable GPS device for proper spatial accuracy and repeatability. The SOP for river channel sample collection is presented in SOP-A12. This SOP will be incorporated into a subsequent revision of the current Field Procedures Manual (CH2M HILL 2005c).

5.3.2 Sample Filtration and Preservation

Shoreline surface water samples for Cr(T) and Cr(VI) analysis will be collected unfiltered and unpreserved, for subsequent filtration and preservation at the laboratory prior to analysis. River channel surface water samples for Cr(T) and Cr(VI) analysis will be field-filtered and preserved at the time of sample collection.

Surface water samples (both shoreline and river channel) for all other laboratory analyses (i.e., pH, specific conductance, hardness, TDS, and TSS) do not require filtration prior to laboratory analysis. Therefore, surface water samples collected for these analyses will not be filtered in either the field or the laboratory.

5.3.3 Field Quality Control Samples

Field quality control samples will be collected during each GMP monitoring event in accordance with the PG&E Topock QAPP for Water Quality Sampling and Analysis (CH2M HILL 2005c). Specific to the surface water monitoring plan, one equipment blank will be collected during each river channel surface water sampling event. The equipment blank will be collected by running deionized water through a new segment of tubing used for collection of the depth-specific river channel surface water samples. The equipment blank will be submitted for laboratory analysis for Cr(T) and Cr(VI).

5.4 Surface Water Monitoring Schedule

Table 5-1 summarizes the proposed sampling frequencies and analyses for the surface water monitoring program. A schedule of Topock GMP surface water and groundwater monitoring events through June 2006, including approximate sampling dates, is presented in Table 4-4. Following the June 2006 event, the surface water monitoring program will be re-evaluated and modified as warranted with DTSC approval.

TABLE 4-3

Revision 1-7/13/05

Site Analytical Parameters, Test Methods, and Reporting Limits

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Analytical Parameter	Units	Groundwater		Surface Water		Drinking Water production wells		Drinking Water Maximum Contaminant Levels [4]
		Analytical Method	Minimum Reporting Limit [1]	Analytical Method	Minimum Reporting Limit [1]	Analytical Method	Minimum Reporting Limit [1]	
Constituents of Concern (COCs)								
Hexavalent Chromium	µg/L	SW 7196 [2]	10	---	---	---	---	Note 5
Hexavalent Chromium	µg/L	SW 7199 [3]	0.2	SW 7199 [3]	0.2	EPA 218.6	0.0002	Note 5
Total Chromium, dissolved	µg/L	SW 6010B	1	SW 6010B	1	EPA 200.7	0.001	50; Note 5
Constituents of Potential Concern (COPCs)								
pH	pH units	EPA 150.1	0.1	EPA 150.1	0.1	EPA 150.1	0.1	6.5 - 8.5*
Specific conductance	µS/cm	EPA 120.1	2	EPA 120.1	2	EPA 120.1	2	1600*
Lead, dissolved	µg/L	SW 6010B	5	---	---	---	---	not established
TPH-Extractable (Diesel Range)	mg/L	EPA 8015M	0.5	---	---	---	---	not established
TPH-Extractable (Motor Oil Range)	mg/L	EPA 8015M	0.5	---	---	---	---	not established
Constituents of Interest (COIs)								
Hardness	mg/L	---	---	EPA 130.2	---	---	---	not established
TDS (mg/L)	mg/L	---	---	EPA 160.1	10	---	---	500*
TSS (mg/L)	mg/L	---	---	EPA 160.2	10	---	---	not established
Antimony, dissolved	µg/L	SW 6010B	3	---	---	---	---	6
Arsenic, dissolved	µg/L	SW 6010B	5	---	---	---	---	50
Barium, dissolved	µg/L	SW 6010B	500	---	---	---	---	1000
Beryllium, dissolved	µg/L	SW 6010B	1	---	---	---	---	4
Cadmium, dissolved	µg/L	SW 6010B	2	---	---	---	---	5
Cobalt, dissolved	µg/L	SW 6010B	5	---	---	---	---	not established
Copper, dissolved	µg/L	SW 6010B	10	---	---	---	---	1000*
Mercury, dissolved	µg/L	SW 7470A	0.2	---	---	---	---	2
Molybdenum, dissolved	µg/L	SW 6010B	5	---	---	---	---	not established
Nickel, dissolved	µg/L	SW 6010B	20	---	---	---	---	100
Selenium, dissolved	µg/L	SW 6010B	5	---	---	---	---	50
Silver, dissolved	µg/L	SW 6010B	5	---	---	---	---	100*
Thallium, dissolved	µg/L	SW 6010B	1	---	---	---	---	2
Vanadium, dissolved	µg/L	SW 6010B	5	---	---	---	---	not established
Zinc, dissolved	µg/L	SW 6010B	20	---	---	---	---	5000*

Site Analytical Parameters, Test Methods, and Reporting Limits
Monitoring Plan for Groundwater and Surface Water Monitoring Program
PG&E Topock Compressor Station, Needles, California

Analytical Parameter	Units	Groundwater		Surface Water		Drinking Water production wells		Drinking Water Maximum Contaminant Levels [4]
		Analytical Method	Minimum Reporting Limit [1]	Analytical Method	Minimum Reporting Limit [1]	Analytical Method	Minimum Reporting Limit [1]	
Field Water Quality Parameters								
Temperature	ºC	Field Instrumentation	---	Field Instrumentation	---	Field Instrumentation	---	
Specific Conductance	µS/cm	Field Instrumentation	---	Field Instrumentation	---	Field Instrumentation	---	
Dissolved Oxygen	mg/L	Field Instrumentation	---	Field Instrumentation	---	Field Instrumentation	---	
Oxidation-Reduction Potential	mV	Field Instrumentation	---	Field Instrumentation	---	Field Instrumentation	---	
pH	pH units	Field Instrumentation	---	Field Instrumentation	---	Field Instrumentation	---	
Turbidity	NTU	Field Instrumentation	---	Field Instrumentation	---	Field Instrumentation	---	

Notes:

[1] Minimum reporting limit for undiluted samples. Reporting limits are increased when sample dilution is required.

[2] Method SW 7196A is used for samples collected from monitoring wells where prior monitoring has detected hexavalent chromium [CR(VI)] concentrations above 100 micrograms per liter (µg/L).

[3] Method SW 7199 is used for all surface water samples and all groundwater samples collected from monitoring wells where prior monitoring has not detected Cr(VI) concentrations above 100 µg/L.

[4] Drinking water maximum contaminant levels (MCLs) listed are California primary MCLs.

[5] **Additional Arizona (ADEQ) water quality standards for Chromium: (source: Arizona Administrative Register, Title 18, Section R18-11-109, Appendix A)**
Surface water aquatic/wildlife chronic toxicity: dissolved Cr(VI) 11 µg/L
Surface water aquatic/wildlife acute toxicity: dissolved Cr(VI) 16 µg/L
Surface water fish consumption: total recoverable Cr(VI) 2,000 µg/L
Surface water full-body contact: total recoverable Cr(VI) 4,200 µg/L
Domestic water source: total recoverable Cr(VI) 21 µg/L, and total recoverable Cr(T) 100 µg/L

Hardness is the sum of the calcium and magnesium concentrations, expressed as calcium carbonate (CaCO3) in milligrams per liter (mg/L)

***** secondary MCL

--- not applicable

TDS Total Dissolved Solids
TSS Total Suspended Solids

TABLE 4-4

Revision 1-7/13/05

Summary Schedule for 2005-2006 Monitoring Activities

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Month	Start Week/Dates	Monitoring Event	Event Type	Notes
2005				
January	1/10/2005	2005-051-M01	M	Resample for 4th quarter 2004 event. Shoreline SW sampling.
	1/25/2005	2005-052-W04	BW	
February	2/7/2005	2005-053-M02	M	Shoreline SW sampling.
	2/14/2005	2005-MW-27-confirm	W	Confirmation sampling.
	2/23/2005	2005-054-W08	BW	Instituted weekly sampling under Contingency Plan.
March	3/1/2005	2005-055-W09	W	
	3/7/2005	2005-056-Q1	Q	Chromium filtration test round 1 and shoreline SW sampling.
	3/13/2005	IM1-2005-057	W	
	3/22/2005	2005-058-W12	BW	
	3/29/2005	2005-059-W13	W	
April	4/4/2005	2005-060-M04	M	Chromium filtration test round 2 and shoreline SW sampling.
	4/12/2005	2005-061-W15	W	
	4/19/2005	2005-062-W16	BW	
	4/26/2005	2005-063-W17	W	
May	5/2/2005	2005-064-M05	M	Shoreline SW sampling.
	5/10/2005	2005-065-W19	W	Weekly contingency sampling reduced to one well.
	5/17/2005	2005-066 -W20	BW	
	5/24/2005	2005-067-W21	W	
	5/31/2005	2005-068-W22	BW	
June	6/7/2005	2005-069-W23	W	
	6/13/2005	2005-070-Q2	Q	Shoreline SW sampling.
	6/21/2005	2005-071-W25	W	
	6/29/2005	2005-072-W26	BW	
July	7/5/2005	2005-073-W27	W	
	7/12/2005	2005-074-M07	M*	River channel and shoreline SW sampling.
	7/19/2005	2005-075-W29	W	
	7/26/2005	2005-076-W30	BW	
August	8/2/2005	2005-077-W31	W	
	8/8/2005	2005-078-M08	M	Shoreline SW sampling.
	8/16/2005	2005-079-W33	W	
	8/23/2005	2005-080-W34	BW	
	8/30/2005	2005-081-W35	W	
September	9/6/2005	2005-082-W36	BW	
	9/13/2005	2005-083-W37	W	
	9/19/2005	2005-084-Q3	Q*	River channel and shoreline SW sampling.
	9/28/2005	2005-085-W39	W	
October	10/4/2005	2005-086-M10	M	Shoreline SW sampling.
	10/11/2005	2005-087-W41	W	
	10/18/2005	2005-088-W42	BW	
	10/25/2005	2005-089-W43	W	
November	10/31/2005	2005-090-M11	M	Shoreline SW sampling.
	11/8/2005	2005-091-W45	W	
	11/15/2005	2005-092-W46	BW	
	11/22/2005	2005-093-W47	W	
	11/29/2005	2005-094-W48	BW	
December	12/6/2005	2005-095-W49	W	

TABLE 4-4

Revision 1-7/13/05

Summary Schedule for 2005-2006 Monitoring Activities

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

Month	Start Week/Dates	Monitoring Event	Event Type	Notes
December	12/12/2005	2005-096-A1	A*	Includes quarterly requirements; river channel & shoreline SW sampling.
	12/20/2005	2005-097-W51	W	
	12/28/2005	2005-098-W52	BW	
2006				
January	1/4/2006	2006-099-W01	W	
	1/9/2006	2006-100-M01	M*	River channel and shoreline SW sampling.
	1/18/2006	2006-101-W03	W	
	1/24/2006	2006-102-W04	BW	
February	2/1/2006	2006-103-W05	W	
	2/6/2006	2006-104-M02	M*	River channel and shoreline SW sampling.
	2/15/2006	2006-105-W07	W	
	2/21/2006	2006-106-W08	BW	
March	3/1/2006	2006-107-W09	W	
	3/6/2006	2006-108-Q1	Q*	River channel and shoreline SW sampling.
	3/15/2006	2006-109-W11	W	
	3/21/2006	2006-110-W12	BW	
	3/29/2006	2006-111-W13	W	
April	4/3/2006	2006-112-M04	M	Shoreline SW sampling.
	4/12/2006	2006-113-W15	W	
	4/18/2006	2006-114-W16	BW	
	4/26/2006	2006-115-W17	W	
May	5/8/2006	2006-116-M05	M	Shoreline SW sampling.
	5/17/2006	2006-117-W20	W	
	5/23/2006	2006-118-W21	BW	
	5/31/2006	2006-119-W22	W	
June	6/5/2006	2006-120-Q2	Q*	River channel and shoreline SW sampling.
	6/14/2006	2006-121-W24	W	
	6/20/2006	2006-122-W25	BW	
	6/28/2006	2006-123-W26	W	

Notes:

M = monthly
Q = quarterly
W = weekly
BW = biweekly
A = annually
SW = surface water

* Depth-specific river channel surface water sampling will be conducted on a quarterly basis after initial July 2005 event (see Section 5), and monthly during low water level periods (typically December through March). Low-water stage events will be evaluated based upon projected river levels.

Sampling events through June 20, 2005 have been completed, later sampling events are scheduled and subject to change.

Forecasted weekly contingency sampling to continue only under DTSC direction.

TABLE 5-1

Revision 1-7/13/05

Surface Water Sampling Analyses and Frequencies

Monitoring Plan for Groundwater and Surface Water Monitoring Program

PG&E Topock Compressor Station, Needles, California

	Analytical Parameters and Frequencies						
Well ID	**Hexavalent Chromium**	**Total Chromium**	**Specific Conductance**	**pH**	**Hardness**	**TDS**	**TSS**
River Channel Surface Water							
C-CON	Q-M*	Q-M*	Q	Q	Q-M*	Q	Q
C-I-3	Q-M*	Q-M*	Q	Q	Q-M*	Q	Q
C-NR1	Q-M*	Q-M*	Q	Q	Q-M*	Q	Q
C-NR3	Q-M*	Q-M*	Q	Q	Q-M*	Q	Q
C-NR4	Q-M*	Q-M*	Q	Q	Q-M*	Q	Q
C-R22	Q-M*	Q-M*	Q	Q	Q-M*	Q	Q
C-R27	Q-M*	Q-M*	Q	Q	Q-M*	Q	Q
C-TAZ	Q-M*	Q-M*	Q	Q	Q-M*	Q	Q
Shoreline Surface Water							
CON	Q - M	Q - M	Q	Q	---	---	---
I-3	Q - M	Q - M	Q	Q	---	---	---
NR-1	Q - M	Q - M	Q	Q	---	---	---
NR-2	Q - M	Q - M	Q	Q	---	---	---
NR-3	Q - M	Q - M	Q	Q	---	---	---
R-22	Q - M	Q - M	Q	Q	---	---	---
R-27	Q - M	Q - M	Q	Q	---	---	---
R-28	Q - M	Q - M	Q	Q	---	---	---
RRB	Q - M	Q - M	Q	Q	---	---	---

Notes:

See Table 4-3 for list of methods and reporting limits.
M = monthly
Q = quarterly
--- = not applicable
* Depth-specific river channel surface water sampling will be conducted on a quarterly basis after initial July 2005 event (see Section 5), and monthly during low water level periods (typically December through March). Low-water stage events will be evaluated based upon projected river levels.

G:\PacificGasElectricCo\TopockProgram\Database\Tuesdai\GMP_WKPLN.mdb - rpt_SW_analyses
Date printed: 7/13/2005

N

0 1,000 2,000 Feet

LEGEND

- River channel surface water sampling location
- Shoreline surface water sampling location
- Approximate limits of hexavalent chromium greater than 50 ppb in Alluvial Aquifer March 2005

C-NR4
C-NR3
NR-3
NR-2
C-NR1
NR-1
C-CON
CON
A-Dock
Park Moabi
PG&E Parcel No. 650-151-08
RRB
Colorado River
Park-Moabi
66
Topock Marsh
50 ppb
R-28
BAT CAVE WASH
R-27
C-R27
Topock Marina
BN & SF RAILROAD
INTERSTATE 40
R-22
C-R22
NEW EVAPORATION PONDS
C-I3
I-3
C-TAZ
TOPOCK COMPRESSOR STATION
PG&E
FORMER EVAPORATION POND SITE
DEBRIS RAVINE

FIGURE 5-1
PROPOSED SURFACE WATER MONITORING LOCATIONS JULY 2005

MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2005\GMP_RIVER_SWLOCS_JULY05.MXD GMP_RIVER_SWLOCS_JULY05.PDF 7/7/2005 10:08:43

SOP-A12

Depth-Specific River Water Sampling
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for river channel surface water sampling at the Topock site. This SOP should be used for depth-specific river channel surface water sampling stations on the Colorado River.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP).
2) Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, and Field Procedures Manual and QAPP (Field Procedures Manual), as required.
3) Topock Program Health and Safety Plan (HSP).
4) Blank sampling logs and field notebook.

PREPARATION & SETUP

1) Review event-specific SAP or event-specific field instructions, previous sampling logs, Field Procedures Manual, and HSP.
2) Initiate field logbook for sampling activity.
3) Inspect all equipment and calibrate field water quality (WQ) meters according to SOP-A9, *Calibration of Field Instruments*.
4) Inventory sample bottles, required analyses, and confirm the lab courier schedule.
5) Field-check and set up sampling equipment: WQ meters, health and safety apparatuses (life vest, rescue rope, life preserver), water depth meter or depth-finder, peristaltic pump, filters, sufficient tygon and silicone tubing, polypropylene rope, sampling equipment, etc.

SAMPLING PROCEDURES

6) Prepare river water sampling log (use attached form).
7) The sampling team will travel to each river sampling station in a motorized boat. A safety inspection of the boat will be performed by the field crew prior to boarding (check for fire extinguisher, etc.). Samples will be collected from selected stations on the river approximately one-third the river width from the California shoreline.
8) Collect an equipment blank sample prior to sampling by running deionized water through a new segment of tubing.
9) An industry standard (Trimble or similar) resource grade handheld DGPS unit (GeoXT or similar) will be used with real-time correction (wide area augmentation system) to

locate the river channel sampling stations within a 1 meter radius (68% of the time, commonly referred to 1 sigma accuracy). At each location, two anchors should be positioned upstream at least 10 feet from each other (Attachment A). Record the GPS coordinates on the sampling log. In the event a sampling station is too shallow to safely approach by boat, the next closest location with adequate depth will be sampled and a remark noted on the sampling log with the new GPS coordinates.

10) Record the depth of the river at each sampling station using the depth-finder or a weighted tape. If a weighted tape is used, read the tape at the river water surface when the weight touches the river floor. Record river depth on the sample log.

11) Samples will be collected from three depths at each river channel sampling station: 1 foot from the bottom of the river, at the mid-point of the water column, and 1 foot from the water surface. Calculate the depth of the midpoint of the water column and record on the sample log.

12) Samples are to be collected using a variable-speed peristaltic pump with ¾-inch tygon tubing attached to a weighted polypropylene rope (Attachment A) and a segment of silicone tubing for use in the peristaltic pump. Dedicated tubing will be used for each sample depth at each sample station. Once the sampling depths have been calculated for each station, pre-cut three pieces of tygon tubing and attach them to the rope so that their intakes are at the proper sampling depths. Lower the weighted rope and tubing until the weight touches the river bottom and the tubing intakes are at the correct depths. Confirm river depth using the depth-finder or weighted tape. Attach the discharge end of the sample tubing to the flow cell of the water quality meter. Start the peristaltic pump and allow the flow cell to fill and the water to equilibrate for approximately 3 minutes, or until the temperature readings remain stable for 30 seconds (+/- 1 °C). Record the time, pH, conductivity, turbidity, dissolved oxygen, temperature, salinity, TDS, and ORP on the field log. Note and provide qualifying remarks if parameter readings are anomalous or unstable due to an instrument problem. Turn off the peristaltic pump, remove tubing from the flow cell, and restart the pump. Attach a 0.45 micron filter when sampling for Cr(T) by USEPA Method 6010B or for Cr(VI) by USEPA Method 7199. Refer to SOP-A6 in the Field Procedures Manual for filtration procedures. Pump approximately 500 ml through the system and begin filling the applicable sample bottles. Remove the filter prior to filling sample bottles for the other analyses, which do not require filtration. Ensure that the samples do not contact any source of metal. Place the samples on ice immediately after collection. Record all sample information on the field log.

13) Collect remaining samples for analyses according to the event-specific SAP. Use a new piece of tygon tubing and change out the flexible silicone tubing in the peristaltic pump for each depth, at each location.

14) Follow the Field Procedures Manual for sample handling and management, equipment decontamination, and investigation-derived waste (IDW) management.

Project Name PG&E Topock GMP **Sampling Event** _____

Job Number _____ **Date** _____ Time of depth measurement _____

Field Team _____ Page ____ of ____ GPS Elevation _____

Field Conditions _____ Sample Location Total River Depth _____ River Water Column Mid-depth _____

Sample ID C-NR1-S Sample Time _____ GPS Coordinates (measured): _____

Depth to Sample: _____ Time: _____ Measure Point: _____ **QC Sample No. and Type** _____ QC Sample Time _____

Water Level Meter Serial Number: Water Quality Meter Serial Number: Sampling Method:

Sample Location (Upper, Mid, Lower)	Time		pH	Conductivity	Turbidity NTU	Diss. Oxygen mg/L	Temp. °C	Salinity %	TDS g/L	Eh / ORP mv	Comments (See descriptors below)

Observations: (i.e. low water level, sand bank present, etc..) _____

Remarks _____

Color: clear, grey, yellow, brown, black, cloudy, green **Odor**: none, sulphur, organic, other **Solids**: Trace, Small Qu, Med Qu, Large Qu, Particulate, Silt, Sand

Sample ID C-NR1-M Sample Time _____ GPS Coordinates (measured): _____

Depth to Sample: _____ Time: _____ Measure Point: _____ **QC Sample No. and Type** _____ QC Sample Time _____

Water Level Meter Serial Number: Water Quality Meter Serial Number: Sampling Method:

Sample Location (Upper, Mid, Lower)	Time		pH	Conductivity UNITS	Turbidity NTU	Diss. Oxygen mg/L	Temp. °C	Salinity %	TDS g/L	Eh / ORP mv	Comments (See descriptors below)

Observations: (i.e. low water level, sand bank present, etc..) _____

Remarks _____

Color: clear, grey, yellow, brown, black, cloudy, green **Odor**: none, sulphur, organic, other **Solids**: Trace, Small Qu, Med Qu, Large Qu, Particulate, Silt, Sand

Sample ID C-NR1-D Sample Time _____ GPS Coordinates (measured): _____

Depth to Sample: _____ Time: _____ Measure Point: _____ **QC Sample No. and Type** _____ QC Sample Time _____

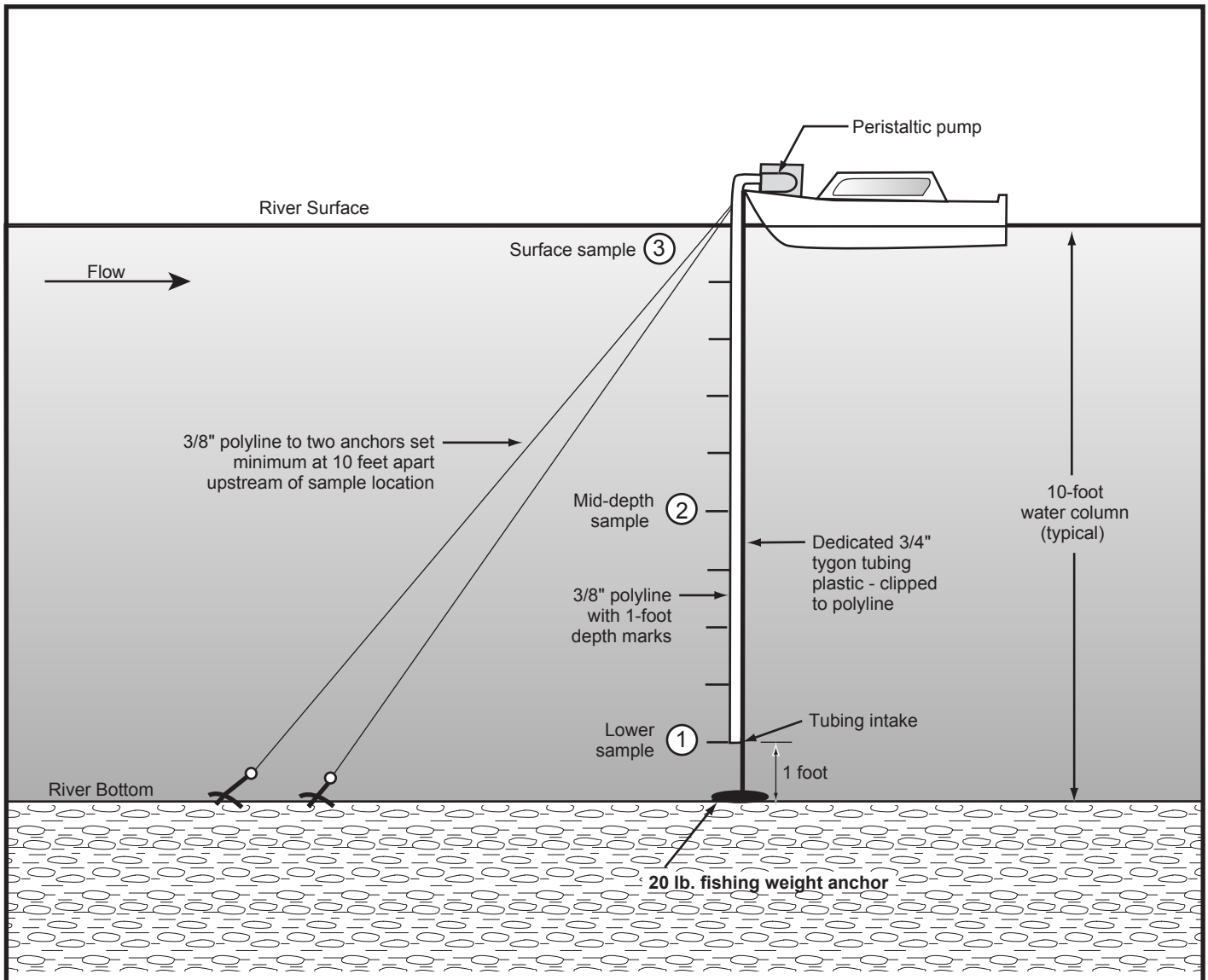
Water Level Meter Serial Number: Water Quality Meter Serial Number: Sampling Method:

Sample Location (Upper, Mid, Lower)	Time		pH	Conductivity UNITS	Turbidity NTU	Diss. Oxygen mg/L	Temp. °C	Salinity %	TDS g/L	Eh / ORP mv	Comments (See descriptors below)

Observations: (i.e. low water level, sand bank present, etc..) _____

Remarks _____

Color: clear, grey, yellow, brown, black, cloudy, green **Odor**: none, sulphur, organic, other **Solids**: Trace, Small Qu, Med Qu, Large Qu, Particulate, Silt, Sand



River Channel Water Sampling Locations

(1) Lower sample collected at one foot above river bottom.

(2) Mid-depth sample collected at mid-depth of river water column.

(3) Surface sample collected at one foot below water surface.

Notes:

See SOP-A12 for other sampling details

ATTACHMENT A (SOP-A12)
DEPTH-SPECIFIC RIVER WATER SAMPLING METHOD

MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Pacific Gas and Electric Company®

Yvonne J. Meeks
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September 14, 2005

Mr. Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

Subject: Review of Access Routes for Groundwater and Surface Water Data Collection Locations, and Proposed Mitigation Measures
Pacific Gas and Electric Company, Topock Project

Dear Mr. Shopay:

This letter transmits the technical memorandum entitled *Review of Access Routes for Groundwater and Surface Water Data Collection Locations, and Proposed Mitigation Measures* for the Pacific Gas and Electric Company (PG&E) Topock program. This technical memorandum documents access routes to data collection locations and mitigation measures to protect and avoid nearby biological and cultural resources during data collection activities.

This technical memorandum was originally submitted to the California Department of Toxics Substances Control (DTSC) on June 7, 2005. This revised memorandum incorporates comments received from DTSC and the U.S. Bureau of Land Management (BLM) on the proposed mitigation measures. The mitigation measures identified by DTSC and BLM have been incorporated into the data collection programs at Topock.

Due to the sensitive nature of the information contained in the attached memorandum, please do not copy or otherwise distribute this memorandum.

If you have any questions, please do not hesitate to contact me at (805) 546-5243.

Sincerely,

Julie Eakins for Yvonne Meeks

Cc: Susan Stratton/DTSC
Cathy Wolff-White/BLM
Sally Murray/BLM
Mark Howell/BLM

PG&E Topock Project: Review of Access Routes for Groundwater and Surface Water Data Collection Locations, and Proposed Mitigation Measures

Date: September 14, 2005

Introduction

This memorandum summarizes the results of reviewing Pacific Gas and Electric Company (PG&E) Topock site data collection locations and access routes for areas where additional precautions on sampling procedures were warranted to be more protective of biological or cultural resources. This memorandum also describes the mitigation measures related to biological or cultural resources used during access for routine data collection activities. Detailed mitigation procedures specific to the Colorado River floodplain are included as an attachment to this memorandum.

Background

An initial review of access to data collection locations with respect to cultural and biological resources was summarized in the June 7, 2005 technical memorandum "Review of Access Routes for Groundwater and Surface Water Data Collection Locations, and Proposed Mitigation Measures, PG&E Topock Project" (CH2M HILL 2005a). Review and discussion of that memorandum with the California Department of Toxic Substances Control (DTSC) and the United States Bureau of Land Management (BLM) primarily focused on access to wells during nesting season (May through September) on the Colorado River floodplain area. These discussions related to six sampling locations (18 monitoring wells total) on the BLM-managed portion of the floodplain, and three sampling locations (six monitoring wells total) on the Havasu National Wildlife Refuge (HNWR) to the south, which is managed by the United States Fish and Wildlife Service. In response to these discussions, low-impact sampling procedures were devised and tested with BLM and DTSC observation in June and July.

This collaboration led to preparation of a memorandum that focused on the floodplain area "Site Access and Sampling Procedures for Groundwater Monitoring Wells Located Near Potential Southwestern Willow Flycatcher Habitat, Rev. 1, PG&E Topock Compressor Station" (CH2M HILL 2005b). That technical memorandum included a description of the low-impact access procedures, specific equipment information, and the qualifications of biological resources monitors. The development of floodplain data collection access methods in communication with DTSC and BLM continued in July, and was discussed at Consultative Work Group meetings. Since the low-impact procedures increased the sampling staff workload, more rigorous heat stress monitoring procedures were

implemented as well. A July 19, 2005 letter from DTSC approved a reduced sampling frequency for groundwater monitoring wells located in the floodplain area during the flycatcher nesting season.

Before the June 2005 quarterly sampling event, monitors surveyed the data collection locations for the presence of biological and cultural resources near the wells or sampling points, to assess the need for modification to access procedures. The results of those surveys are incorporated herein. The focused surveys or inspections were intended to add detail for the vicinity of the sampling locations, rather than to supercede other, previous site-wide cultural and biological resource surveys.

Data Collection Locations at the PG&E Topock Site

The attached map shows the Topock project groundwater and surface water data collection locations.[1] The map also shows the access routes used for sampling and transducer downloads. These lines indicate vehicle access on existing roads, and indicate where all-terrain vehicle (ATV) or foot access is used at locations where pickup truck access is not possible. Purple lines on the map indicate where either pickup trucks or ATVs are used. Blue lines indicate routes with access by ATV but not by pickup truck. Black dotted lines indicate foot access routes. Where the black dots overlay the blue routes on the floodplain area, the access is on foot during the May through September nesting season, and by ATV outside of nesting season. The access routes with specific mitigation measures or access procedures discussed herein are highlighted in green.

Table 1 summarizes the frequency of the current sampling schedule at each data collection point and the typical means of access. Table 1 also includes the results of a review of these locations for potential cultural and biological resource concerns from surveys performed during sampling events in June and July 2005. As Table 1 indicates:

- The most frequent sampling is focused on the floodplain and MW-20 Bench areas. Also in these areas, and at the observation (OW) and compliance (CW) wells in the upland injection area, biweekly visits will continue to download data loggers for the transducer measurements of water levels in these wells.
- In the injection area, the initial Compliance Monitoring Program (CMP) groundwater sampling frequency is monthly, following the July 2005 start of treatment plant operation and injection.
- Wells that are more dispersed across the PG&E Topock site are sampled on a quarterly schedule.

One well not included in Table 1, MWP-12, does not have an access route included on the map. Well MWP-12 is not currently used for data collection. If this well is used in the future, the crew will use the existing gravel road that approaches the well from the northwest for access.

[1] Data collection locations do not include boat-based sampling in Colorado River, future well locations, or past or future soil/sediment sampling locations.

Review of Cultural and Biological Resources at Data Collection Points and Access Routes

Sampling locations and access routes were reviewed by PG&E, CH2M HILL, and Applied Earthworks (AE) for proximity of access or data collection activities relative to cultural or biological resources. Specifically, the data collection locations on the upland areas of the site were reviewed to assess whether special procedures might be prudent near potential desert tortoise habitat, and on the floodplain areas a similar review was done with respect to potential Southwest Willow Flycatcher (SWFL) habitat. This review is documented in Table 1, and led to the identification of routes without the need for additional precautions (the access routes that are not highlighted in green), and routes where additional precautions were taken by developing modified access procedures or by adding mitigation measures (the access routes shown highlighted in green, including the specific floodplain access routes detailed in the map inset).

Cultural Setting of the PG&E Topock Site

While the data collection locations and access routes were reviewed specifically as described in Table 1, PG&E is also aware of the larger context for this program. The project area lies within a geographic area of cultural and natural resources that is considered sacred by local tribes and PG&E is committed to conducting work activities in a manner which appropriately recognizes and respects these resources. To this end, site orientation will stress that all site activities, river sampling, data collection on the floodplain and upland areas, and treatment and injection area operations on the upland portion of the site, must be conducted in a respectful manner that is conscious of this context.

Access Procedures at Routes without Additional Precautions (routes that are not highlighted in green on map)

A basic set of training and operating procedures apply to all data collection staff and locations. The training of CH2M HILL and Strongarm Environmental Field Services (SEFS) field data collection staff includes:

- HAZWOPER training,
- Review of the PG&E Topock Site Health and Safety Plan, the Groundwater Monitoring Plan, and relevant standard operating procedures and event-specific Sampling and Analysis Plans.
- PG&E Topock Compressor Station safety orientation training.
- Desert Tortoise and Southwestern Willow Flycatcher awareness training.
- Review of project-specific access conditions and resource protection measures from various work plan approvals by the regulatory agencies.
- Orientation to provide awareness of other biological and cultural resources (such as desert pavement, cryptogam soils, protections of pre-and post-European artifacts, and other regional topics), provided by on-site CH2M HILL and AE or PG&E field monitoring staff.

- Spill Prevention and Emergency Notification Procedures

Since Interim Measures No. 3 construction is completed, the cultural and biological resource orientation, previously provided by on-site cultural and biological monitors will become a formal training conducted by the PG&E field contact representatives (FCRs) and will be maintained with an annual 'refresher' for current staff. The training will also be provided as part of site introduction for new staff before they begin work at the site.

The operating procedures that are common to all data collection sites include the following:

- Access by vehicles is restricted to established roads or tracks. For off-road access the number of vehicles used is minimized (usually one pickup and trailer for SEFS and one pickup or SUV for CH2M HILL).
- All vehicles observe a 10-mph speed limit on Historic Route 66 (H-66), and travel slowly off-road (5 mph speed) to give time to observe and avoid wildlife and minimize noise, dust, and vehicle rutting.
- Most off-road access is by low-impact All Terrain Vehicles (ATV's) which carry sampling or data collection equipment and can tow a small trailer for management of groundwater sampling purge water.
- Access beyond the purple or green lines on the map is by ATV (blue lines) or on foot (dotted black lines) Access follows consistent routes or paths.
- Sampling crews are aware that they should minimize time near possible wildlife habitat.
- There is coordination with an on-site FCR and security patrol to prevent unauthorized access to site areas.

These minimum procedures are followed for all data collection locations. More rigorous procedures are used at locations where potential concerns were identified.

Access Procedures at Routes with Additional Precautions (routes highlighted in green on map)

The review by PG&E, CH2M HILL and AE cultural and biological resource staff identified data collection locations where additional precautions were warranted, in the floodplain area and in the upland area, as described below.

Floodplain Area

- Well locations MW-27, MW-30, MW-34, MW-36, PE-1 and MW-42, on the BLM-managed area
- Well locations MW-32, MW-22 and MW-43 on the HNWR

Mitigation measures for these floodplain area locations are described in the attached technical memorandum "Site Access and Sampling Procedures for Groundwater Monitoring Wells Located Near Potential Southwestern Willow Flycatcher Habitat, Rev. 2, PG&E Topock Compressor Station." This attachment incorporates minor changes to the low-impact sampling methods, as developed and reviewed with DTSC and BLM in July.

This attachment will serve as a guidance document for data collection staff when used in conjunction with appropriate health and safety procedures and the Groundwater Monitoring Program and Performance Monitoring Program sampling plans.

Upland Area

- East Mesa wells (IW-2, IW-3, OW-1, OW-2, and OW-5 well clusters)
- West Mesa wells (OW-3 well cluster)
- Compliance wells (CW-1, CW-2, CW-3, and CW-4 well clusters).
- Monitoring wells MW-14, MW-15, MW-16, MW-18, and MW-25.

Mitigation measures for these upland area locations are described below. The goal of these additional precautions is to prevent any excursion onto areas that were not previously disturbed or are not allowable for access or work area use, and thus prevent impacts from data collection on cultural or biological resources. Unlike the modified access procedures that were developed for use on the floodplain only during the summer nesting season, the additional precautions for these upland area sampling locations will be applied on a year-round basis.

The general approach for protecting resources located in the vicinity of these locations is to require personnel and vehicles to stay within the areas that were previously used, and to use 'inclusive' fencing to mark the boundaries of allowable access routes or work areas to these locations, rather than fencing to exclude specific cultural and biological resources. The measures that were outlined above for wells without potential access concerns will also apply at these locations. For the less frequent quarterly or semiannual access to wells MW-15, MW-16, MW-18, and MW-25, the mitigation consists of requiring sampling crews to stay on the clearly defined gravel access roads to each well.

The orange plastic fencing placed to mark boundaries during construction and well installation was replaced with lathe stakes that are less visually intrusive. These boundary stakes will be maintained, and if needed a similar marker for both access routes and work area boundaries may be substituted in the future. Any replacement will have limited visual impacts, such as small fiberglass or ABS plastic pole markers often used to mark driveway entrances, topped with a taut rope to prevent travel off existing designated work areas.

Specific areas where these boundary markings are maintained include:

- Access route on and off H-66 and edges of the East Mesa.
- Access route from H-66 and a turnaround/work area near OW-3 on the West Mesa.
- Access route from H-66 and a turnaround/work area near CW-4 in the unnamed wash.
- Access routes past CW-2 and turnaround area at CW-3.
- Defined access turn-off from H-66 to CW-1 and MW-14.

The added precautions for these sampling locations include these procedures, and associated training. We have reinforced the training of data collection staff (CH2M HILL and SEFS, and other subcontractors if used in the future). This work orientation includes information regarding cultural and biological resources and the spiritual importance to local tribes of the geographic area and the river. The orientation also emphasizes the need to stay within the established, marked access routes and work areas, and to prevent enlargement of previously used areas. It also includes instilling awareness of specific access details, such as:

- Driving one-way on the CW-2 and CW-3 access track and turning vehicles only at the established turnaround at CW-3.
- Driving in the center of H-66 to avoid wear on the H-66 shoulders, and obeying the 10 mph speed limit.
- Driving in only the active channel area of the wash when accessing CW-1.
- Not 'cutting corners' when exiting H-66 to access well locations.
- Staying on established roads to access MW-15, and MW-16.

Attachments

Table 1

Figure 1

Technical Memorandum

References

CH2M HILL. 2005a. Technical Memorandum. "PG&E Topock Project: Review of Access Routes for Groundwater and Surface Water Data Collection Locations, and Proposed Mitigation Measures." June 7.

_____. 2005b. Technical Memorandum. "Site Access and Sampling Procedures for Groundwater Monitoring Wells Located Near Potential Southwestern Willow Flycatcher Habitat, Rev. 1." June 29.

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-9		S	No			Yes	No	No	The nearest acacia/creosote bush is approximately 24 feet west of the wellhead.	The site is previously disturbed, considered poor quality desert tortoise habitat, and unsuitable SWFL habitat.	The well site is within previously disturbed portion of Bat Cave Wash.
MW-10		S	No			No	No	No	No vegetation was observed within the vicinity of the wellhead.	The site is previously disturbed, considered poor quality desert tortoise habitat, and unsuitable SWFL habitat.	The well site is within previously disturbed portion of Bat Cave Wash.
MW-11		S	No			Yes	No	No	The area immediately surrounding the wellhead is bare. Several creosote bushes are located on the east bank of the wash and tamarisk is located about 100 feet northeast of the well.	The site is previously disturbed, considered poor quality desert tortoise habitat, and unsuitable SWFL habitat.	The well site is within previously disturbed portion of Bat Cave Wash. Noise impacts from the railroad and I-40 traffic.
MW-12		Q	No			Yes	No	No	Creosote bushes and mesquite trees occur along the access route. Grass species, saltbush, and cheesebush to West.	The site is previously disturbed, considered poor quality desert tortoise habitat, and unsuitable SWFL habitat.	Well is located in a highly disturbed playa/floodplain between Park Moabi Road, Interstate 40, and the Compressor Station. Noise impacts from nearby facilities.

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-13		Q	No			Yes	No	No	Palo verde (approximately 12 feet northeast) and creosote bushes on east side of Road (approximately 8 feet east).	The site is previously disturbed, considered poor quality desert tortoise habitat, and unsuitable SWFL habitat.	Well is located adjacent to existing access (dirt) road. Small wash on the northeast side of the well.
MW-14		Q	Yes	Access road bisects site.	Stay on road and within in the delineated area.	Yes	No	No	The area immediately surrounding the wellhead is bare. A few scattered creosote bushes in vicinity.	The site is previously disturbed, considered poor quality desert tortoise habitat, and unsuitable SWFL habitat.	Site is previously disturbed by gas pipeline construction and is located adjacent to Route 66 on a small bench.
MW-15		S	Yes	Site about 50 meters away.	Stay on road.	Yes	No	No	Most of the area surrounding the wellhead is bare except for creosote bushes about 8-35 feet away.	The site is previously disturbed, considered poor quality desert tortoise habitat, and unsuitable SWFL habitat.	Located near PG&E holding ponds.
MW-16		S	yes	Site about 30 meters away.	Stay within area previously disturbed.	No	No	No	Area immediately adjacent to wellhead is bare.	The site is previously disturbed, considered poor quality wildlife habitat, and unsuitable SWFL habitat.	Located near PG&E holding ponds.

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-17		S	No			Yes	No	No	Site surrounding wellhead has several scattered creosote bushes about 5-10 feet.	The site is previously disturbed, considered poor quality desert tortoise habitat, and unsuitable SWFL habitat.	Noise impacts from Park Moabi Road and railroad traffic.
MW-18		S	Yes	On Route 66	Take care not to impact road	Yes	No	No	The area surrounding the well head is bare. Acacia, palo verde, creosote bushes are located approximately 150 feet north of the site in the wash.	The site is previously disturbed, considered poor quality desert tortoise habitat, and unsuitable SWFL habitat.	The well is located within a previously disturbed area (on Route 66). The well is adjacent to a large, unnamed wash.
MW-19		Q	No			Yes	No	No	Palo verde 20 feet to the northwest and creosote bushes 15 feet to the north.	The site is previously disturbed, considered poor quality desert tortoise habitat, and unsuitable SWFL habitat.	Well is located adjacent to access road. Sparse vegetation less than 1% cover within 50 feet.
MW-20-70	Yes	Q	No			No	No	No	No vegetation around the well.	The site is previously disturbed, considered poor desert tortoise habitat, and unsuitable SWFL habitat.	Well located within MW-20 bench in a developed area. Site is covered with imported gravel. Noise impacts from the railroad and I-40 traffic.
MW-20-100	Yes	Q									
MW-20-130	Yes	Q									

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-21		Q	No			Yes	No	No	Palo verde on the road shoulder approximately 10 feet east of the well and one palo verde located about 10 feet to the northwest.	The site is previously disturbed and considered unsuitable wildlife habitat.	Well is flush mounted in an asphalt road on the east side of Park Moabi Road. Noise impacts from the railroad and I-40 traffic.
MW-22		Q	No			Yes	No	Maybe	Tamarisk thicket to east of wellhead	Potential SWFL habitat	Special Nesting Season Access Procedures Apply. Noise impacts from the railroad and I-40 traffic.
MW-23		Q	No			Yes	No	No	Area immediately surrounding the wellhead is bare. Several scattered creosote bushes border access road to well approximately 6 feet west and east. Tamarisk thicket with a wetland area is adjacent and down slope of the site.	The site is previously disturbed, considered poor desert tortoise habitat, and unsuitable SWFL habitat.	Well is located on a plateau adjacent to Park Moabi Road in a highly disturbed creosote bush scrub community. Noise impacts from the railroad and I-40 traffic.
MW-24A MW-24B MW-24BR		S S Q	No			No	No	No	The area immediately surrounding the wells is bare.	The site is previously disturbed, considered poor desert tortoise habitat, and unsuitable SWFL habitat	The well site is on a bench above the Bat Cave Wash.

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-25	Yes	Q	Yes	Adjacent to Route 66	Take care not to impact road	Yes	No	No	Creosote on north, south, and east boundaries (approximately 5-12 feet). Phacelia, plantain, and beavertail cactus on the west side of the access road.	The site is previously disturbed, considered poor desert tortoise habitat, and unsuitable SWFL habitat.	Well is located adjacent to access road in a previously disturbed area. Creosote bush shrub community has a shrub height of approximately 3 feet and provides about 20-25% cover.
MW-26	Yes	Q	No			Yes	No	No	No vegetation adjacent to the well. Creosote bush on road shoulder about 10-12 feet from well.	The site is previously disturbed and considered unsuitable wildlife habitat.	Well is flush mounted within the paved Park Moabi Road.
MW-27-20	Yes	Q	No			Yes	No	Maybe	Well within a mesquite, tamarisk, and arrow weed thicket. The nearest mesquite is located about 6 feet south, 5 feet east, and 10 feet northeast.	Potential SWFL habitat.	Special Nesting Season Access Procedures Apply. Noise impacts from the railroad and I-40 traffic.
MW-27-60	Yes	Q									
MW-27-85	Yes	M									

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-28-25 MW-28-90	Yes Yes	Q M	No			Yes	No	No	Well site surrounded by arrow weed about 50 feet east, 10 feet west, 7 feet south, and 10 feet north. New arrow weed sprouts were observed in the well vicinity. The nearest creosote bush was observed about 60 feet north east of the wells. The nearest tamarisk was observed about 150 feet northwest of the wells.	The site is unsuitable SWFL habitat.	The site has previously been disturbed.
MW-29	Yes	Q	No			Yes	Yes	No	Site is surrounded by arrow weed with salt cedar beyond the arrow weed at about 3 feet north, 30 feet south, and 100 feet west.	The site is unsuitable SWFL habitat.	The site has been previously disturbed. Well site is situated on an actively shifting sands on floodplain.
MW-30-30 MW-30-50	Yes Yes	Q Q*	No			Yes	Yes	No	The area immediately surrounding the wellhead is bare. Salt cedar surrounds the bare area about 10-70 feet to the north, south, east, and west.	Potential SWFL habitat.	Special Nesting Season Access Procedures Apply. Well site is situated within actively shifting sands on floodplain.

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-31-60	Yes	Q	No			Yes	No	No	Palo verde & creosote bushes are located between Park Moabi Road and the well. Palo verde & mesquite are located on the east side of the existing access road.	The site is previously disturbed, considered poor desert tortoise habitat, and unsuitable SWFL habitat.	Well is located adjacent to existing access/egress for MW-20 bench adjacent to a highly disturbed dune area with scattered Mesquite, Palo Verde, and Creosote.
MW-31-135	Yes	Q									
MW-32-20	Yes	Q	No			Yes	Yes	Maybe	Tamarisk thicket to east of wellheads. One mesquite about 10 feet northwest of the wellhead.	Potential SWFL habitat.	Special Nesting Season Access Procedures Apply. Noise impacts from the railroad and I-40 traffic.
MW-32-35	Yes	Q									
MW-33-40	Yes	Q	No			Yes	Yes	No	The area immediately surrounding the wellhead is bare. Salt cedar surrounds the site 15-50 feet.	The site is previously disturbed and considered unsuitable desert tortoise and SWFL habitat.	Site has previously been disturbed. Well site is situated on an actively shifting sands on floodplain.
MW-33-90	Yes	Q									
MW-33-150	Yes	M									
MW-33-210	Yes	M									
MW-34-55	Yes	Q	No			Yes	No	No	Salt cedar surrounds the bare soil immediately surrounding the wellhead about 15 feet to the north, east, and west.	The site is unsuitable desert tortoise habitat and potential SWFL habitat.	Special Nesting Season Access Procedures Apply.
MW-34-80	Yes	M									
MW-34-100	Yes	BW-BW									

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-35-60	Yes	Q	No			Yes	No	No	Wells are adjacent to a highly disturbed creosote bush shrub community. Tamarisk thickets are located about 50 feet east of the site. Creosote bordering the northeast side of the well area (approximately 8 feet east of wellhead).	The site is previously disturbed, considered poor desert tortoise habitat, and unsuitable SWFL habitat.	Wells are located within 20 feet of the road shoulder adjacent to Route 66.
MW-35-135	Yes	Q									
MW-36-20	Yes	Q	No			Yes	Yes	No	The area immediately surrounding the wellhead is bare. Salt cedar surrounds bare area about 10-30 feet to the north, west, and east. Arrow weed surrounds the bare area to the south.	The site is previously disturbed, considered unsuitable desert tortoise habitat, and potential SWFL habitat.	Special Nesting Season Access Procedures Apply. Well site is situated within actively shifting sands on floodplain.
MW-36-40	Yes	Q									
MW-36-50	Yes	Q									
MW-36-70	Yes	Q									
MW-36-90	Yes	M									
MW-36-100	Yes	M									
MW-37D		Q	No			Yes	No	No	Palo verde and creosote bush are located along both banks of the Bat Cave Wash.	The site is a poor quality desert tortoise habitat and unsuitable SWFL habitat.	The site has previously been disturbed and is within Bat Cave Wash.
MW-37S		Q									

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-38D		S	No			Yes	No	No	The area immediately surrounding the wellhead is bare. Two Acacia about 8 feet west of the site.	The site is a poor quality desert tortoise habitat and unsuitable SWFL habitat.	The site is located within a disturbed portion of the Bat Cave Wash.
MW-38S		S									
MW-39-40	Yes	Q*	No			Yes	Yes	No	The area immediately surrounding the wellhead is bare. Salt Cedar surrounds the bare area at about 20-70 feet to the north, south, east, and west.	The site is unsuitable desert tortoise habitat and potential SWFL habitat.	Special Nesting Season Access Procedures Apply. Well site is situated within actively shifting sands on floodplain.
MW-39-50	Yes	Q*									
MW-39-60	Yes	Q									
MW-39-70	Yes	Q									
MW-39-80	Yes	M									
MW-39-100	Yes	M									
MW-40D		Q	No			No	No	No	No vegetation exists at the site.	The site is unsuitable desert tortoise and SWFL habitat.	The well site is located on the I-40 median and is very disturbed. Noise impacts from I-40 traffic
MW-40S		Q									

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-41D MW-41M MW-41S		Q Q Q	No			Yes	No	No	Cat claw acacia, creosote, and palo verde are within 20 feet of the wells. Beavertail cactus are 80 feet to the northwest. White sage is about 20 feet east toward the wash. Cholla are about 30 feet east. Smoke trees are in the wash.	The boundary is delineated potential nesting tree locations within 25 feet. The site is a poor quality desert tortoise and SWFL habitat.	Wells are located adjacent to previously disturbed IM3 construction parking area in a transitional area between creosote bush scrub and palo verde dominant communities. Wells are adjacent to Bat Creek Wash.
MW-42-30 MW-42-55 MW-42-65	Yes Yes Yes	Q Q Q	No			Yes	No	No	The area immediately surrounding the wellhead is bare. Tamarisk surrounds the well site about 8-100 feet.	The site is unsuitable desert tortoise habitat and potential SWFL habitat.	Special Nesting Season Access Procedures Apply

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-43-25	Yes	Q	No			Yes	No	Maybe	Well site within Tamarisk thicket under I-40 bridge.	The site is unsuitable desert tortoise habitat and potential SWFL habitat.	Special Nesting Season Access Procedures Apply
MW-43-75	Yes	M									
MW-43-90	Yes	M									
Test Wells and Extraction Wells											
TW-1		2A	No			No	No	No	Area immediately surrounding wellhead is bare.	The site is a poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed. Well adjacent to TCS.
TW-2S	Yes	Q**	No			No	No	No	None	The site is a poor quality desert tortoise habitat and unsuitable SWFL habitat.	Well located within MW-20 bench in a developed area. Site is covered with gravel.
TW-2D	Yes	M	No			No	No	No	None	The site is a low quality wildlife habitat and is not a suitable SWFL habitat.	Well located within MW-20 bench in a developed area. No sensitive vegetation or soil present. Site is covered with gravel.
Water Supply Wells											
PGE-6		2A	No			No	No	No	The area immediately surrounding the wells is bare.	The site is a poor quality desert tortoise habitat and unsuitable SWFL habitat.	The site has been previously disturbed. The well site is on a bench above Bat Cave Wash. Noise impacts from I-40 traffic.
PGE-7		2A	No			No	No	No	The area immediately surrounding the wells is bare.	No wildlife issues observed. The site is a poor quality wildlife habitat and is not a suitable SWFL habitat.	The site has been previously disturbed. The well site is on a bench above the Bat Cave Wash. Noise impacts from I-40 traffic.

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
PGE-8		2A	No			No	No	No	Area surrounding wellhead is bare.	The site is poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed and near TCS.
Park Moabi		Q	No			No	No	No			
Injection Area Observation Wells											
OW-1	Yes	M (6/05 12/05) Then Q	Yes	Sites everywhere on East Mesa	Stay within designated areas.	No	No	No	No vegetation surrounds wellhead.	The site is poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed.
OW-2	Yes	M (6/05 12/05) Then Q	Yes	Sites everywhere on East Mesa	Stay within designated areas.	No	No	No	No vegetation surrounds wellhead.	The site is poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed.
OW-3	Yes	M (6/05 12/05) Then Q	Yes	Sites everywhere on West Mesa	Stay within designated areas.	No	No	No	No vegetation surrounds wellhead.	The site is poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed.
OW-5		M (6/05 12/05) Then Q	Yes	Sites everywhere on East Mesa	Stay within designated areas.	No	No	No	No vegetation surrounds wellhead.	The site is poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed.
Injection Area Compliance Wells											
CW-1	Yes	S	Yes	Adjacent to Route 66	Take care not to impact road	No	No	No	No vegetation surrounding wellhead.	The site is poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed.
CW-2	Yes	S	Yes	3 sites	Stay within designated areas.	Yes	No	No	One Beavertail cactus located 24 feet south of the wellhead.	The site is poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed.

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
CW-3	Yes	S	Yes	3 sites	Stay within designated areas.	No	No	No	No vegetation surrounding wellhead.	The site is poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed.
CW-4	Yes	S	Yes	Site across wash within 50 meters.		Yes	Yes	No	One Acacia located 16 feet southeast of wellhead, one creosote bush located 6 feet east, and one creosote bush located 16 feet south of the wellhead. Palo verde, creosote, acacia, and lycium located along access/egress route within the wash.	The site is poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed. The well is located within a large unnamed wash located on the western side of the project site. Cryptogrammic soils present about 24 feet west of wellhead.
Surface Water Sampling Locations											
I-3	Yes	M	Yes	Travel is on Route 66	Take care not to impact road.						
R-22		M	No			Yes	No	Maybe	At river edge adjacent to tamarisk thicket under I-40 bridge. Site also adjacent to emergent wetland dominated by common reed to the south.	Potential SWFL habitat nearby	Adjacent to Colorado River. Noise impacts from I-40 and river traffic.
R-27		M	No			Yes	No	Maybe	Sampling location is located at the river edge. No vegetation immediately surrounding sampling location.	Potential SWFL habitat nearby	Adjacent to Colorado River. Noise impacts from railroad and river traffic.

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
R-28		M	No			Yes	No	No	Sampling location is located at the river edge. No vegetation immediately surrounding sampling location.	The site is unsuitable SWFL habitat.	Adjacent to Colorado River. Noise impacts from river traffic.
RRB	Yes	M	No			Yes	No	No	No vegetation immediately surrounding sampling location.	Potential SWFL habitat nearby at Bat Cave Wash.	Adjacent to Colorado River. Noise impacts from HR66 and river traffic.
CON		M	No			Yes	No	No	Scattered arrow weed in vicinity of sampling location.	Potential SWFL habitat.	Site previously disturbed. Adjacent to Colorado River. Noise impacts from river traffic.
A-Dock		M	No			Yes	No	No	Scattered arroweed in vicinity of sampling location.	Considered unsuita	Site previously and continuously disturbed by regional park marina activities.
NR-1		M	No			Yes	No	No	Scattered arroweed in vicinity of sampling location.	Considered unsuitable desert tortoise and SWFL habitat.	Site previously and continuously disturbed by regional park campground activities.
NR-2		M	No			Yes	No	No	Scattered arroweed in vicinity of sampling location.	Considered unsuitable desert tortoise and SWFL habitat.	Site previously and continuously disturbed by regional park campground activities.
NR-3		M	No			Yes	No	No	Scattered arroweed in vicinity of sampling location.	Considered unsuitable desert tortoise and SWFL habitat.	Site previously and continuously disturbed by regional park campground activities.
Additional Water Level Measurement Locations											

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MWP-08		NA	No			Yes	No	No	Some scattered creosote bushes in the vicinity of well.	The site is poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed.
MWP-10		NA	No			Yes	No	No	Some scattered creosote bushes in the vicinity of well.	The site is poor quality desert tortoise habitat and unsuitable SWFL habitat.	Site previously disturbed.
MW-01		NA	No			No	No	No	No vegetation surrounds wellhead.	Site is unsuitable desert tortoise and SWFL habitat.	Site is previously disturbed by existing PG&E holding ponds. Ponds are enclosed by chain link fence.
MW-02		NA	No			No	No	No	No vegetation surrounds wellhead.	Site is unsuitable desert tortoise and SWFL habitat.	Site is previously disturbed by existing PG&E holding ponds. Ponds are enclosed by chain link fence.
MW-03		NA	No			No	No	No	No vegetation surrounds wellhead.	Site is unsuitable desert tortoise and SWFL habitat.	Site is previously disturbed by existing PG&E holding ponds. Ponds are enclosed by chain link fence.
MW-04		NA	No			No	No	No	No vegetation surrounds wellhead.	Site is unsuitable desert tortoise and SWFL habitat.	Site is previously disturbed by existing PG&E holding ponds. Ponds are enclosed by chain link fence.
MW-05		NA	No			No	No	No	No vegetation surrounds wellhead.	Site is unsuitable desert tortoise and SWFL habitat.	Site is previously disturbed by existing PG&E holding ponds. Ponds are enclosed by chain link fence.

TABLE 1

Data Collection Locations, Frequency of Access, and Natural and Cultural Resource Review

PG&E Topock Site, Needles, California

Well ID	Transducer Present	Sampling Frequency	Cultural Resources Nearby?	Cultural Observations	Cultural Notes	Biological Resources Nearby?			Biological Observations		Biological Notes
GMP Monitoring Wells					Observations & Recommendations	Plants	Soils	Wildlife	Plants	Wildlife	Observations
MW-06		NA	No			No	No	No	No vegetation surrounds wellhead.	Site is unsuitable desert tortoise and SWFL habitat.	Site is previously disturbed by existing PG&E holding ponds. Ponds are enclosed by chain link fence.
MW-07		NA	No			No	No	No	No vegetation surrounds wellhead.	Site is unsuitable desert tortoise and SWFL habitat.	Site is previously disturbed by existing PG&E holding ponds. Ponds are enclosed by chain link fence.

Notes:

BW	biweekly
M	monthly
Q	quarterly
A	annually
S	semi-annually
2A	bi-annually
NA	not routinely sampled. Included for documentation of access conditions
Q*	Revert to monthly sampling once well PE-1 is brought on line.
Q**	Quarterly while inactive, revert to monthly if active.

Wells with transducers are accessed for biweekly downloads

The sampling frequencies are from the September 6 2005 letter from DTSC.

Surface Water Sampling Locations are sampled monthly, foot access except I-3, NR1, -2, -3.

N

0 375 750 Feet

1 inch equals 750 feet

200 0 200 Feet

1 inch equals 400 feet

Inset Area

NR-1
CON
A-Dock
To NR-1 thru NR-3
To Park Moabi
Bureau of Reclamation (managed by BLM)
U.S. Government
RRB
Pacific Gas & Electric (PG&E)
San Bernardino County (managed by BLM)
U.S. Government
Park Moabi Rd.
MW-35-060
MW-35-135
MW-29
MW-33-cluster
MW-28-25
MW-28-90
R-28
MW-39-cluster
MW-30-cluster
MW-36-cluster
MW-34-cluster
PE1
R-27
MW-27
MW-19
MW-31-060
MW-31-135
TW-2D
TW-2S
MW-20-cluster
MW-41
MW-13
MW-37S
MW-37D
Treatment Plant Facility
MW-14
MW-25
U.S. Government
MW-42-cluster
BN&SF RAILROAD
INTERSTATE 40
MW-40S
MW-40D
MW-26
MW-32-20
MW-32-35
R-22
MW-43-cluster
MW-11
PGE-06
MW-24A
MW-24BR
MW-24B
PGE-07
MW-12
MW-22
MW-21
MW-23
MW-38S
MW-38D
TW-01
MW-10
MW-09
PGE-08
I-3
-24B
MW-17
OW-3
West Mesa
CW-4
East Mesa
IW-2
OW-2
OW-5
IW-3
OW-1
CW-3
Staging Area
CW-2
MW-18
CW-1
MW-07
MW-04
MW-08
MW-06
MW-05
MW-16
MW-01
MW-03
MW-15
MWP-08
MWP-10
MWP-12
Bureau of Land Management (owned & managed by BLM)
PG&E
Metro of
MW-35-060
MW-35-135
MW-29
MW-33-40
MW-33-90
MW-19
MW-28-90
MW-28-25
MW-31-060
MW-31-135
TW-2S
TW-2D
MW-39 cluster
MW-36 cluster
PE-1
MW-20-130
MW-20-100
MW-20-070
MW-34-55
MW-34-80
MW-30-30
MW-30-50
MW-25
R-27
MW-27
MW-42 cluster
MW-32-20
MW-32-35
MW-26
MW-43
R-22
MW-22
MW-21
MW-12

LEGEND

- Well Site
- Surface Water Monitoring Location
- ATV Parking Area
- Truck Parking Area
- Access Routes with Specific Mitigation Measures
- Access by pickup truck or ATV
- Access by ATV
- Access by foot
- Nesting season access by foot, otherwise by ATV

Sources: San Bernardino County Assessor, Parcel quest, State Board of Equalization, Pacific Gas and Electric Company, and Plat maps provided by BLM.

FIGURE 1
TOPOCK PROJECT SAMPLING CREW ACCESS ROUTES

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Site Access and Sampling Procedures for Groundwater Monitoring Wells Located Near Potential Southwestern Willow Flycatcher Habitat, Rev. 2, PG&E Topock Compressor Station

Site Access and Sampling Procedures for Groundwater Monitoring Wells Located Near Potential Southwestern Willow Flycatcher Habitat, Rev. 2

PG&E Topock Compressor Station

Date: September 14, 2005

Introduction

This technical memorandum describes the proposed modified field procedures to be used for specific groundwater monitoring wells located on the Colorado River floodplain at the Pacific Gas and Electric Company (PG&E) Topock Compressor Station site, Needles, California. The modifications to site access and sampling procedures were developed in response to U. S. Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), and the California Department of Toxic Substances Control (DTSC) requirements for reduced field activities in potential habitat for the southwestern willow flycatcher. BLM biology staff have identified the more densely vegetated areas of the floodplain where modified access and sampling procedures are required during the flycatcher nesting season, which is May through September. Well sampling, transducer data collection, and any other work activities will not occur the day prior to or during the protocol survey timing for the flycatcher. Upon completion of the surveys, the onsite biologist will approve/disapprove of work activities depending on the survey results. If a flycatcher is not detected, then the biologist will permit the activities. If a flycatcher is detected, then the biologist will not permit the work activities, and the regulatory agencies will be consulted. All field staff will undergo sensitivity training prior to an activity to become familiar with the habitat issues on the floodplain.

The floodplain area that is subject to the modified access and sampling procedures include well clusters MW-27, MW-30, MW-34, MW-36, and MW-42, and the extraction well PE-1, on BLM-managed land, and MW-43 and MW-22 on USFWS land. Figure 1 shows the floodplain area and the locations of the monitoring wells. The modified site access and groundwater purging/sampling procedures described in this memorandum are intended to be protective of natural resources by minimizing human impact in the potential habitat areas during flycatcher nesting season.

Background

Under the ongoing Groundwater Monitoring Program, water samples are collected for chromium and other water quality analyses from 35 wells along the Colorado River floodplain at the Topock site. The frequency of sampling from the 35 floodplain wells and

associated surface water shoreline sampling locations varies by location and is performed as frequently as biweekly at specified locations. The floodplain wells are sampled according to field procedures described in the DTSC-approved sampling plan and Standard Operating Procedures (SOPs). The sampling SOPs require purging the wells of at least three well volumes with an electric submersible pump and stabilization of water quality parameters before sampling can be conducted. Depending on the diameter and depth of the well and the stabilization of field parameters, between 15 and 200 gallons of water are typically purged from each well. The floodplain well sampling activity requires the use of all terrain vehicles (ATVs) with trailers to transport well purging and sampling equipment and purge water tanks.

At the request of the DTSC, a memorandum describing access for sampling of all PG&E Topock monitoring wells and surface water sampling locations was prepared and submitted to DTSC and BLM on June 7, 2005. During the week of June 13, 2005, PG&E was informed by the BLM biologist that portions of the floodplain area were off-limits to vehicular traffic during the potential nesting season. As a result, groundwater sampling was not conducted at well clusters MW-27, MW-30, MW-34, MW-36, and MW-42 (total 18 wells) during the June 2005 quarterly monitoring event.

On June 21, 2005, a modified sampling procedure was tested and demonstrated for BLM review by sampling well MW-34-100. The pump reel, generators, and other equipment that are normally transported to well clusters on ATVs were instead carried by foot from the ATV parking area near MW-39 to a work area near PE-1. The pump hose was then carried to the MW-34 well cluster, with purging of MW-34-100 conducted from the work area at PE-1, about 100 feet to the west. After reviewing this demonstration, the BLM biologist asked that the work area for generator use be confined to the vicinity of MW-39 (Figure 1), with only the pump head carried to each of the well locations. The following revised sampling procedures are based on discussion with the BLM biologist at the June 21 and July 13 field meetings and June 23, 2005 and July 21, 2005 teleconferences.

Modified Access Procedures

During the June and July conference calls—attended by BLM, DTSC, USFWS, and PG&E representatives—a modified access and sampling procedure for the potential habitat area was discussed in detail. Refer to Figure 1 for the proposed locations of access routes and staging areas.

For wells located on BLM property, pickup-truck-carried equipment is staged on the graded road approximately 120 feet south of well cluster MW-35. The pickup-truck is therefore located the minimum distance from the paved road and on an established access route; this location for pickup-truck-carried equipment provides a reduction in risk to transport equipment safely. From that point, ATVs travel south to access monitoring wells MW-33, MW-28 and MW-39, with access to wells south and east of MW-39 only on foot. ATVs park at the MW-39 well cluster. The ATVs are a Polaris 700 Sportsman and an Arctic Cat 400, which are used to transport equipment and purge water on the floodplain. Manufacturers' specifications for the ATVs were included as an attachment in PG&E's previously-submitted technical memorandum, dated June 29, 2005. PG&E contacted the manufacturers to discuss these models. Based on these discussions, PG&E confirmed that these models are equipped

with the best available mufflers from the manufacturers. Only two ATVs are in use at one time.

All vehicles, power equipment, and purge water storage tanks are staged northwest of monitoring well location MW-39, which was deemed sufficiently far enough from areas of potential SWFL nesting habitat by the BLM biologist. Only foot traffic along established trails is permitted from the staging area to the five well clusters located near potential habitat (Figure 1).

On the Havasu National Wildlife Refuge (HNWR) property, located to the south of the railroad bridge, pickup-truck-carried equipment is staged at the cleared and graded area to the west of well cluster MW-32 (Figure 1). No ATVs will be required for work in this area. All power equipment and purge water storage tanks are staged at this location. Only foot traffic along established trails is permitted from the staging area to the two well clusters MW-22 and MW-32 located near potential nesting habitat on the HNWR property. Other than for details about staging locations, the procedures that are described below for the BLM property also apply to sampling to these HNWR locations.

An electric submersible pump is carried on foot from the staging area to each well location and lowered into the water column per the Groundwater Monitoring Program sampling plan and SOPs. From the wellhead, discharge tubing is run along the trails to the purge water holding tanks at the staging area. The distance from the sample location to the staging area is as much as 800 feet. Electrical power cords are also run along the trails from a portable electric generator at MW-39 to the pump control box. The pump control box is situated approximately 350 to 400 feet from the wellhead. That distance is determined by the maximum length of the motor lead cable that connects the control box to the pump.

The following list summarizes the modified "nesting season" sampling procedures for the five floodplain well clusters MW-27, MW-30, MW-34, MW-36, and MW-42. These modified procedures will be followed each year during May through September:

- A biologist will pre-survey the planned work area for the presences of nesting listed-bird species, and sampling will proceed if the survey results are negative. BLM and DTSC will be contacted and sampling will not proceed if pre-survey finds nesting listed-bird species.
- New sampling procedures and biological resource sensitivity will be reviewed at each field event kickoff briefing.
- Pickup trucks will stage at the MW-35 area off Park Moabi Road, or west of the MW-32 cluster.
- Only two ATVs will transport equipment from MW-35 area to the MW-39 area.
- ATVs will maintain low speed and low revolutions per minute to minimize noise. The target speed will be 5 mph on the floodplain, per BLM direction. The ATVs will maintain a reduced speed to the extent possible while avoiding getting lodged or stuck.
- A biologist will accompany the sampling team upon startup of activities and will provide a reconnaissance "sweep" during the sampling event.

- All equipment transported by ATV will be staged northwest of MW-39, which will be the ATV parking area. Generators will be operated at this area only. Two 2-kilowatt generators will be operated in parallel to mitigate noise.
- The pump control box will be staged on the established footpath about 400 feet from the well to be sampled.
- The pump discharge hose will be carried by two people to the well to be sampled, and the pump will be placed in the well following a water level measurement.
- Spill control measures, such as large plastic trays, will be placed under each hose connection between the well and the staging area.
- The pump flow rate will be set at the pump control box as the purge is started, then the control box will be left unattended.
- The well purge will be conducted and documented from the MW-39 work area.
- When the well purge is complete, two people will carry a cooler with sample bottles to the well head and one person will go to the pump control box.
- After sample bottles are filled, the pump will be shut down at the control box, and the pump will be removed from the well.
- The pump and sample cooler will be carried back to the MW-39 or MW-32 staging area.
- The pump and first hose length will be decontaminated and taken to the next well for sampling.
- At all times, conversation noise and abrupt or unnecessary movements will be avoided, and equipment noise will be minimized. Equipment will be muffled or padded during transport and setup to avoid clanging or other impact noises from bottles and metal components.
- A biologist's report of the sampling activities will be completed within a week of the sampling and submitted to DTSC and BLM. The *curricula vitae* of the project biologist were included as an attachment in PG&E's previously-submitted technical memorandum, dated June 29, 2005.

Modified Purging and Sampling Procedures

To minimize the presence of the sampling crew members near the well locations, water quality readings are measured from the discharge at the staging area. Typically, the water quality readings are measured at the well head. Field readings are measured using a Horiba U-22 water quality meter with a flow cell. Three consecutive readings taken at least 3 minutes apart must meet the following criteria:

- pH +/- 0.1 pH units
- Specific conductance +/- 3%
- ORP +/- 10 millivolts
- Turbidity +/- 10% NTU units (when turbidity is >10 NTUs)

- Dissolved oxygen +/- 0.3 mg/L
- Temperature +/- 2º Celsius

It is expected that discharged purge water will be heated after traveling across hot sand on the floodplain. For this reason, temperature and dissolved oxygen are eliminated as stabilization criteria at these wells. The revised stabilization criteria include:

- pH +/- 0.1 pH units
- Specific conductance +/- 3%
- ORP +/- 10 millivolts
- Turbidity +/- 10% NTU units (when turbidity is >10 NTUs)

In addition, water level measurements are taken at the beginning and end of the purge only. No measurements are taken during the purge.

Since the water from the discharge hose is expected to be heated, analytical samples will be collected at the wellhead. Once the field parameters are stable and three well volumes have been purged from the well, one crew member carries an ice chest with sample bottles to the well head and collects the samples is accordance with the SOP. A tee fitting on the sampling hose is used for sample collection at the wellhead. After the samples are collected, the pump is shut down and pulled from the well. Equipment that requires decontamination is carried back to the staging area before sampling the next well. Otherwise, equipment is moved directly to the next well location to be sampled.

A PG&E-designated biologist is onsite during sampling to ensure that these measures are adequate to avoid any potential direct and indirect impacts to the southwestern willow flycatcher near the monitoring wells.

A trial of these modified procedures occurred on June 30, 2005, July 7, 2005, and July 11, 2005. The BLM biologist observed the trial to ensure that sampling proceeded as agreed during the June 23, 2005 and July 21, 2005 teleconferences.

Health and Safety

The nesting season of the southwestern willow flycatcher occurs during the hottest part of the year when temperatures can exceed 120 degrees Fahrenheit in the afternoon. Additional health and safety procedures are put in place to address the additional exertion required for the modified sampling procedures while working in the summer heat.

The following procedures are implemented for sampling in hot weather conditions:

- The workday begins at 5:00 a.m. and work ceases no later than 12:00 p.m.
- Crew numbers are at least doubled to allow for crew rotations for rest and rehydration breaks.
- Oral body temperature is monitored to determine if employees are adequately dissipating heat buildup. If an employee's body temperature exceeds 99.6 degrees Fahrenheit, the following work period will be shortened by one-third. If an employee's oral temperature exceeds 100.4 degrees Fahrenheit, he or she will not return to work.

- Heart rate is measured during each break period. If an employee's heart rate exceeds 100 beats per minute (bpm), or 20 bpm above resting rate, the subsequent work period will be shortened by one-third. If the heart rate exceeds 180 bpm minus the employee's age, then work activities are suspended until the rate returns to resting rate.
- Each individual's weight is measured throughout the day. If weight loss exceeds 1.5 percent of total body weight, the worker will be removed from work until fluids have had time to be absorbed and body weight returns to less than 1.5 percent of loss. If body weight loss exceeds 3 percent, the employee will be removed from work for the day.

These procedures were observed by CH2M HILL Health and Safety Specialist and a DTSC Certified Industrial Hygienist on July 13, 2005. The procedures were deemed sufficient to protect employees from heat related illness.

Attachments

Figure 1
Photo Log of Floodplain Sampling Procedures

References

CH2M HILL. 2005a. Technical Memorandum. "PG&E Topock Project: Review of Access Routes for Groundwater and Surface Water Data Collection Locations, and Proposed Mitigation Measures." June 7.

_____. 2005b. Technical Memorandum. "Site Access and Sampling Procedures for Groundwater Monitoring Wells Located Near Potential Southwestern Willow Flycatcher Habitat, Rev. 1." June 29.

N

0 375 750 Feet

1 inch equals 750 feet

200 0 200 Feet

1 inch equals 400 feet

Inset Area

NR-1
CON
A-Dock
To NR-1 thru NR-3
To Park Moabi
Bureau of Reclamation (managed by BLM)
U.S. Government
RRB
Pacific Gas & Electric (PG&E)
San Bernardino County (managed by BLM)
U.S. Government
Park Moabi Rd.
MW-35-060
MW-35-135
MW-29
MW-33-cluster
MW-28-25
MW-28-90
R-28
MW-39-cluster
MW-30-cluster
MW-36-cluster
MW-34-cluster
PE1
R-27
MW-27
MW-19
MW-31-060
MW-31-135
TW-2D
TW-2S
MW-20-cluster
MW-41
MW-13
MW-37S
MW-37D
Treatment Plant Facility
MW-14
MW-25
U.S. Government
MW-42-cluster
BN&SF RAILROAD
INTERSTATE 40
MW-40S
MW-40D
MW-26
MW-32-20
MW-32-35
R-22
MW-43-cluster
MW-11
PGE-06
MW-24A
MW-24BR
MW-24B
PGE-07
MW-12
MW-22
MW-21
MW-23
MW-38S
MW-38D
TW-01
MW-10
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MW-17
OW-3
West Mesa
CW-4
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OW-2
OW-5
IW-3
OW-1
CW-3
Staging Area
CW-2
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Bureau of Land Management (owned & managed by BLM)
PG&E
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MW-33-90
MW-19
MW-28-90
MW-28-25
MW-31-060
MW-31-135
TW-2S
TW-2D
MW-39 cluster
MW-36 cluster
PE-1
MW-20-130
MW-20-100
MW-20-070
MW-34-55
MW-34-80
MW-30-30
MW-30-50
MW-25
R-27
MW-27
MW-42 cluster
MW-32-20
MW-32-35
MW-26
MW-43
R-22
MW-22
MW-21
MW-12

LEGEND

- Well Site
- Surface Water Monitoring Location
- ATV Parking Area
- Truck Parking Area
- Access Routes with Specific Mitigation Measures
- Access by pickup truck or ATV
- Access by ATV
- Access by foot
- Nesting season access by foot, otherwise by ATV

Sources: San Bernardino County Assessor, Parcel quest, State Board of Equalization, Pacific Gas and Electric Company, and Plat maps provided by BLM.

FIGURE 1
TOPOCK PROJECT SAMPLING CREW ACCESS ROUTES

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

View of hose reel and power cable located about 400 feet west of MW-27

View of purge water hose and power cable placed southward from the MW-39 staging area, with railroad, highway, and gas pipeline bridge piers visible in background

View of MW-27 showing water level meter at side of casing with pump set in well, ready to begin purge as staff leave the location. The well purge will be monitored from the MW-39 staging area.

View of MW-39 showing equipment staging and ATV parking area to north, the MW-20 Bench facilities are visible to west in background. Staff present include the biological resources monitor.

Appendix A2:
IM No. 1 Work Plan

Workplan
Field Activities for Groundwater Well Installation
PG&E Topock Project

Prepared for the United States Bureau of Land Management

DRAFT - February 5, 2004

INTRODUCTION

This workplan provides a project description to enable the United States Bureau of Land Management (BLM) to authorize the installation of groundwater monitoring and test wells located on United States Bureau of Reclamation (BOR) property, currently managed by the BLM. As you are aware, Pacific Gas and Electric Company (PG&E) is addressing mitigation of historical chromium releases at the Topock site under the oversight of the California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC). The PG&E Topock Compressor Station is located in San Bernardino County, approximately 15 miles to the southeast of Needles, California.

On January 22, 2004, DTSC directed PG&E to immediately prepare an Interim Measure (IM) Workplan to mitigate potential impacts of chromium in groundwater on the Colorado River. In accordance with DTSC's directive, PG&E is evaluating interim remedial measures that can be put into place as soon as possible to initiate hydraulic control of that portion of the chromium plume that could pose a potential threat to the Colorado River. Assisting DTSC and PG&E in this regard are the members of the Topock Consultative Workgroup (CWG), constituted under California's Site Designation Process, and consisting of representatives of DTSC, the Colorado River Basin Regional Water Quality Control Board, Metropolitan Water District (MWD) and the various federal agencies who own or manage land at the project site.

PG&E is proposing an IM that consists of groundwater extraction from one or more wells to effect hydraulic control of the plume. The first step in planning for an IM involves siting, installation , sampling and testing of one or more groundwater remediation test wells. The proposed locations of the groundwater test wells are shown on Figure 1. This memorandum describes the activities that will take place during the installation and testing of the groundwater test wells, focusing on issues important to the BLM. Throughout the drilling activities, efforts will be made to minimize disturbance to BLM lands and protect desert habitat. PG&E requests that BLM review the details provided herein and consider the issuance of an amendment to the existing right-of-way (ROW) amendment granted previously to PG&E (ROW #CAAZCA 37877, December 17, 2001). PG&E is prepared to

immediately meet BLM staff at the Topock site to discuss this workplan following BLM's initial review.

DRILLING, INSTALLATION AND WELL TESTING ACTIVITIES

The purpose of the proposed drilling and hydraulic testing activities is to collect hydrogeologic information specific to the northeastern portion of the Topock site. Additional hydrogeologic and hydraulic data is essential for calibrating the groundwater flow model, an important tool for evaluating remedial alternatives. The results of these proposed activities will be used to evaluate the next steps for implementation of an interim-measure (IM) consisting of groundwater extraction and treatment.

The primary area of well drilling activity is the MW-20 bench area, located approximately 700 feet west of the Colorado River (see Figure 2). The MW-20 bench area is the proposed location of test well TW-2. If evaluation of groundwater pumping at TW-2 indicates that hydraulic control of the plume boundaries will not be achieved, additional well(s) will be installed at one or more of the alternative locations shown on Figure 2. Additional test wells would be sequentially installed, as applicable to confirm hydrogeologic conditions and to effect hydraulic control of the plume boundaries. As a member of the Topock CWG, BLM will be updated weekly by PG&E with the results of field tests.

As discussed during the Topock CWG meeting of January 29, 2004, seven locations for potential test well installation have been identified. These locations are shown as A, B, C, D, E, F and G. However, test well "G" on Figure 2 is proposed in the Havasu National Wildlife Refuge [HNWR] managed by the U.S. Fish and Wildlife Service [USFWS]; this location is provided for informational purposes only. In addition, DTSC has requested that PG&E consider two locations to install deep monitoring wells. The proposed monitoring well locations are also shown on Figure 2 (locations H and I). The reasons for installing additional monitoring wells at the site are to collect detailed hydrogeologic information in areas where data gaps occur and to provide additional groundwater monitoring. Representative photos of the areas proposed for well installation are provided on Figure 3.

Activities proposed to take place on BLM property include:

- Installation of two monitoring wells and one test well (TW-2);
- Installation of one or more additional test wells, if required;
- Staging of materials and equipment;
- Temporary storage of water and investigation derived wastes (IDW).

Well installation requires access for large trucks, including a drill rig and water supply truck. Smaller 4-wheel drive vehicles will provide much of the material transport to the drilling area. Short-term material storage on the MW-20 bench will be necessary to accommodate the drilling operations. Materials stored at the test well location consist of consumables and equipment required for drilling activities (e.g., steel casing, sand, bentonite, cement grout, drill rods, drill bits, etc.).

FIELD ACTIVITIES

Field activities include drilling a test boring to a maximum depth of approximately 200 feet, installation of a test well, well development, surface wellhead construction and well testing. The fieldwork begins with placement of IDW containers adjacent to the approved drilling location. Secondary containment of the IDW containers is provided by a combination of liners and temporary berms. Each type of IDW is stored in its own container (see Figure 4). IDW generated during the field activities and their respective containers are as follows:

IDW Type	Number of containers	Container Description	Container Dimensions (length x width x height)
Soil cuttings	2	20 cubic yard steel containers	33 feet x 8 feet x 6 feet
Drilling mud	1	9,240 gallon steel tank	33 feet x 8 feet x 6.5 feet
Development water	6 - 10	21,000 gallon steel tank	35 feet x 8 feet x 12.5 feet

A mud rotary drilling rig (or similar rig) is used to drill an initial corehole and install the permanent monitoring well in this corehole. Figure 5 is a photograph of a typical drilling rig proposed for this work. The drilling mud and cuttings generated from the corehole drilling are transferred to an IDW container located adjacent to the test well. Following the coring, geophysical logging occurs to characterize the aquifer materials in the test well area using equipment mounted in a small utility van or small truck and trailer. The geophysical logging does not generate additional drilling wastes.

Based on the coring and geophysical logs, a permanent well is installed in the initial corehole. The corehole is enlarged to between 8 and 14 inches in diameter using the mud rotary drilling equipment**.** The drilling mud and cuttings and wastewater generated during well installation will be transferred to the IDW container. The well is constructed using 2-8 inch steel or PVC casing.

Following well installation, the well is developed using a combination of surging, bailing, and pumping to remove any drilling fluid and sediment from the well. The wastewater produced from these activities is transferred to IDW storage tanks. The disposal process for IDW materials is discussed below under Waste Management.

The well will be completed with a flush-mounted concrete utility box to minimize above-grade facilities and allow crew and equipment access to the work area. A dedicated submersible pump will be installed in the well. A temporary power supply (e.g. trailer mounted generator) will be required to operate the pump. Temporary piping will be used to convey the pump discharge the short distance (100 feet) to the IDW storage. Following installation of the pump, hydraulic testing, including constant rate or step drawdown pumping tests will be conducted as the last step in well development. Testing may be short in duration at some wells (i.e., 2-4 hours) or longer at key wells (i.e., 2-3 days).

Figure 6 shows a schematic view of the test well and Figure 7 provides a representative photograph of the surface features. Site preparation including equipment staging and tank

staging is estimated to take 2 to 3 days. Well installation activities, including drilling, development, geophysical and initial hydraulic testing and surface wellhead construction are estimated to require 3 to 4 weeks.

WASTE MANAGEMENT

Several types of waste materials will be generated during the drilling and development of the wells. IDW materials that will be generated include groundwater, drill cuttings, drilling mud, and incidental trash. Groundwater generated during well development is expected to contain concentrations of chromium ranging from 1 – 13 milligram / Liter (mg / L). Drill cuttings and drilling mud may potentially contain chromium, although during previous drilling operations at the Topock site these materials had nondetectable concentrations of chromium. The incidental trash will consist of empty paper and plastic bags, cardboard boxes, wooden pallets, and miscellaneous debris.

Groundwater generated during drilling and testing will be collected and stored in temporary storage tanks. The groundwater in the tanks will be sampled and analyzed for hexavalent chromium [Cr(VI)], total chromium [Cr(T)], total dissolved solids (TDS) and other constituents as required. Disposal for this groundwater will occur at a permitted hazardous waste disposal facility. The storage tanks containing groundwater may be onsite for a period of up to 90 days.

Drilling mud is thick, pudding like mixture of bentonite clay that is circulated through the drill bit during drilling. Drilling mud stored in the tank will be sampled and analyzed for Cr(VI), Cr(T) and any other constituents required prior to disposal. The drilling mud may be disposed of on the PG&E property or hauled offsite, depending on the analytical laboratory results. It is estimated that the mud tank would need to be onsite for a period of approximately 60 days.

Drill cuttings are the fragments of rock and soil that are removed to create the borehole. After placement in the roll-off bin, the cuttings will be sampled and analyzed for chromium and other constituents. If the cuttings are found to be free of contaminants, they will be spread on the ground in the vicinity of the borehole or on PG&E property. If the cuttings are found to contain contaminants, they will be trucked offsite for disposal at a permitted hazardous waste disposal facility. It is estimated that the cuttings bin will need to be onsite for a period of approximately 60 days.

Incidental trash will be collected at the end of each drilling shift and hauled off the drill site to an appropriate disposal facility.

EMERGENCY RESPONSE PLAN

Spill containment equipment (e.g., sorbent materials, shovels, etc.) will be maintained on-site at all times that there is groundwater in the temporary storage tank. As a contingency in the event of a leak from the storage tank, equipment (vacuum trucks, pumps, etc.) and trained spill response personnel will be on call 24 hours per day for every day that the tanks contain liquid. Trained emergency response personnel will mobilize to the site within 4 hours.

The secondary containment at the IDW tank storage area will be continuously inspected during the pump test and at regular 2-hour intervals thereafter. For any minor leaks, such

as dripping from a valve or pump, the water will be contained in a pail and added to the storage tank.

MONITORING WELL "I": INSTALLATION ACTIVITIES AND ACCESS

The well installation activities described above apply to both the test wells and monitoring wells. For purposes of the proposed ROW amendment, test well and monitoring well activities are considered essentially similar, with the exception of proposed monitoring well "I" located east of the MW-20 bench. This monitoring well occurs within an area of sandy riparian habitat. As such, special equipment will be utilized for installation of this well, similar to equipment procured previously during installation of monitoring wells MW-30 though MW-34, shown on Figure 2.

Drilling will use a balloon-tired ATV rotosonic drill rig and a balloon-tired 4x4-fork lift as a support vehicle to minimize disturbance in this area. Representative photos of this equipment are provided in Figure 8. Access to monitoring well "I" is anticipated to occur from a route that begins approximately 500 feet south of the mouth of Bat Cave Wash off Park Moabi Road. IDW materials generated during installation of this monitoring well will initially be stored in drums and transferred to IDW containers located at the MW-20 bench.

Other activities associated with installation of monitoring well "I" are identical to those described above.

IM PROGRAM AND SCHEDULE

As noted previously, well installation activities are anticipated to commence at the MW-20 bench. The minimum level of activities include installation of one test well (TW-2) and one monitoring well at the MW-20 bench, and a second monitoring well ("I") located east of this area. No additional monitoring wells are proposed at this time.

PG&E anticipates the commencement of drilling activities in March, pending approval of this workplan and authorization from BLM. The field activities will be conducted from March through April or May, depending on the number of well installations.

TABLE 1
Duration of Field Activities

Field Activities	Approximate Duration
Site Preparation (Site clearance, equipment and tank staging)	3-5 days
Drilling, Installation and Testing of IM Test Well (Location A)	3-4 weeks
Drilling, Installation and Testing of IM Monitoring Well (Location H, I)	2-3 weeks
Demobilization	2 days
Storage of drilling wastewater, cuttings and mud (IDW) for disposal	30 – 90 days

Note: It is expected that new well installation and testing (either a monitoring well or test well) will take 3 to 4 weeks.

Pacific Gas and Electric Company

Yvonne Meeks
Site Remediation Project Manager
Environmental Affairs

6588 Ontario Road
San Luis Obispo, CA 93405

Tel: 805-546-5243
Fax:: 805-546-5232
yjm1@pge.com

Mailing Address
4325 South Higuera Street
San Luis Obispo, CA 93401

March 12, 2004

Mr. Donald Ellsworth
Field Manager
U.S. Department of the Interior, Bureau of Land Management
2610 Sweetwater Avenue
Lake Havasu City, Arizona 86406

Subject: Request for Approval to Install Wells on BLM Property
Pacific Gas and Electric Company, Topock Compressor Station
Needles, California

Dear Mr. Ellsworth:

Pacific Gas and Electric Company (PG&E) requests the Bureau of Land Management's (BLM) approval to install extraction and monitoring wells on BLM property as part of the Interim Measures No. 1 program for management of chromium at the Topock Compressor Station. On March 3, 2004, BLM issued a signed Action Memorandum approving the time-critical interim measures activities at the site to facilitate and streamline PG&E's efforts to continue to protect the Colorado River. Per the direction of Casey Padget (US Department of the Interior, Office of the Solicitor) in our March 4, 2004 telephone call, these activities are classified as site-specified activities under the Action Memorandum and require only the approval by the BLM Field Office Manager prior to implementation.

The locations of the proposed wells, as indicated on the attached map, have been finalized based on a consensus reached by the Department of Toxic Substances Control (DTSC) and the Consultative Work Group (CWG) technical team during discussions on March 11, 2004. The attached map shows the locations of both necessary well installations (TW-2, MW-28D, MW-31D, MW-35, MW-36, MW-37, MW-39, MW-40) and potential well sites. The need for the potential wells will be evaluated after the installation of the above-mentioned wells and review of data.

At DTSC's direction, PG&E has committed to a drilling start date of March 22, 2004. PG&E requests your approval by Monday, March 15, 2004, to avoid delay of the drilling activities. If you have any questions, please call me at (808) 546-5243.

Sincerely,

Terri Herson for

Yvonne Meeks

cc: Barbara Coler
Permitting Division
Department of Toxic Substance Control
700 Heinz Avenue, Suite 200
Berkeley, California 94710

Norman Shopay
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, California 94710

Alfredo Zanoria
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5796 Corporate Avenue
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Jeff Smith
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Casey Padget
U.S. Department of the Interior
Office of the Solicitor
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Lakewood, CO 80215

Paul Meyer
U.S. Department of Interior
Bureau of Land Management
Denver Federal Center, Bldg. 50
P.O. Box 25047 (D-5100)
Denver, Colorado 80225-0007

Byard Kershaw
U.S. Department of Interior
Bureau of Land Management
222 N. Central Avenue
Phoenix, Arizona 85004

N

0 150 300 450
Feet

LEGEND

- Proposed Extraction Well on BLM property
- Proposed Monitoring Well on BLM property
- Potential Step-out Monitoring Well on BLM Property
- Potential Extraction Well on BLM property

Note: Actual well locations are subject to field conditions.

RRB
MW-29
MW-35
MW-33-40
MW-33-90
MW-13
MW-28D
R-28
MW-28
MW-19
MWDSC
BLM
MW-31
MW-31D
MW-37
Ravine
MW-20 Bench
TW-2
MW-39
MW-36
MW-34-80
MW-34-55
MW-20 Cluster
MW-30-50
MW-30-30
R-27
MW-25
MW-27
BLM
BN / SF Railroad
HNWR
MW-32-20
MW-32-35
MW-26
R-22
MW-11
MW-22
PGE-06
MW-24A
MW-24BR
MW-21
MW-12
MW-24B
PGE-07
MW-23
TW-1
HNWR
PG&E
MW-10
MW-09
PGE-08
PG&E Topock Compressor Station
500
550
600
650
700

Figure 1-2
Proposed Well Locations on BLM Property

INTERIM MEASURES NO. 1
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Appendix A3:
IM No. 1/2 BLM Action Memo

BLM Fax Cover Sheet

Bureau of Land Management
Lake Havasu Field Office
2610 Sweetwater Avenue · Lake Havasu City, Arizona 86406
Phone (928) 505-1200 · *Fax* (928) 505-1208
Toll Free 1-888-213-2582 · *Website:* lakehavasu.az.blm.gov

Number of Pages 5
(Including this cover sheet)

Date 3-3-2004

Deliver To Terri Herson

Office CH2MHILL

Phone (___) _____ Fax (___) _____

Sender Janice Easley
for Pat Taylor Phone (928) 505-1239

Notes/Comments: The signed Action Memorandum

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAKE HAVASU FIELD OFFICE

In Reply Refer To:
CAAZCA 43660 (070)

March 3, 2004

ACTION MEMORANDUM

TO: Elaine Zielinski
State Director

FROM: Don Ellsworth
Field Manager, Lake Havasu Field Office

SUBJECT: Time Critical Removal Action,
Pacific Gas and Electric Topock Compressor Facility

I. PURPOSE

This Action Memorandum documents the basis for authorizing a time critical removal action to address the release of hazardous substances from the Pacific Gas and Electric (PG&E) Compressor Station near Topock, Arizona (hereafter "PG&E facility"). Hazardous substances released from the PG&E facility have migrated onto or under land managed by the Bureau of Land Management ("BLM") on behalf of the Bureau of Reclamation ("BOR"). Specifically, hazardous substances including, without limitation, hexavalent chromium released from the PG&E facility have been detected in groundwater under BLM-managed land. This plume of contaminated groundwater has been detected in groundwater samples collected within 150 feet of the Colorado River and is or may be migrating toward the Colorado River.

This time critical removal action is authorized pursuant to the response action authority of Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. §9604. Pursuant to Executive Order 12580, as amended, and Department of the Interior ("DOI") Departmental Manual, Section 104 response action authority has been delegated to BLM to address the release or threatened release of hazardous substances on or from land under BLM's jurisdiction, custody, or control. The purpose of the proposed time critical removal action is to prevent or abate the release of hexavalent chromium into the Colorado River.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The PG&E facility comprises approximately 265 acres located 15 miles southeast of Needles, California, south of Interstate 40, in the north end of the Chemehuevi Mountains. The facility is an inholding within the Havasu National Wildlife Refuge, is located within half a mile of BLM-managed land, and is less than one mile from the Colorado River.

PG&E has been the owner and operator of the PG&E facility since 1951 and has owned the property on which the facility is located since 1965. Beginning in 1951 and continuing to approximately 1989, PG&E conducted onsite disposal of significant quantities of wastewater

containing hexavalent chromium from the cooling towers of the compressor station at the facility. According to PG&E's estimates, from 1951 to 1969 PG&E disposed annually at least six million gallons of untreated chromium-contaminated wastewater into Bat Cave Wash, an ephemeral stream that flows north from the facility across Havasu National Wildlife Refuge and BLM-managed land emptying into the Colorado River. From 1970 until approximately 1989, PG&E also disposed of wastewater in evaporation ponds on the Refuge adjacent to BLM-managed property. In addition to these evaporation ponds, PG&E disposed of wastewater and/or other waste containing hazardous substances in a percolation bed and an unlicensed injection well at or near the facility.

B. Other Actions to Date

In 1988, PG&E completed a soil investigation in the Bat Cave Wash area at the request of the California Department of Health Services (now known as the Department of Toxic Substances Control ("DTSC")) and the U.S. Environmental Protection Agency ("EPA"). The soil investigation documented chromium contamination in the environment around the former percolation bed. A 1989 "Comprehensive Ground Water Monitoring Evaluation" prepared by the California Regional Water Quality Control Board ("CRWQCB") identified chromium contamination associated with the injection well.

By letter dated May 29, 1995, PG&E reported the presence of chromium in groundwater samples taken on the east side of Bat Cave Wash near the north boundary of the PG&E facility. In response, on February 26, 1996, DTSC and PG&E executed a Corrective Action Consent Agreement pursuant to State law under which DTSC directed PG&E to perform a "Facility Investigation" as well as any "Interim Measures" determined to be necessary to address immediate or potential threats to human health and/or the environment.

In the course of implementing groundwater monitoring required under the Corrective Action Consent Agreement, PG&E has documented an extensive plume of groundwater contaminated with hexavalent chromium that stretches from the PG&E facility under National Wildlife Refuge and BLM-managed property toward the Colorado River. On February 3, 2004, reported concentrations of hexavalent chromium of 111 parts per billion ('ppb") in groundwater taken from monitoring well MW34-80. This monitoring well is located on BLM-managed property approximately 150 feet from the Colorado River. Based on this finding, DTSC has ordered PG&E to prepare and submit Interim Measures ("IM") Workplan No. 2 "to immediately begin pumping, transport and disposal of groundwater from existing monitoring wells at the MW20 cluster." These monitoring wells are located on BLM-managed property. To facilitate the coordination of BLM and DTSC authorities for responding to groundwater contamination from the PG&E facility, this Action Memorandum authorizes PG&E to perform the activities described in IM Workplan No. 2, as specified herein.

III. THREATS TO PUBLIC HEALTH, OR WELFARE, OR THE ENVIRONMENT

As documented by recent groundwater sampling results, hexavalent chromium has been detected in significant concentrations in wells within 150 feet of the Colorado River. The Colorado River is an important drinking water source utilized by the Metropolitan Water District of Southern California, which provides drinking water to approximately 18 million people. While investigation to date has not yet confirmed that contaminated groundwater has reached the Colorado River, the proximity of the groundwater plume to the River constitutes an actual or potential threat of contamination of a significant drinking water supply. In addition, the proximity of the groundwater plume to the Colorado River constitutes an actual or potential threat to the environment.

IV. ENDANGERMENT DETERMINATION

Actual, ongoing, or threatened releases of hazardous substances through groundwater may continue to migrate toward the Colorado River and may reach the River if not addressed by implementing the time critical removal action described in Attachment 1 of this Action Memorandum. This time critical removal action is necessary to prevent or abate the release or substantial threat of release of hazardous substances into the Colorado River. Due to the proximity of the groundwater plume to the River, BLM determines, in accordance with Section 300.415(b)(2) of the National Oil and Hazardous Substances Contingency Plan ("National Contingency Plan" or "NCP"), 42 U.S.C. §300.415(b)(2), that a time critical response is necessary.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

As described specifically in Attachment 1, which is incorporated herein, the proposed time critical removal action is to pump, and transport and dispose offsite, groundwater from existing monitoring wells at the MW20 cluster in order to achieve a net reversal of the groundwater gradient away from the Colorado River. Activities on BLM-managed land called for in any transportation plan, site health and safety plan, or other plans identified in Attachment 1 that have not yet been reviewed and approved by BLM are authorized by this Action Memorandum: provided, however, that such plans are subject to BLM review and approval prior to implementation.

In the event such reversal of gradient is not achieved by pumping from the existing wells identified in Attachment 1, additional existing wells may be pumped, or new wells may be sited, installed, tested and pumped, to achieve such reversal. Any such additional wells are authorized by this Action Memorandum: provided, however, that utilization of such wells is subject to BLM review and approval prior to installation or pumping.

Because such actions will be financed by PG&E, BLM has not determined the estimated costs to implement this time critical removal action.

VI. EXPECTED CHANGE IN SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

In the event response action is delayed or not taken, hazardous substances may be released, or there is a substantial threat of such release, into the Colorado River.

VII. OUTSTANDING POLICY ISSUES

BLM is coordinating this time critical removal action with work required of PG&E pursuant to the Corrective Action Consent Agreement issued by DTSC. This coordination of BLM CERCLA authorities and State RCRA authorities is intended to facilitate and streamline PG&E's performance of work necessary to protect the Colorado River. BLM must ensure, however, that such work is performed in a manner consistent with CERCLA, the National Contingency Plan (42 U.S.C. Part 300), and other applicable Federal requirements. In the event that Federal requirements are not satisfied through this coordination effort, BLM may be required to initiate, or require PG&E to perform, activities independent of State law.

VIII. ENFORCEMENT

BLM and DOI have determined that PG&E is a responsible party pursuant to Section 107 of CERCLA, 42 U.S.C. § 9607. As defined by CERCLA, PG&E is the owner and operator of the PG&E facility from which hexavalent chromium has been released into the environment. Hexavalent chromium is a hazardous substance under CERCLA.

By letter dated February 12, 2004, DOI has notified PG&E of its potential liability under CERCLA and has requested that PG&E enter into an administrative order on consent ("AOC") by which PG&E would agree to reimburse DOI, BLM, and other DOI bureaus for response costs incurred in overseeing PG&E's performance of response action on Federal property. In the event that DOI is unable to reach an agreement with PG&E over the terms of this AOC, DOI may decide to take response action unilaterally, may initiate enforcement action or take any other measures necessary to direct or require PG&E to perform response action, and seek to recover all response costs incurred from PG&E.

IX. RECOMMENDATION

This decision document identifies the current proposed time critical removal action to prevent or abate releases of hexavalent chromium from the PG&E facility from migrating to the Colorado River. BLM has determined that PG&E is capable of performing this removal action in a manner consistent with the NCP, contingent on PG&E's full compliance with the requirements of this Action Memorandum including Attachment 1. Conditions at the site meet the criteria for undertaking the proposed time critical removal action, as specified by Section 300.415 (b)(2) of the NCP, 40 CFR § 300.415(b)(2). We recommend your approval of the proposed time critical removal action.

Carl Rountree

Approval

5/3/04

Date

Disapproval

Date

Attachment:

Interim Measures Workplan No. 2

United States Department of the Interior

BUREAU OF LA
Lake Hava
2610 Swee
Lake Havasu Ci

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To Terri Hasson	From Yvonne Meeks
Co. CH2M	Co. PG+E
Dept.	Phone # 805-546-5243
Fax # 510-622-9077	Fax #

In reply refer to:
CAAZCA 43660 (070)

March 15, 2004

Yvonne Meeks
Site Remediation Project Manager
Pacific Gas and Electric Company
4325 South Higuera Street
San Luis Obispo, CA 93401

Dear Ms. Meeks:

On March 12, 2004, we received your request for approval to install extraction and monitoring wells on Bureau of Land Management property as part of the Interim Measures No. 1 program for management of chromium at the Topock Compressor Station. You also requested that approval be granted by March 26, 2004.

We have reviewed the proposed well locations that were depicted on the enclosed map. In accordance with Action Memorandum, dated March 3, 2004, 1 hereby authorize installation of four of the wells (MW- 35, MW36, MW 39and MW-28D). These wells are proposed for installation as monitoring wells on the sand duneseast of the MW20 Bench. Enclosed are stipulations for all four well locations. This office conducted the necessary cultural and T&E surveys on Wednesday, March 24, 2004, with Ray Romero the biologist from CH2MHILL.

This letter does not authorize activities included in Interim Measures No. 1, other than the above-mentioned wells. Feel free to contact me at (928) 505-1264 if you have questions or other concerns relating to this letter.

Sincerely,

Donald Ellsworth
Field Manager

Enclosure

Cc: Consultative Workgroup (CWG) members

Stipulations for monitoring wells MW-28D,35,36,39

Stipulations for monitoring wells MW-28D,35,36,39 located along the bench and in the dunes adjacent to the river:

1. Native vegetation such as creosote bush (*Larrea tridentata*), arrowweed (*Pluchea sericea*), and honey mesquite (*Prosopis glandulosa*) should be avoided to the extent possible.

2. Prior to destroying any vegetation during the months of March through August, that vegetation must be inspected for the presence of nesting birds. This inspection should be carried out by a biologist from the Bureau of Land Management or CH2MHILL.

3. All trash and debris should be collected and disposed of in covered waste containers.

4. All vehicles stationary for a period longer than 15 minutes should be inspected underneath for wildlife. Any wildlife found should be moved out of harms way prior to moving those vehicles.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Lake Havasu Field Office
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406-9071

In reply refer to:
CAAZCA 43660 (070)

March 15, 2004

Yvonne Meeks
Site Remediation Project Manager
Pacific Gas and Electric Company
4325 South Higuera Street
San Luis Obispo, CA 93401

Dear Ms. Meeks:

On March 12, 2004, we received your request for approval to install extraction and monitoring wells on Bureau of Land Management property as part of the Interim Measures No. 1 program for management of chromium at the Topock Compressor Station. You also requested that approval be granted by March 15, 2004.

We have reviewed the proposed well locations that were depicted on the enclosed map. In accordance with Action Memorandum, dated March 3, 2004, I hereby authorize installation of two of the wells (MW-31D and TW-2). These wells are proposed for installation on a bench near existing wells. We will need more time to review the remainder of your proposal. Staff from this office has tentatively scheduled a field trip to the site on Thursday, March 18, 2004, to conduct the necessary reconnaissance of areas of land that would be disturbed by future well construction. We will contact you with an update after we have conducted the field investigations. In the meantime, it would be helpful if we had more information to help us with our analysis. Please provide us with estimated areas for disturbance, the types of vehicles that will be accessing the areas for well installation, and the location of any roads that will be constructed. Your request also includes installation of MW-40, which we are unable to locate on the map.

This letter does not authorize activities included in Interim Measures No. 1, other than the above-mentioned wells. Feel free to contact me at (928) 505-1264 if you have questions or other concerns relating to this letter.

Sincerely,

Donald Ellsworth
Field Manager

Enclosure

Cc: Consultative Workgroup (CWG) members

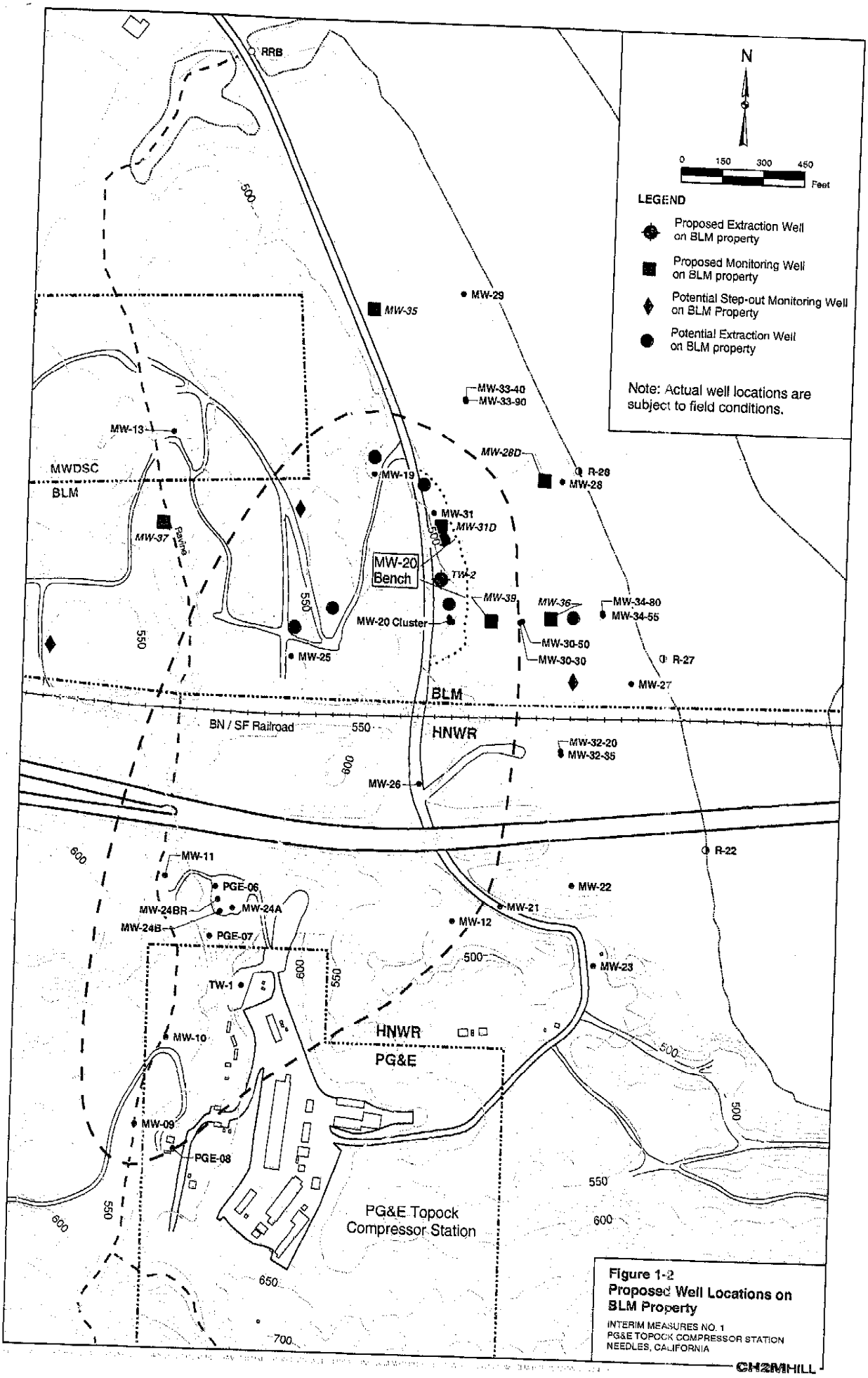

Figure 1-2
Proposed Well Locations on BLM Property
INTERIM MEASURES NO. 1
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

BLM Fax Cover Sheet

Bureau of Land Management
Lake Havasu Field Office
2610 Sweetwater Avenue · Lake Havasu City, Arizona 86406
Phone (928) 505-1200 · *Fax* (928) 505-1208
Toll Free 1-888-213-2582 · *Website:* lakehavasu.az.blm.gov

Number of Pages 3
(Including this cover sheet)

Date 8 April 2004

Deliver To Ray Romero

Office SCO

Phone (661) 948-9311 Fax (714) 424-2085

Sender Mark D. Howell Phone (928) 505-1226

Notes/Comments:

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Lake Havasu Field Office
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406-9071

In reply refer to:
CAAZCA 43660 (070)

April 8, 2004

Yvonne Meeks
Site Remediation Project Manager
Pacific Gas and Electric Company
4325 South Higuera Street
San Luis Obispo, CA 93401

Dear Ms. Meeks:

On March 15, 2004, we received your request for approval to install extraction and monitoring wells on Bureau of Land Management property as part of the Interim Measures No. 1 program for management of chromium at the Topock Compressor Station.

In accordance with the Action Memorandum, dated March 3, 2004, I hereby authorize installation of one well (MW- 37), for monitoring and extraction, contingent upon implementation of the attached stipulations. This well is proposed for installation in Bat Cave Wash. After informal consultation was initiated with U.S. Fish and Wildlife Service, BLM Wildlife Biologist Mark Howell determined that the action would result in a **No Effect** on any Endangered Species. Mr. Howell also consulted with Raymond D. Romero, Senior Wildlife Biologist for CH2MHILL, and agreed that the attached stipulations would be sufficient measures to mitigate any effects from the installation of well MW-37.

This letter does not authorize activities included in Interim Measures No. 1, other than the above-mentioned well. Feel free to contact me at (928) 505-1264 if you have questions or other concerns relating to this letter.

Sincerely,

Michael Wilson for

Donald Ellsworth
Field Manager

Enclosure

Cc: Consultative Workgroup (CWG) members

Stipulations for monitoring well MW-37

1. The applicant shall report all State protected species destroyed or damaged to the Lake Havasu Field Office (LHFO) Wildlife Biologist.
2. All maintenance crew personnel are to report any sightings of desert tortoise (*Gopherus agassizii*), desert bighorn sheep (*Ovis canadensis*), other wildlife species and Federally listed migratory birds such as bald eagle (*Haliaeetus leucocephalus),* brown pelican (*Pelecanus occidentalis*), etc., to the LHFO Wildlife Biologist.
3. Care shall be taken not to disturb or destroy desert tortoise or their burrows. A handling, collecting, damaging, or destroying desert tortoise is prohibited by the Endangered Species Act. Any sightings of desert tortoise should be immediately reported to the LHFO Wildlife Biologist within 48 hours, including location, approximate size, and date of observations. Desert tortoises will not be handled and/or disturbed except by a U.S. Fish and Wildlife Service certified handler.
4. All activity must cease immediately if a desert tortoise is found. The LHFO Wildlife Biologist should be contacted at (928) 505-1200, in the event that a tortoise is encountered.
5. All personnel working within the project area should have desert tortoise training with the LHFO Wildlife Biologist, or a training class given by PG&E and approved by the LHFO Wildlife Biologist or Raymond D. Romero, CH2MHILL Senior Wildlife Biologist.
6. A LHFO authorized Wildlife Biologist (such as Raymond D. Romero) will be onsite to escort, pre-survey, and monitor all work activities at MW-37.
7. All trash and debris should be collected and disposed of in covered waste containers.
8. All vehicles stationary for a period longer than 15 minutes should be inspected underneath for wildlife. Any wildlife found, other than desert tortoise (tortoise should be handled by qualified personnel), should be moved out of harms way prior to moving those vehicles.
9. To the extent possible, native vegetation (especially cacti, palo verde (*Cercidium sp.*), mesquite (*Prosopis sp.*), and acacia (*Acacia sp.*) will be avoided.
10. The immediate vicinity of the project area will be surveyed for nesting birds prior to initiation of the project.
11. Tarps will be laid out to prevent any equipment leaks (i.e., oil, hydraulic fluid, etc.) from coming into contact with the ground surface in Bat Cave Wash.
12. Only the drill rig and support equipment will be allowed within Bat Cave Wash.
13. Other than the drill activities taking place within the wash, vehicles will remain on existing roads.
14. Additionally, PG&E and CH2MHILL will adopt the terms and conditions contained in the U.S. Fish and Wildlife Issued Biological Opinion for Maintenance Activities on the Pacific Gas and Electric Company Gas Pipeline System in the California Desert (6840, CA-063.50) (1-8-99-F-71).

Appendix A4:
IM No. 1 Phase 2 Work Plan

Pacific Gas and Electric Company®

Yvonne J. Meeks
Site Remediation - Portfolio Manager
Environmental Affairs

6588 Ontario Road
San Luis Obispo, CA 93405
Mailing Address
4325 South Higuera Street
San Luis Obispo, CA 93401

805.546.5243
Internal: 664.5243
Fax: 805.546.5232
Internet: YJM1@pge.com

January 31, 2005

Mr. Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

Subject: Final Phase 2 Monitoring Well Installation Work Plan
Pacific Gas and Electric Company, Topock Project

Dear Mr. Shopay:

This letter transmits the final *Phase 2 Monitoring Well Installation Work Plan* for the additional drilling and well installation planned for plume delineation at the Pacific Gas and Electric Company (PG&E) Topock site. The enclosed revised work plan incorporates comments on the draft work plan provided by DTSC on January 24, 2005.

Well drilling activities were initiated on January 26, 2005, in accordance with DTSC's approval to proceed concurrent with the preparation of the final work plan. A separate technical memorandum addressing the installation of temperature monitoring probes in the well boreholes, and field team instructions addressing the collection of anaerobic core samples, will be submitted by February 1, 2005. A separate work plan addressing the filtration comparison study will be submitted by February 4, 2005.

If you have any questions, please do not hesitate to contact me. I can be reached at (805) 546-5243.

Sincerely,

Teri Hixson
for Yvonne Meeks

cc: CWG Members

Phase 2 Monitoring Well Installation Work Plan PG&E Topock Compressor Station Needles, California

January 31, 2005

Prepared for

California Department of Toxic Substances Control

on behalf of

Pacific Gas and Electric Company

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, CA 94612

Phase 2 Monitoring Well Installation Work Plan
PG&E Topock Compressor Station
Needles, California

Prepared for
California Department of Toxic Substances Control

on behalf of
Pacific Gas and Electric Company

January 31, 2005

This work plan was prepared under supervision of a

California Certified Engineering Geologist,

Paul Bertucci, C.E.G.
Project Hydrogeologist

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Acronyms and Abbreviations

µg/L	micrograms per liter
bgs	below ground surface
BLM	U.S. Bureau of Land Management
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
DTSC	California Department of Toxic Substances Control
HNWR	Havasu National Wildlife Refuge
IDW	investigation-derived waste
IM	Interim Measure
PG&E	Pacific Gas and Electric Company
PVC	polyvinyl chloride
USGS	U.S. Geological Survey

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station in Needles, California, under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). PG&E's Draft Interim Measures Work Plan, dated February 2004, (CH2M HILL, 2004a) identified the general locations where new field investigations and groundwater monitoring and test wells were proposed for the Interim Measures program. The activities described in PG&E's Draft Interim Measures Work Plan are collectively referred to as Interim Measure (IM) No. 1. In a letter dated February 9, 2004, DTSC directed PG&E to implement IM No. 2 to begin pumping, transport, and disposal of groundwater. As part of IM No. 2, PG&E is required to conduct additional hydrogeologic investigations for further plume delineation and to support remediation activities.

The rationale, number, and locations for hydrogeologic investigations and wells for IM No. 1 and IM No. 2 were discussed, expanded, and agreed upon during subsequent meetings between representatives from PG&E, regulatory agencies, stakeholders, and consultants. The first phase of investigations involved installation of wells or well clusters at eight locations (MW-28, MW-31, and MW-35 through MW-40). Three of these well clusters were located in or near Bat Cave Wash. The other five were located on or near the Colorado River floodplain. During the planning for Phase 1, additional well locations were identified that might be drilled later, depending on the outcome of Phase 1. These locations were identified as step-out monitoring well locations. After the sampling results from the Phase 1 wells became available, additional data gaps were identified, and the number and locations of Phase 2 wells were modified to address these data gaps.

The Phase 2 drilling program described in this work plan involves the installation of monitoring wells or monitoring well clusters at five locations on the western floodplain of the Colorado River near the PG&E Topock Compressor Station. Locations for additional step-out monitoring wells, and a well identified as a contingency, are also presented in this work plan. Finally, this work plan identifies the locations of three potential extraction wells that could be installed if additional extraction capacity is needed. The decision to install these additional extraction wells will be based on the outcome of Phase 2 monitoring well installations and initial groundwater sampling efforts. If the groundwater chromium plume is found to extend beyond the hydraulic capture zone of extraction well TW-2, the installation and operation of the additional extraction wells will be evaluated to fully maintain hydraulic control. A work plan supplement would be submitted if it is determined that one or more of the additional extraction wells or the contingency-delineation monitoring wells are needed.

1.1 Project Background

The Topock Compressor Station is located in San Bernardino County, approximately 15 miles to the southeast of Needles, California (Figure 1; figures are located at the end of this work plan). In February 1996, PG&E and DTSC entered into a Corrective Action

Consent Agreement pursuant to Section 25187 of the California Health and Safety Code. Under the terms of that agreement, PG&E was directed to conduct a Resource Conservation and Recovery Act Facility Investigation and to implement corrective measures to address constituents of concern released in the Bat Cave Wash Area near the PG&E Topock Compressor Station. DTSC determined that immediate action was required and, recognizing the time-critical nature of its directive, prepared a California Environmental Quality Act Notice of Exemption on February 10, 2004. The primary constituents of concern at Topock are hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]. The source was Cr(VI) salts historically used as a corrosion inhibitor in the station's cooling towers. DTSC is the lead administering agency for the project.

Assisting DTSC and PG&E with the planning and review of interim remedial measures are the members of the Topock Consultative Work Group, which was constituted under California's Site Designation Process. The Consultative Work Group consists of representatives from DTSC; the California Regional Water Quality Control Board, Colorado River Basin Region; the Metropolitan Water District of Southern California; the various federal agencies who own or manage adjacent property; and other project stakeholders.

As directed by the DTSC under IM No. 2, PG&E is currently pumping groundwater from one deep extraction well (TW-2D), located on a bench along the station access road and above the Colorado River floodplain. The bench, referred to as the monitoring well MW-20 bench, is owned by the U.S. Bureau of Reclamation and is managed by the U.S. Bureau of Land Management (BLM). PG&E began pumping from this location in March 2004, and is currently pumping at a rate of approximately 70 gallons per minute. The parcels on which these monitoring wells are slated to be installed are maintained by either BLM, located to the north, or the Havasu National Wildlife Refuge (HNWR), located to the south. Monitoring well installations described in this work plan will be completed under IM No. 2.

1.2 Project Objectives

The primary objective of the IM No. 2, Phase 2 drilling program is to provide additional monitoring wells to fill data gaps to further assess the hydrogeology and distribution of chromium in the floodplain area. This will involve the installation of monitoring wells or monitoring well clusters at five locations in the floodplain near the Colorado River. These locations (MW-27, MW-33, MW-34, SO-1, and SO-2) are shown on Figure 2.

Also shown on Figure 2 are the locations of two contingency wells, SO-4 and CW-1. The need for these wells will be determined based on the results from the Phase 2 drilling program and subsequent groundwater sampling. The details of how these wells would be designed and constructed would be provided in a subsequent work plan. The location of SO-4 has not been cleared for drilling because this well is near potential habitat for the Willow Flycatcher. Additional biological surveys would be needed to determine whether a well could be installed at the location of SO-4.

2.0 Phase 2 Drilling Program

2.1 Site Preparation

The proposed access routes shown on Figure 2 were surveyed on December 6, 2004, with representatives of BLM and HNWR. It was determined that the necessary clearing of vegetation to allow access for drilling equipment can be accomplished without damage to sensitive plant species. Prior to clearing vegetation or moving equipment onto BLM or HNWR land, additional surveys will be conducted to ensure that no nesting birds will be displaced by the drilling activities. All activities associated with the clearing and well drilling activities will be coordinated with BLM and HNWR to ensure the protection of cultural and biological resources. On December 22, 2004, PG&E submitted formal requests to BLM and HNWR for the proposed Phase 2 drilling sites and access routes shown on Figure 2 (PG&E, 2004a and 2004b). BLM approved the construction of wells at these sites on December 29 (BLM, 2004). Approval by HNWR for well location SO-2 and the associated access routes is anticipated prior to February 15, 2005.

Site preparation shall take place prior to execution of drilling and monitoring well installation tasks. Site preparation shall include identifying and avoiding biologically and/or culturally sensitive areas and site hazards, to the extent possible. The drill rig shall be cleaned before mobilization to each site and following completion of drilling at each site if visible grease, oil, or other contamination is evident on the equipment. After the drill rig has mobilized into place, short-term staging areas will be established. Visqueen will be laid on the ground surface in the staging areas to keep the drilling materials and equipment clean and to minimize impacts to the ground surface from the drilling materials and equipment. Materials to be stored at the well site include drilling equipment and well construction materials (e.g., casing, sand, bentonite, and grout).

2.2 Drilling Requirements

Drilling and well installations shall conform to state and local regulations. CH2M HILL will obtain all permits, applications, and other documents required by state and local authorities. Utility clearances will also be obtained prior to commencement of drilling. Boreholes will be 6 to 8 inches in diameter and straight enough to allow an installed monitoring well to be plumb in the soil boring, to allow passage of pumps or sampling devices down the well and to ensure sufficient thickness of annular materials outside the monitoring well casing.

Potable water may be added during drilling to assist with lifting cuttings from the well when advancing casing. The driller will keep the amount of water added to a minimum. The field geologist will record the volume of water added and ensure that this water volume, at a minimum, is removed from the well during development.

2.2.1 Rotosonic Method

Drilling will be accomplished using the rotosonic drilling technique, which involves advancing a rotating and vibrating drill head or core barrel through the subsurface. This method produces a continuous core from the land surface to target drilling depths (ranging from 40 to 150 feet below ground surface [bgs]), generates minimal drilling wastes, and typically can drill through gravel, cobble, and competent bedrock formations. The continuous core obtained from sonic drilling will facilitate the core logging, sampling, and core preservation requirements for the Interim Measures drilling program (CH2M HILL, 2004b).

2.2.2 All-terrain Rig with Rotosonic Method

The monitoring wells planned for the floodplain area will require use of track-mounted or balloon-tire all-terrain drilling equipment. A track-mounted sonic drilling rig of the same type that was used to construct the previous floodplain monitoring wells is already onsite for another activity; this rig will be used to drill the floodplain wells, as feasible.

To support the all-terrain drilling rig, a tracked or balloon-tired forklift and one or more all-terrain vehicles will be used to transport crew, equipment, and materials from staging areas near the roadways to the drill site on the floodplain. The forklift will also be used to transport cuttings and excess core generated from drilling the soil borings to lined, steel roll-off soil bins that will be temporarily staged on the MW-20 bench, on PG&E property, or, with permission of the property owners, in other suitable locations on BLM or HNWR property. Disposal procedures for the investigation-derived waste (IDW) are discussed in Section 3.0.

2.2.3 Core Logging and Preservation

Lithologic descriptions will be logged under the supervision of a California Registered Geologist at each soil boring based on visual inspection of the retrieved core. The field log will document the following information at each soil boring:

- Unique soil boring or well identification
- Purpose of the soil boring (e.g., monitoring well)
- Location in relation to an easily identifiable landmark
- Names of the drilling subcontractor and logger
- Start and finish dates and times
- Drilling method
- If applicable, types of drilling fluids and depths at which they were used
- Diameters of surface casing, casing type, and methods of installation
- Depth at which saturated conditions were first encountered
- Lithologic descriptions (based on the Unified Soil Classification System)
- Sampling-interval depths
- Zones of caving or heaving
- Depth at which drilling fluid was lost and the volume lost
- Changes in drilling fluid properties
- Drilling rate
- Drilling rig reactions, such as chatter, rod drops, and bouncing

As recommended by the Topock Consultative Work Group technical committee, a subset of core material from the saturated Alluvial Aquifer and Miocene conglomerate unit will be preserved in the field. At each of the deep boring locations, selected core samples will be collected at approximately 10-foot intervals within the saturated zone, sealed in aluminized Mylar sleeves, and archived for potential future testing or analysis. Core samples for preservation will be selected based on lithology, with zones that are different from the norm being targeted. Any obvious gray- or black-colored reducing zones will be sampled along with any obviously aerobic zones. This might result in some additional samples to those collected on 10-foot intervals. One core sample will also be preserved from the unsaturated zone at each well site in the densely vegetated areas (MW-34D, MW-27D, and SO-2). These samples might be useful in understanding the geochemistry of the root zone.

At the request of the U.S. Geological Survey (USGS), if wood fragments are encountered during drilling activities, the following protocol shall be followed for the handling and collection of wood samples:

1. If wood is found in core and/or drilling cuttings, transfer the material to a film canister using tweezers and/or spoons. This will avoid possible carbon contamination from organics present in the oil found on bare hands.
2. Label the sample and note the sampling location. Include a lithologic description of the deposits from which the sample was retrieved and describe any potential problems encountered while transferring the sample that may bias the analytical results.
3. As soon as possible, dry the sample in an oven at about 104 degrees Fahrenheit (40 degrees Celsius) for 24 hours. This will help prevent algae growth that could bias the analytical results.
4. Wrap the dried samples in aluminum foil, then insert the foil into a labeled resealable plastic bag. Store the resealable plastic bag and its contents in a cool, dry place until the samples can be transferred to the USGS for carbon-14 age dating.

The carbon-14 dating results will be used by the USGS in their studies of the geologic history of the lower Colorado River Basin. PG&E is collecting the samples at the request of the USGS, but is not responsible for analysis, reporting, or interpretation of sample results.

2.2.4 Groundwater Grab Sampling During Drilling

Groundwater grab samples will be collected during drilling of the deepest monitoring well at each of the five locations. The sampling interval for these grab samples will be approximately every 20 feet through the saturated zone. Grab samples will be obtained from an open section of borehole below the drive casing either by bailing or by pumping using a special sampling pump designed by the drilling contractor, ProSonic. The sampling pump incorporates a packer which is inflated in the bottom of the temporary casing to isolate the open hole below the casing. Attached below the packer is a submersible pump enclosed in a short section of well screen. By using a packer to hydraulically isolate the sampling interval from the water standing in the temporary casing above, the purge volumes can be minimized and representative samples can be obtained from a discrete section of the borehole.

Purging will involve pumping one to three casing volumes from the well and monitoring the field parameters (temperature, pH, electrical conductivity, and oxidation-reduction potential). After the field parameters have stabilized and at least one casing volume has been removed, groundwater samples will be collected for Cr(VI) analysis. Because these samples are considered screening level data, the Cr(VI) analyses will be conducted at the field laboratory currently set up at the batch treatment plant. A sufficient quantity of sample will be collected and filtered in the field so that confirmation samples can be sent to a certified laboratory if Cr(VI) is detected in any of the grab samples. The confirmation samples would be run for Cr(T) because they would not be analyzed within the 24 hour holding time for Cr(VI) analyses. All groundwater grab samples will be filtered in the field prior to preservation and analysis.

2.3 Monitoring Well Requirements

Monitoring wells will be installed and developed sequentially. Table 1 lists the target depths of each planned soil boring/monitoring well. The final well constructions will be based on conditions encountered in the field and might deviate from details listed in Table 1. Paired monitoring wells (shallow [S], middle [M], and deep [D] completions) are planned at three locations (MW-27, SO-1, and SO-2). At two locations (MW-33D and MW-34D), single-completion monitoring wells will be installed in the vicinity of existing monitoring wells MW-33-40, MW-33-90, MW-34-55, and MW-34-80 to monitor water conditions at the base of the Alluvial Aquifer at these locations.

Pending the results of core analyses and post-construction groundwater sampling, the IM No. 2, Phase 2 drilling program includes a contingency for installing additional monitoring wells near MW-29 and in lower Bat Cave Wash (Figure 2). The need and specifications for contingency wells will be evaluated as part of the step-out drilling program.

TABLE 1
Planned Drilling Locations and Target Depths – Phase 2 Hydrogeologic Investigations
Phase 2 Monitoring Well Installation Work Plan, PG&E Topock Compressor Station, Needles, California

Location/ Property Owner	Drilling Site	Well ID	Well Type	Approximate Well Depth (ft bgs)	Approximate Screened Interval (ft bgs)
Floodplain/BLM	MW-33	MW-33D	Deep Monitoring Well	150	120 to 140
Floodplain/BLM	MW-34	MW-34D	Deep Monitoring Well	110	100 to 110
Floodplain/BLM	SO-1	MW-42S	Monitoring Well Cluster	30	10 to 30
		MW-42M		60	40 to 60
		MW-42D		110	80 to 100
Floodplain/BLM	MW-27	MW-27M	Monitoring Well Pair	60	40 to 60
		MW-27D		110	90 to 100
Floodplain/HNWR	SO-2	MW-43S	Monitoring Well Cluster	20	10 to 20
		MW-43M		50	30 to 40
		MW-43D		90	50 to 60

Notes:
All monitoring wells will be 2-inch Schedule 40 PVC completed within an above-ground casing monument.
All monitoring well screens will be 10 to 20 feet in length, made of 2-inch, slotted Schedule 40 PVC with 0.020-inch openings.
Recovered core will be sealed and preserved at 20-foot depth intervals through the saturated zone.
ft = feet

2.3.1 Casing Requirements

All monitoring wells are anticipated to be less than 150 feet in total depth, with 2-inch Schedule 40 PVC casings and screens. Casing requirements are as follows:

- All casing will be new, unused, and decontaminated.
- Glue will not be used to join casing, and casings will be joined only with compatible threads that will not interfere with the planned use of the well.
- All PVC will conform to ASTM Standard F 480-88A or the National Sanitation Foundation Standard 14 (Plastic Pipe System).
- The casing will be straight and plumb.

2.3.2 Well Screen Requirements

Well screen requirements are as follows:

- All requirements that apply to casing will also apply to well screen, except for strength requirements.
- Screens will be factory slotted.
- Screen slot size will be 0.020 inch.
- The bottom of the screen of the shallow- and middle-depth wells will be capped with a blank end cap (sediment trap) and the cap will be joined to the screen by thread; a 10-foot blank casing sump and end cap will be used on the deep monitoring wells.

2.3.3 Annular Space Requirements

The annular space will be filled with a filter pack, a bentonite seal, or casing grout between the well casing and the borehole wall. In middle- and shallow-depth wells more than 50 feet deep, at least two stainless steel centralizers will be used, one at the bottom and one at the top of the screen. Because centralizers interfere with electric logs, no centralizers will be used in the deep wells where borehole geophysics will be run.

2.3.4 Filter Pack Requirements

The filter pack will consist of No. 3 silica sand (consistent with other monitoring wells completed in the Alluvial Aquifer) and will extend from the bottom of the hole to approximately 2 feet above the top of the well screen. The top of the sand pack will be sounded to verify its depth during placement. Additional filter pack will be placed as required to return the level of the pack to 2 feet above the screen. A minimum 1-foot-thick layer of fine sand will be placed above the No. 3 sand filter pack to minimize the potential for the bentonite slurry (seal) material to invade the filter pack adjacent to the top of the well screen during well construction.

The contractor will record the volume of the filter pack emplaced in the well. With the approval of the field geologist, potable water may be used to emplace the filter pack, as long as no contaminants are introduced to the subsurface.

2.3.5 Bentonite Seal Requirements

The bentonite seal requirements are as follows:

- The bentonite seal will consist of at least 2 feet of bentonite between the filter pack and the casing grout.
- Only 100 percent sodium bentonite will be used.
- Bentonite chips or pellets will be hydrated with potable water if the transition seal is not below the water table; otherwise a bentonite slurry (1 gallon water for 2 pounds bentonite) will be used.

2.3.6 Casing Grout Requirements

The casing grout requirements are as follows:

- The casing grout will extend from the top of the bentonite seal to ground surface.
- The grout will be either a 30 percent solids bentonite grout or a cement mixture in the following proportions:
  - 94 pounds of neat Type I or II Portland or American Petroleum Institute Class A cement
  - Not more than 4 pounds of 100 percent sodium bentonite powder
  - Not more than 6.5 gallons of potable water

- All grout will be pumped into place using a tremmie pipe.
- The expected volume of each ingredient in the grout mixture will be pre-calculated and documentd.
- No accelerator compounds will be used in the grout mixture.

San Bernardino County will be notified at least 2 hours prior to grouting to provide them the opportunity to have a representative onsite during grouting.

2.3.7 Surface Completion Requirements

Surface completions will consist of a steel, locking wellhead monument surface completion. A watertight expanding rubber seal type locking cap will be provided for each well. The wellhead monument (steel stovepipe) completion will be placed over the casing and cap and seated in a 3-foot by 3-foot by 4-inch-thick concrete pad. The ground surface will be freed of grass and scoured to a depth of 2 inches before setting the concrete pad. The diameter of the sleeve or stovepipe will be at least 4 inches greater than the diameter of the casing. The concrete pad will be sloped away from the well sleeve. The identity of the well will be permanently marked on the casing cap and the protective sleeve.

All wells will be secured as soon as possible after drilling by using corrosion-resistant locks. The locks will be keyed for opening with one master key.

2.3.8 Well Development and Geophysical Logging

Following well construction and annular seal placement, the monitoring wells will be developed using a combination of surge block, bailer, and pumping. Development will not begin until at least 48 hours after placement of the grout. During development, temperature, pH, specific conductance, and turbidity will be measured using field instruments. Well development will continue until field parameters stabilize and turbidity is reduced to less than 50 nephelometric turbidity units. The purge water produced during well development will be collected in portable tanks or drums at the drill site and transferred to cuttings bins or storage tanks in the staging area. Disposal procedures for the IDW are discussed in Section 3.0.

A cased-hole geophysical survey (natural gamma ray and induction) will be conducted in the deep monitoring well constructed at each of the Phase 2 well cluster locations (Figure 2). This type of geophysical survey has been run in other monitoring wells at the Topock site for hydrogeologic and water quality characterization.

2.3.9 Well Completion Diagrams

A completion diagram will be prepared for each monitoring well installed. It will include the following information:

- Well identification
- Drilling method
- Installation date(s)

- Elevations of ground surface and the measuring point
- Total boring depth
- Lengths and descriptions of the screen and casing
- Lengths and descriptions of the filter pack, bentonite seal, casing grout, and any back filled material
- Elevation of groundwater surface
- Summary of the material penetrated by the soil boring

2.3.10 Step-out and Contingency Wells

Depending on the results of the Phase 2 field activities, the need for additional (i.e., contingency) monitoring and extraction wells will be evaluated. If construction of the contingency wells is deemed necessary after completion of Phase 2 field activities, then the specifications and associated monitoring protocol will be addressed in a subsequent work plan. Figure 2 depicts proposed locations for the potential step-out well cluster (SO-4), contingency well (CW-1), and potential extraction well (PE-1, PE-2, and PE-3) locations.

2.4 Post-construction Groundwater Sampling

All Phase 2 monitoring wells shall be sampled within approximately 10 days after well development using a temporary adjustable-rate submersible pump. The purge rates and volumes for sampling these small-diameter wells will be selected to obtain representative groundwater samples from the aquifer zone.

Groundwater samples collected from the new monitoring wells will be analyzed for Cr(VI), Cr(T), total dissolved solids, specific conductance, and cations/anions (chloride, sulfate, alkalinity, carbonate/bicarbonate, nitrate, and general minerals). Field water quality parameters (temperature, pH, specific conductance, oxidation-reduction potential, dissolved oxygen, and turbidity) will also be measured and recorded. The analytical data that result from the post-construction groundwater sampling efforts will be incorporated with the analytical data available from sampling efforts at nearby monitoring well clusters to support the water quality evaluations.

Post-construction groundwater sampling activities will follow the procedures, analytical methods, reporting limits, and quality control plan used for the Topock groundwater monitoring program, as described in the *Sampling and Analysis Plan, Groundwater and Surface Water Monitoring*, dated July 2004 (CH2M HILL, 2004c). The Cr(VI) and Cr(T) samples will be filtered in the laboratory before analysis consistent with prior IM field investigations and the groundwater monitoring program. General chemistry and other parameters will be included in subsequent sampling from all newly installed IM monitoring wells as part of the routine groundwater monitoring program.

3.0 Waste Management and Equipment Decontamination

3.1 Waste Management

Several types of waste materials will be generated during the drilling, development, and sampling of the new monitoring wells. IDW materials that will be generated include groundwater, drill cuttings, and incidental trash.

Water generated during drilling and development activity will be collected in drums or portable storage tanks temporarily located at each drilling site and transferred by forklift to storage tanks in a staging area for characterization, treatment, or disposal at a permitted waste disposal facility. Based on available data, it is anticipated that chromium concentrations in groundwater samples collected from planned monitoring wells will be low to nondetect. Therefore, it is not considered necessary to provide secondary containment berms for water storage tanks.

Drill cuttings include the fragments of rock and soil that are removed to create the borehole. The cuttings will be contained in lined roll-off bins at the staging area during the drilling and sampling activities. After sampling and characterization, all cuttings bins will be removed from the staging area for ultimate disposal by PG&E. The cuttings will be screened for chromium. If the cuttings are characterized as a hazardous waste, they will be transported offsite for disposal at a permitted hazardous waste disposal facility. It is estimated that the soil IDW bins temporarily staged at the drill sites will not remain in excess of 45 days.

Incidental trash will be collected at the end of each drilling shift and hauled off the drill site to an appropriate disposal facility.

3.2 Equipment Decontamination

The back of the drilling rig and all downhole drilling tools will be decontaminated prior to starting each new borehole. Decontamination will be accomplished by steam cleaning the core barrel, drill stem, drive casing, and back of the drilling rig. Steam cleaning will be conducted on a decontamination pad so that all rinsate can be contained and collected. Rinsate from the decontamination operation will be transferred to the cuttings bin or purge water tank that contains materials from the borehole last drilled by the rig. The decontamination rinsate will be managed along with the cuttings or purge water.

4.0 Schedule and Reporting

The schedule for the installation of the Phase 2 monitoring wells is provided in Table 2. This work will be conducted during daylight hours.

Following completion of the fieldwork, a summary report will be prepared to document the well installation and the results of sampling and testing of the monitoring wells. The report will include the drilling, well completion, well development, and post-construction groundwater sampling records and results. The investigation report will be submitted approximately 5 weeks after the completion of the fieldwork. The results of drilling, logging, and water quality analyses will also be provided to DTSC and project stakeholders in periodic interim data releases while well installation and testing program are performed.

TABLE 2
Phase 2 Field Schedule
Phase 2 Monitoring Well Installation Work Plan, PG&E Topock Compressor Station, Needles, California

Activity	Duration	Start	Finish
DTSC Review of Draft Work Plan	9 days	1/12/05	1/24/05
Revise Draft Work Plan and Submit Final to DTSC	5 days	1/24/05	1/31/05
Monitoring Well Drilling and Installation (five locations)	6.5 weeks	1/27/05	3/14/05
Phase 2 Fieldwork Summary Report	5 weeks	3/15/05	4/19/05

All wells near sensitive habitat must be installed by March 15, which is the start of the nesting season for one of the endangered species that may be present. This breeding season extends through the summer and possibly into the early fall. Thus, if any well near sensitive habitat cannot be completed by March 15, it is likely that the drilling of that well would be delayed until October 2005.

5.0 Required Permits and Approvals Required

Table 3 provides a listing of permits and approvals that have been identified as applicable to the installation of the Phase 2 monitoring wells on the BLM and HNWR land adjacent to the Colorado River, near the PG&E Topock Compressor Station. To expedite the schedule, permits, cultural and natural resource surveys, approvals have been obtained for the planned monitoring wells on BLM land. Approval for wells on HNWR property is still pending. All applicable and necessary permits and approvals will be documented prior to moving drilling equipment to the site.

TABLE 3
Permits, Approvals, and Certifications for Monitoring Wells
Phase 2 Monitoring Well Installation Work Plan, PG&E Topock Compressor Station, Needles, California

Agency	Permits, Approvals, Certifications, etc.
BLM	Action memorandum authorizing IM No. 2 activities on BLM land
DTSC	CEQA Notice of Exemption (emergency project)
State Water Resources Control Board/ Colorado River Basin Regional Water Quality Control Board	Notice of Intent and Storm Water Pollution Prevention Plan for construction activities; coverage under statewide general permit
U.S. Fish & Wildlife Service	Informal Consultation
California Department of Fish and Game	CDFG 1600 (emergency exemption)
State Historic Preservation Office	Section 106 Consultation
San Bernardino County	Well permits

6.0 References

CH2M HILL. 2004a. *Draft Interim Measures Workplan, Topock Compressor Station.* February 3.

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_____. 2004c. *Sampling and Analysis Plan, Groundwater and Surface Water Monitoring, PG&E Topock Compressor Station, Needles, California.* July 14.

Pacific Gas and Electric Company (PG&E). 2004a. Letter to BLM. "Request for BLM Approval, Well Installation and Construction Activities on BLM-Managed Land." December 22.

_____. 2004b. Letter to Havasu National Wildlife Refuge (HNWR). "Field Activities Summary for Supplemental Interim Measures No. 2, Well Installation on HNWR." December 22.

U.S. Bureau of Land Management (BLM). 2004. Letter to Yvonne Meeks, PG&E, from Patricia Taylor, BLM.

Figures

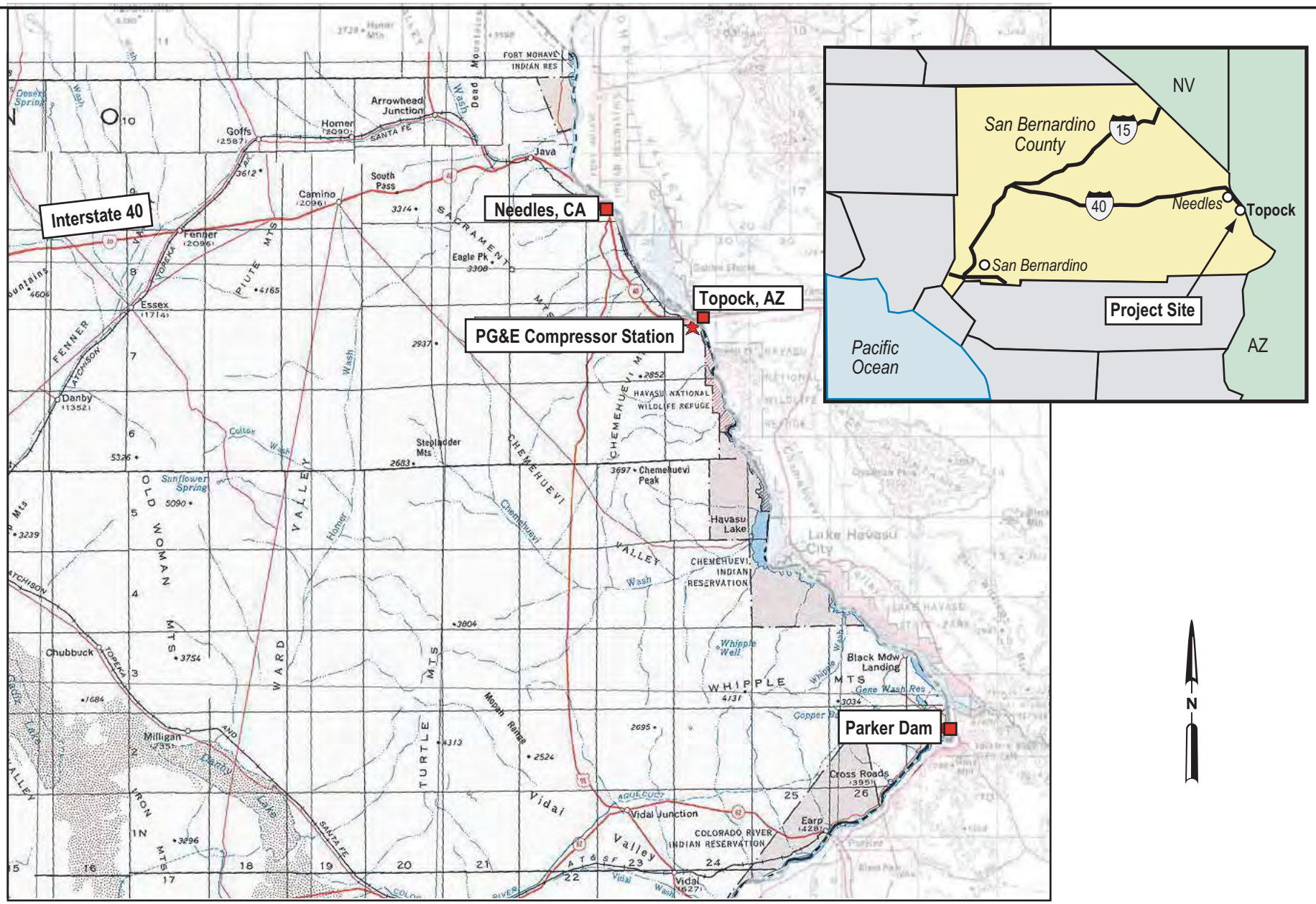

FIGURE 1
SITE LOCATION MAP
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

315994.PS.07.IW_Figure 1 SiteLocMap-Final_12/29/04_ccc

N

0 150 300 450

Feet

LEGEND

- Proposed IM Phase 2 Delineation Monitoring Well
- Potential Contingency Monitoring Well (evaluate after Phase 2)
- Potential Extraction Well
- Proposed Rig Access Route

Approximate limits of hexavalent chromium in groundwater >= 0.05 mg/L (September 2004)

RRB
MW-35-60
MW-35-135
SO-4 (BLM)
MW-29
CW-1
MW-41S
MW-41M
MW-41D
MW-33-40
MW-33-90
MW-33D
MW-13
PG&E
BLM
PE-3
MW-19
MW-28-90
MW-28-25
R-28
MW-31-60
MW-31-135
MW-37S
MW-37D
MW-20 Bench
MW-39
MW-36
MW-34-55
MW-34-80
TW-2S
TW-2D
MW-20 Cluster
MW-34D
MW-30-30
MW-30-50
PE-1
MW-25
R-27
MW-27
SO-1
MW-27 M/D
BLM
HNWR
MW-32-20
MW-32-35
PE-2 (HNWR)
MW-26
SO-2 (HNWR)
MW-40S
MW-40D
R-22
MW-11
MW-22
PGE-06
MW-21
MW-24BR
MW-24A
MW-12
MW-24B
PGE-07
MW-23
MW-38S
MW-38D
TW-1
HNWR
MW-10
PG&E
MW-09
PGE-08
PG&E Topock Compressor Station

Figure 2
Proposed Locations for Phase 2 Groundwater Investigations, January 2005
PHASE 2 MONITORING WELL INSTALLATION WORK PLAN
INTERIM MEASURES FIELD PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Appendix A5:
IM No. 1 Phase 2 BLM Approval and Stipulations

07-001

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Lake Havasu Field Office
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406-9071

In reply refer to:
CAAZCA 43660 (330)

December 29, 2004

Yvonne Meeks
Portfolio Manager – Site Remediation
Pacific Gas & Electric Company
4325 South Higuera Street
San Luis Obispo, CA 93401

Dear Ms. Meeks:

This letter is in response to your request dated December 22, 2004 for the Bureau of Land Management (BLM) review of well installation and construction activities on BLM managed land. Pacific Gas and Electric Company (PG&E) requested the following:

1. Field Activity Summary for Supplemental Interim Measures No. 2, Well Installation on BLM-Managed Land identifies 8 proposed well locations. These wells are included under Action Memorandum No. 2 previously approved by the BLM. BLM has reviewed the Field Activity Summary and approves the drilling of the following 7 monitoring and extraction wells: MW-27, MW-34, MW-33, SO-1, CW-1, PE-1, and PE-3. Contingency monitoring well location SO-4 is located near a riparian area within Bat Cave Wash. Previous surveys by BLM personnel have identified this location as an area of concern because of possible southwestern willow flycatcher habitat. An on-site field inspection was not conducted for SO-4 and BLM will not approve SO-4 in its current location at this time.

2. Design Plan for Groundwater Compliance Monitoring, Supplemental IM-3 Workplan identifies 7 well locations on BLM-managed land and PG&E private property. BLM has reviewed the Design Plan and approves the following 7 proposed compliance monitoring wells: CMW-1, CMW-5, CMW-6 on BLM property and CMW-2, CMW-3, CMW-4 and CMW-7 located on PG&E property.

3. Field Change for Construction of Valve Vault No. 1 and Extraction Well Vaults (MW-20 Bench). PG&E requests installation of a concrete valve box to be located on the MW-20 bench location with three brine tanks to be set where the last three treatment tanks are currently in place. BLM has reviewed this proposal and approves this location. This action is covered under Action Memorandum No. 2 since it is part of the required work to enable the correct functioning of the facility.

The Workplan included proposed well locations on Havasu National Wildlife Refuge (HNWR). BLM does not have jurisdiction on U.S. Fish and Wildlife Service property, and cannot authorize requests on the HNWR.

You must continue to comply with the mitigation measures attached to Action Memorandum No. 3, dated September 17, 2004, which authorized Interim Measures No. 3 Work Plan, Revision 1 and Action Memorandum No 2, dated March 3, 2004. Additional Special Conditions of Approval are enclosed and should be considered a compliance requirement.

If you have questions, contact Project Manager Cathy Wolff-White at (928) 505-1309 or Wildlife Biologist Mark Howell at (928) 505-1226.

Sincerely,

Patricia A. Taylor
Acting Field Manager

Enclosure

SPECIAL CONDITIONS OF APPROVAL

1. All drilling activities will be completed prior to March 15, 2005. Completing drilling activities by this date should minimize impacts to wildlife and any local/transient Threatened or Endangered Species that could potentially occur within the project area.

2. Monitoring Well MW-27M/D is located in dense vegetation and, because of its location, will be a high priority item in the construction schedule. MW-27M/D shall be completed as early as possible to minimize potential impacts to avian species during the breeding season. Vegetation clearing for installation of MW-27M/D will be kept to a minimum and occur to the north of the access route. Only trimming and minor vegetation removal shall occur to allow access by drilling equipment. A biologist knowledgeable with southwestern flora and fauna will conduct a pre-construction survey and will be present during vegetation removal to identify native tree species.

3. All native tree species shall be avoided if possible. In the event that native trees cannot be avoided, those trees will be transplanted to a nearby location approved by the on-site biologist.

4. Disturbance will be kept to a minimum while conducting monitoring studies in the floodplain. If possible, vehicle travel shall be limited and foot travel will be used to access MW-27M/D. No motorized vehicle travel will occur within the dense vegetation along the southern portion of the floodplain for monitoring data gathering. If possible, vehicles shall stay at least 100' from the area of dense vegetation surrounding MW-27M/D.

5. A summary biological report will be submitted within 30 days of completion of Phase 2 Interim Measures No. 2. This report will consist of records for all wildlife sightings by on-site biologists during construction. A list of all vegetation removed and transplanted shall also be provided within the report. Photographs of all well locations prior to and after installation will also be provided for BLM review.

Appendix A6:
IM No. 1 Phase 2 USFWS Action Memo

17 February 2005

To: Steve Smith for Terry Herson, 510-622-9135
From: John Earle, 760-326-3853, fax 760-326-5745
re: Authorization for SO2

Hi Steve,

Terry asked that I fax you this information. I will FedEx a copy once I have the original.

John E.
Havasu National Wildlife Refuge

s1M

United States Department of the Interior

U.S. Fish and Wildlife Service
Havasu National Wildlife Refuge
PO Box 3009
Needles, CA 92363

ACTION MEMORANDUM

To: Regional Director

From: Refuge Manager, Havasu National Wildlife Refuge

Subject: Time Critical Removal Action,
Pacific Gas and Electric Topock Compressor Facility

I. PURPOSE

This Action Memorandum documents the basis for authorizing a time critical removal action to respond to the release of hazardous substances from the Pacific Gas and Electric (PG&E) Compressor Station near Topock, Arizona (hereafter PG&E facility). Hazardous substances released from the PG&E facility have migrated onto or under land managed by the U.S. Fish and Wildlife Service (Service). Specifically, hazardous substances including, without limitation, hexavalent chromium released from the PG&E facility have been detected in groundwater under the Havasu National Wildlife Refuge (Refuge). This plume of contaminated groundwater has been detected in groundwater samples collected within 100 feet of the Colorado River and is or may be migrating toward the Colorado River.

This time critical removal action is authorized pursuant to the response action authority of Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA), 42 U.S.C. §9604. Pursuant to Executive Order 12580, as amended, and Department of the Interior (DOI) Departmental Manual, Section 104, response action authority has been delegated to the Service to address the release or threatened release of hazardous substances on or from land under Service jurisdiction, custody, or control. The purpose of the proposed time critical removal action is to monitor groundwater conditions to determine the extent of contamination and, if necessary, initiate hydrolic control measues needed to reduce further migration of hazardous substances.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The PG&E facility comprises approximately 265 acres located 15 miles southeast of Needles, California, south of Interstate 40, in the north end of the Chemehuevi Mountains. The facility is

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on private land adjacent to the Refuge and BLM-managed land and is less than one mile from the Colorado River.

PG&E has been the owner and operator of the PG&E facility since 1951 and has owned the property on which the facility is located since 1965. Beginning in 1951, PG&E used hexavalent chromium as a corrosion inhibitor and algaecide in the cooling towers at the facility. The cooling tower water was dumped directly into Bat Cave Wash, an ephemeral stream that flows north from the facility, across the Refuge and BLM-managed lands, and directly into the Colorado River. According to PG&E's estimates, from 1951 to 1969, PG&E disposed annually at least six million gallons of chromium-contaminated wastewater. From 1970 until approximately 1989, PG&E also disposed of wastewater in evaporation ponds on the Refuge adjacent to BLM-managed property. In addition to these evaporation ponds, PG&E disposed of wastewater and/or other waste containing hazardous substances in a percolation bed and an unlicensed injection well at or near the facility.

B. Other Actions to Date

In 1988, PG&E completed a soil investigation in the Bat Cave Wash area at the request of the California Department of Health Services (now known as the Department of Toxic Substances Control; DTSC) and the U.S. Environmental Protection Agency (EPA). The soil investigation documented chromium contamination in the environment around the former percolation bed. A 1989 "Comprehensive Ground Water Monitoring Evaluation," prepared by the California Regional Water Quality Control Board (CRWQCB), identified chromium contamination associated with the injection well.

On 29 May 1995, PG&E reported the presence of chromium in groundwater samples taken on the east side of Bat Cave Wash near the north boundary of the PG&E facility. On 26 February 1996, DTSC and PG&E executed a Corrective Action Consent Agreement pursuant to State law under which DTSC directed PG&E to perform a "Facility Investigation" as well as any "Interim Measures" determined to be necessary to address immediate or potential threats to human health and/or the environment.

In the course of implementing groundwater monitoring required under the Corrective Action Consent Agreement, PG&E has documented an extensive plume of groundwater contaminated with hexavalent chromium that stretches from the PG&E facility under the Refuge and BLM-managed property toward the Colorado River. On 3 February 2004, PG&E reported concentrations of hexavalent chromium of 111 parts per billion (ppb) in groundwater taken from monitoring well (MW) 34-80. This monitoring well is located on BLM-managed property approximately 100 feet from the Colorado River. Based on this finding, DTSC ordered PG&E to prepare and submit Interim Measures (IM) Workplan No. 2 "to immediately begin pumping, transport and disposal of groundwater from existing monitoring wells at the MW 20 cluster." These monitoring wells are located on BLM-managed property. To facilitate the coordination of BLM and DTSC authorities for responding to groundwater contamination from the PG&E facility, by Action Memorandum dated 3 March 2004, BLM authorized PG&E to perform the activities described in IM Workplan No. 2. At that time, no request was made for the Service to authorize IM Workplan No. 2-related facilities or activities on the Refuge.

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In June 2004, the Consultative Working Group (the organization comprised of representatives from Federal, tribal, state, and local agencies and tasked with overseeing clean-up) Technical Subcommittee estimated that extraction rates in excess of IM-2 capabilities would be necessary to maintain hydraulic control of the contaminant plume during low river levels typical in winter. IM Workplan No. 3 was developed to address this need. IM Workplan No. 3 called for an on-site or nearby treatment plant with a direct pipeline connection to the MW-20 cluster wells and placed most facilities on BLM-managed or private lands. BLM authorized the IM-3 facilities with an Action Memorandum. IM Workplan No. 3 identified a location for a potential extraction well on the Refuge and associated piping to connect it to the treatment facility. Because PG&E identified this measure as a time critical emergency, on 21 September 2004 the Service authorized the extraction well and piping with a Special Use Permit. Although authorized, no IM-3 facilities or activities have been installed or conducted, respectively.

In December 2004, PG&E requested authorization from the Service to drill a cluster of three monitoring wells at location SO-2, use a "jeep track" and cleared staging area used previously when drilling monitoring wells, construct a new road to the SO-2 site (including removal of native and non-native vegetation), and maintain the new road to allow routine access with an all-terrain vehicle (ATV). The specific activities for which PG&E seeks authorization are described in the attached Technical Memorandum (Attachment 1).

III. THREATS TO PUBLIC HEALTH, OR WELFARE, OR THE ENVIRONMENT

As documented by groundwater sampling results, hexavalent chromium has been detected in significant concentrations in wells within 100 feet of the Colorado River. The Colorado River is an important drinking water source utilized by more than 20 million people. While investigation to date has not confirmed that contaminated groundwater has reached the Colorado River, the proximity of the groundwater plume to the river constitutes an actual or potential threat of contamination of a significant drinking water supply. In addition, the proximity of the groundwater plume to the river constitutes an actual or potential threat to the environment.

IV. ENDANGERMENT DETERMINATION

The action proposed by PG&E is needed to monitor and assess migration of the contaminant plume. This time critical removal action is necessary to mitigate or abate risks associated with release. The Service has determined, in accordance with Section 300.415(b) (2) of the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan or NCP), 42 U.S.C. §300.415(b) (2), that a time critical response is necessary.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

The proposed time critical removal action is described in the attached technical memorandum and includes drilling and routinely sampling a monitoring well cluster at the SO-2 location. If this monitoring well indicates a spread of the contamination, PG&E has prior approval to drill and operate the extraction well and associated piping identified by IM Workplan No. 3. The extraction well will be operated in such fashion as to obtain hydraulic control of the contaminant plume. The extracted water will be piped to a treatment plant located on private land. These

facilities would be operated for a limited period of time. The proposed activities and/or facilities are described in IM Workplans Nos. 2 and 3.

The proposed removal action would be authorized for a period not to exceed two years from the date this Action Memorandum is signed. In the event that the Service determines it is necessary and appropriate to extend the time period for which these activities and facilities are authorized, the Service will notify PG&E and DTSC in writing of such determination.

Because the proposed facilities and activities will be installed and operated by PG&E, the Service has not determined the estimated costs to implement this time critical removal action.

VI. EXPECTED CHANGE IN SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

In the event response action is delayed or not taken, the potential risk of release of hazardous substances into the Colorado River will not be fully monitored, mitigated, or abated.

VII. OUTSTANDING POLICY ISSUES

The Service is coordinating this time critical removal action with work required of PG&E pursuant to the Corrective Action Consent Agreement issued by DTSC. This coordination of Service CERCLA authorities and State Resource Conservation and Recovery Act authorities is intended to facilitate and streamline PG&E's performance of work necessary to protect the Colorado River. The Service must ensure, however, that such work is performed in a manner consistent with CERCLA, the National Contingency Plan (42 U.S.C. Part 300), and other applicable Federal requirements. In the event that Federal requirements are not satisfied through this coordination effort, the Service may be required to initiate, or require PG&E to perform, activities independent of State law.

VIII. ENFORCEMENT

The Service, BLM, and DOI have determined that PG&E is a responsible party pursuant to Section 107 of CERCLA, 42 U.S.C. § 9607. As defined by CERCLA, PG&E is the owner and operator of the PG&E facility from which hexavalent chromium has been released into the environment. Hexavalent chromium is a hazardous substance under CERCLA.

In a 12 February 2004 letter, DOI notified PG&E of its potential liability under CERCLA and has requested that PG&E enter into an administrative order on consent (AOC) by which PG&E would agree to reimburse DOI, the Service, and other DOI bureaus for response costs incurred in overseeing PG&E's performance of response action on Federal property. In the event that DOI is unable to reach an agreement with PG&E over the terms of this AOC, DOI may decide to take response action unilaterally, may initiate enforcement action or take any other measures necessary to direct or require PG&E to perform response action, and seek to recover all response costs incurred from PG&E.

IX. RECOMMENDATION

This decision document authorizes the installation and use of one monitoring well cluster and associated activities on Havasu National Wildlife Refuge. The monitoring well will be sampled routinely to assess the extent of contaminant spread. This action is consistent with DOI policy, and will provide significant environmental and public health benefits by reducing the risk of potential contaminant spread.

The Service has determined that PG&E is capable of performing this action in a manner consistent with the NCP, contingent on PG&E's full compliance with the requirements of this Action Memorandum including Attachment 1 (Technical Memorandum) and Attachment 2 (Special Conditions). I recommend your approval of the proposed facilities and activities.

_____ _____

Approved Date
Refuge Supervisor AZ/NM

_____ _____

Approved Date
Regional Chief NWRS, Southwest Region

_____ _____

Approved Date
Regional Director, Southwest Region

Attachments

ATTACHMENT 2
Time Critical Removal Action, PG&E Topock Facility

HAVASU NATIONAL WILDLIFE REFUGE
SPECIAL CONDITIONS

The authorization to perform the time critical removal action addressed by this Action Memorandum is subject to Pacific Gas and Electric Company's ("PG&E" or "Permittee") agreement to comply with and be bound by the following Special Conditions.

1. All activities on Havasu National Wildlife Refuge (Refuge) are subject to the laws, regulations, and policies of the U.S. Fish and Wildlife Service (Service).

2. Permittee is responsible for ensuring compliance with the substantive requirements of all applicable or relevant and appropriate requirements (ARARs) identified by the Service including, without limitation, ARARs derived from the Clean Water Act, National Historic Preservation Act, Endangered Species Act, and other Federal or more stringent State laws or regulations.

3. This Action Memorandum authorizes activities and facilities for a period not to exceed two years. The authorized activity and related facilities/property must cease and be removed, respectively, within two years unless an extension is issued by the Refuge Manager at least 14 days prior to the expiration of this time.

4. Permittee agrees to indemnify and hold harmless the United States, including the Department of the Interior, the Service, and their agents and employees, from any and all claims or causes of action arising from or on account of acts or omissions of PG&E, its employees, successors, agents, contractors, subcontractors or other persons, in carrying out activities authorized by this Action Memorandum. Permittee further agrees that the United States, and its agencies and employees, shall not be held as a party to any contract entered into by Permittee in carrying out activities under this Action Memorandum.

5. All project activities will be conducted in a manner that avoids a take of any wildlife, particularly threatened and/or endangered (listed) species. Take is defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Should a listed species enter the project site or become harmed or killed by project activities, the project will be shut down and Permittee will consult immediately with the Service and the California Department of Fish and Game (CDFG). Negative effects to wildlife habitat will also be minimized to the maximum possible extent.

6. Wildlife of any kind will not be handled or harassed. Encounters with listed species will be reported to the CH2MHILL project and Refuge biologists. These biologists will

maintain records of all listed species encountered during project activities. This information will include for each individual: the locations (narrative, vegetation type, and maps) and dates of observations, general conditions and health, any apparent injuries and state of healing, and diagnostic markings.

7. To the maximum extent possible, facilities (e.g., pipelines, wells, and access routes) will be sited within an existing right-of-way and previously disturbed or barren areas to limit new surface disturbance.

8. All PG&E employees and contractors involved with the proposed project will be required to attend PG&E's threatened and endangered species education program prior to initiation of activities. New employees will receive formal, approved training prior to working on-site.

9. Trash and food items will be contained in closed containers and removed daily to reduce attractiveness to wildlife or feral animals.

10. Lights will be angled toward the ground, reduced in intensity to levels compatible with safety concerns, and limited in duration of usage. The hue of lighting will be that which is most compatible with and least disturbing to wildlife.

11. Employees will not bring pets to the project site.

12. Firearms will be prohibited from the proposed project site.

13. Employees will be required to check under their equipment or vehicle before it is moved. If a desert tortoise is encountered, the vehicle is not to be moved until the animal has voluntarily moved to a safe distance away from the parked vehicle.

14. Upon completion of well and piping installation, all unused material and equipment will be removed from the site.

15. Upon locating a dead or injured individual of a listed species, PG&E will make initial notification to the Refuge and the Service within three working days. The notification must be made in writing to the Service's Division of Law Enforcement in Torrance (370 Amapola Avenue, Suite 114, Torrance, California 90501; (310) 328-1516) and by telephone and writing to the Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003; (805) 644-1766). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, probable cause of death (if known), and other pertinent information. Animals injured through PG&E activities will be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the CDFG and the Refuge will be contacted for final disposition of the animal.

16. The CH2MHill project biologist will be responsible for assisting PG&E employees and

contractors in compliance with the minimization measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist will be implemented for special-status wildlife species in areas of planned disturbance immediately prior to initiation of ground-disturbing activities. The inspection will provide 100 percent coverage of the area within the project limits. All desert tortoise burrows and pallets outside of, but near, the project footprint will be flagged at that time so that they may be avoided during work activities. At the conclusion of work activities, all flagging will be removed.

17. Preconstruction surveys for avian nesting pairs, nests, and eggs will occur in areas proposed for any vegetation removal and active nesting areas flagged. If nesting birds are detected, vegetation removal will be avoided and Refuge and CH2MHill biologists will be notified.

18. All native vegetation (particularly Palo verde, ocotillo, mesquite, willow species, cottonwood, cat-claw, smoke tree, and cacti species) are considered sensitive by the Refuge. To the maximum extent practicable, Permittee will avoid negative effects to these species.

19. PG&E will designate a field contact representative (FCR) who will be responsible for overseeing compliance with the minimization measures. The FCR must be onsite during all construction activities. The FCR will have authority to halt all activities that are in violation of any Special Conditions. The FCR will have a copy of all special conditions when work is being conducted on the site. The FCR may be a project manager, PG&E representative, or a biologist.

20. The area of disturbance will be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors. As needed, work area boundaries will be delineated with flagging or other marking to minimize surface disturbance associated with vehicle or equipment straying.

21. All activities will be restricted to a pre-determined corridor. If unforeseen circumstances require project expansion, the potential expanded work areas will be surveyed for listed species prior to use of the area. All appropriate minimization measures will be implemented within the expanded work areas based on the judgment of the Refuge biologist. Work outside of the original Refuge-designated area will proceed only after receiving written approval from the Refuge, Service, and CDFG describing the exact location of the expansion.

22. All open holes and trenches will be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum. PG&E has the option of erecting desert tortoise fencing in lieu of inspection of open trenches. During excavation of trenches or holes, earthen ramps will be provided to facilitate the escape of any wildlife species that may inadvertently become entrapped. If a desert tortoises is trapped, the Refuge biologist

will be notified immediately. The desert tortoise will be allowed to escape before work continues in that location. A final inspection of the open trench segment will also be made immediately before back filling. All open pipe segments will be covered when work activity is not occurring at the site. Trenches must meet the safety requirements of the Occupational Safety and Health Administration before personnel enter open trenches to remove wildlife.

23. All construction vehicles and equipment will be periodically checked to ensure proper working condition and to ensure that there is no potential for fugitive emissions of oil, hydraulic fluid or other hazardous products. The Refuge will be informed of any hazardous spills.

24. Workers will exercise caution when traveling to and from the project area. To minimize the likelihood for vehicle strikes of wildlife, the speed limit when traveling unpaved area roads will be 15 miles per hour.

25. Intentional killing or collection of plants, other than authorized by this Action Memorandum is prohibited. Permittee will notify the Refuge of any such occurrences.

26. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E will notify the Refuge within 24 hours. As a part of this emergency response, the Refuge may require specific measures to protect wildlife. During cleanup and repair, the Refuge may also require measures to recover damaged habitats.

27. Once the well facility and all terrain vehicle access route are no longer needed, PG&E will be required, as directed by the Refuge, to restore disturbed areas in a manner that will assist in the re-establishment of biological values (as per Condition 31). Methods of such restoration will include the reduction of erosion, planting with appropriate native tress, and irrigation of reestablished vegetation for three years following planting.

28. Within 60 days of completion of construction activities, the FCR and PG&E biologist will prepare a brief report for the Refuge documenting the effectiveness of the minimization measures and making recommendations for modifying the measures to enhance species protection. The report will also provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.

29. All areas within the proposed action area and within the potential impact of the action will be monitored semiannually by PG&E during the active period for tortoise by a biologist knowledgeable of desert tortoise ecology. These surveys will be completed throughout the duration of the action to verify the presence or absence of desert tortoise and reports will be provided to the biologists at the Refuge office on an annual basis.

30. PG&E will survey riparian areas surrounding the proposed action site for southwestern willow flycatchers according to the protocol established by the Service. These surveys

will be completed each year by a biologist permitted by the Service to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports will be provided to the biologists at the Refuge office on an annual basis.

31. During December 2005, all areas used (including equipment storage/staging areas and access routes; excepting a six-foot wide ATV access route across and from the staging area to the well site) will be revegetated with native trees according to the following (Refuge biologists will be available for consultation on methods, techniques, and tree sources.).

- Fremont's Cottonwood from the mainstem Colorado River trees will be planted.
- Trees will be planted on a three-foot by three-foot spacing.
- Trees will be irrigated for three years following planting, such that after three years they will survive as historical wildlife habitat without irrigation.
- If, after five years, tree survival falls below 80%, the previously planted areas will be revegetated using native honey mesquite in a five-foot by five-foot spacing. Irrigation and survival expectations will be the same as with the cottonwood.

IX. RECOMMENDATION

This decision document authorizes the installation and use of one monitoring well cluster and associated activities on Havasu National Wildlife Refuge. The monitoring well will be sampled routinely to assess the extent of contaminant spread. This action is consistent with DOI policy, and will provide significant environmental and public health benefits by reducing the risk of potential contaminant spread.

The Service has determined that PG&E is capable of performing this action in a manner consistent with the NCP, contingent on PG&E's full compliance with the requirements of this Action Memorandum including Attachment 1 (Technical Memorandum) and Attachment 2 (Special Conditions). I recommend your approval of the proposed facilities and activities.

Jeannie Wagner-Green (Acting) — 2-10-05

Approved — Date

Refuge Supervisor AZ/NM

Approved — 2/10/2005 — Date

Regional Chief NWRS, Southwest Region

Approved — 2/16/2005 — Date

Acting Regional Director, Southwest Region

Attachments

Appendix A7:
IM No. 1 Phase 2 Completion Report

Pacific Gas and Electric Company®

Yvonne J. Meeks
Site Remediation - Portfolio Manager
Environmental Affairs

6588 Ontario Road
San Luis Obispo, CA 93405
Mailing Address
4325 South Higuera Street
San Luis Obispo, CA 93401

805.546.5243
Internal: 664.5243
Fax: 805.546.5232
E-Mail: YJM1@pge.com

April 18, 2005

Mark Howell
U.S. Dept. of the Interior,
Bureau of Land Management
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406

Subject: Biological Resource Monitoring – Completion Report

Dear Mr. Howell:

Enclosed is the *Land Area Subject to Groundwater Well Installation Biological Resource Monitoring – Completion Report* provided in accordance with the BLM and USFWS conditions of approval for recent well installation and drilling activity at the Topock site. The attached specifically provides compliance with BLM Condition No. 5 in the 12/29/05 approval letter for the subject activities, as well as USFWS Condition No. 28 of the Action Memorandum signed 12/16/04. An electronic copy of this report was submitted via email on 4/15/05.

Please contact me at (805) 546-5243 if you have any questions or if you need additional information.

Sincerely,

Tim Herron
for Yvonne Meeks

Enclosure

cc: John Earle – US Fish and Wildlife Service, Department of the Interior
Norman Shopay – Department of Toxic Substances Control

Land Area Subject to Groundwater Well Installation Biological Resource Monitoring – Completion Report Topock Project Site Needles, California

PREPARED FOR: Mark Howell/BLM
John Earle/USFWS

PREPARED BY: Ray Romero/CH2M HILL

DATE: April 14, 2005

Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station near Needles, California under the oversight of the California Department of Toxic Substances Control (DTSC). These efforts include the installation of groundwater monitoring and extraction wells and geologic test borings. Approval to perform these activities on Bureau of Land Management (BLM) and United States Fish and Wildlife Service (USFWS) managed lands was subject to conditions provided in separate Action Memoranda. Installation of a well cluster within the Havasu National Wildlife Refuge (HNWR) was authorized by USFWS Action Memorandum dated 16 February 2005. Authorization for activities on BLM land was provided via Action Memoranda dated 3 March 2004 and 17 September 2005. Subsequent approval letters were provided by BLM on 29 December 2005 and 25 February 2005 specifying allowable activities and attaching additional conditions beyond those noted in the Action Memoranda.

In conformance with the conditions provided in the Action Memoranda and related approval letters, pre-construction surveys and compliance monitoring were conducted of all land use areas subject to the installation of four compliance well clusters, five monitoring well clusters, one extraction well, and two test bores. Additionally, a report documenting land use, affected vegetation, and wildlife observed must be submitted to both BLM and USFWS upon completion of the well installations. The purpose of this memorandum is to fulfill this reporting requirement.

Methods

During design and planning of the wells and test borings, much care was taken to utilize those areas that showed evidence of previous land use wherever possible. A variety of land uses are present in the vicinity. The area is traversed by a major railway line, several major gas pipelines, and historic U.S. Route 66 (currently Park Moabi Road). In addition, available information indicates that portions of the floodplain have been used in the past by the Bureau of Reclamation (BOR) to store material dredged from the adjacent Colorado River.

Under the terms of the BLM approval, construction work was completed by an established deadline to avoid potential impacts to sensitive biological resources. In addition, well installation activities were continuously monitored by a qualified biologist. The biologist was responsible for pre-surveying the sites, documenting pre- and post- land use conditions with a global positioning system (GPS) unit and digital camera, staking and flagging work areas and routes where appropriate to minimize land use and avoid sensitive resources, coordinating and monitoring vegetation removal, documenting wildlife observed, and ensuring compliance with the regulatory stipulations.

To assess land use, a survey using a Trimble Geo XT GPS unit was conducted to delineate the areas subject to groundwater well installation activities. Such areas include construction and staging areas associated with the wells, affected vegetation, and access/egress routes. Data collected during the GPS survey was imported into the geographic information system (GIS) maintained for the PG&E Topock project. Polygons were defined for each well location and plotted on an aerial map. The total (net) area of land use resulting from project related well installations was calculated by subtracting the previous non-project related land use acreage from the project related land use acreage.

Results

The installation of the four compliance well pairs (CW) occurred in the vicinity of the injection well field (Figure 1). A pre-existing access route was used to the CW-1 site. This site was located within a previous land use area between Historic Route 66 (HR 66) and the gas pipeline right-of-way. The CW-2 and CW-3 sites were located on a mesa east of the injection well field where an access roadway was not present. Access to these sites was not provided by constructing a roadway, but rather tire tracks were created from vehicles driving over the ground surface. In one specific location, the approximately four-foot high road bank adjacent to HR 66 was graded to smooth the ground surface and provide a small ramp. The well sites and access route were flagged and staked to minimize land use and avoid sensitive resources. The number of vehicles and equipment accessing these sites were kept to the minimum necessary to accomplish the work. Access into the CW-4 site was through the scoured bed of an unnamed wash. The well site and access route were flagged and staked to minimize land use and avoid sensitive resources. Vehicle access to the CW-4 site was strictly limited to the drill rig and support equipment. Workers and visitors parked their vehicles at the injection well field and walked to CW-4. The tire tracks created as a result of equipment access within the wash were temporary as several rain-fall events have since erased the tracks. Therefore, land used to access CW-4 was not added to the land use calculation because of the mitigating effects of the normal surface runoff within the wash. As a result of the compliance well installations, several creosote bushes were either removed or crushed and several beavertail cactuses were transplanted.

The installation of the five monitoring wells (MW-27, MW-33, MW-34, MW-42, and MW-43), one extraction well (PE-1), and two test bores that were sampled and abandoned at potential extraction well sites (PE-1A and PE-1B) occurred within the Colorado River floodplain (Figure 1). Access to the floodplain was via a pre-existing route located at Park Moabi Road and MW-35. This location also served as the staging area for three roll-off bins for water, drill cuttings, and construction related debris. Work crews utilized light weight

all-terrain vehicles known as John Deere Gators to shuttle personnel and materials between the staging area and well sites. The vehicle tracks created by the drill rig and support equipment were considered temporary due to the actively shifting sand dunes. Therefore, land used to access the floodplain wells, with the exception of MW-27 and MW-43, was not added to the land use calculation. The MW-27 and MW-43 installations required vegetation removal and occurred on more silty and clayey soils that will not as quickly become erased by shifting sand, so those areas are included in the project related land use calculation.

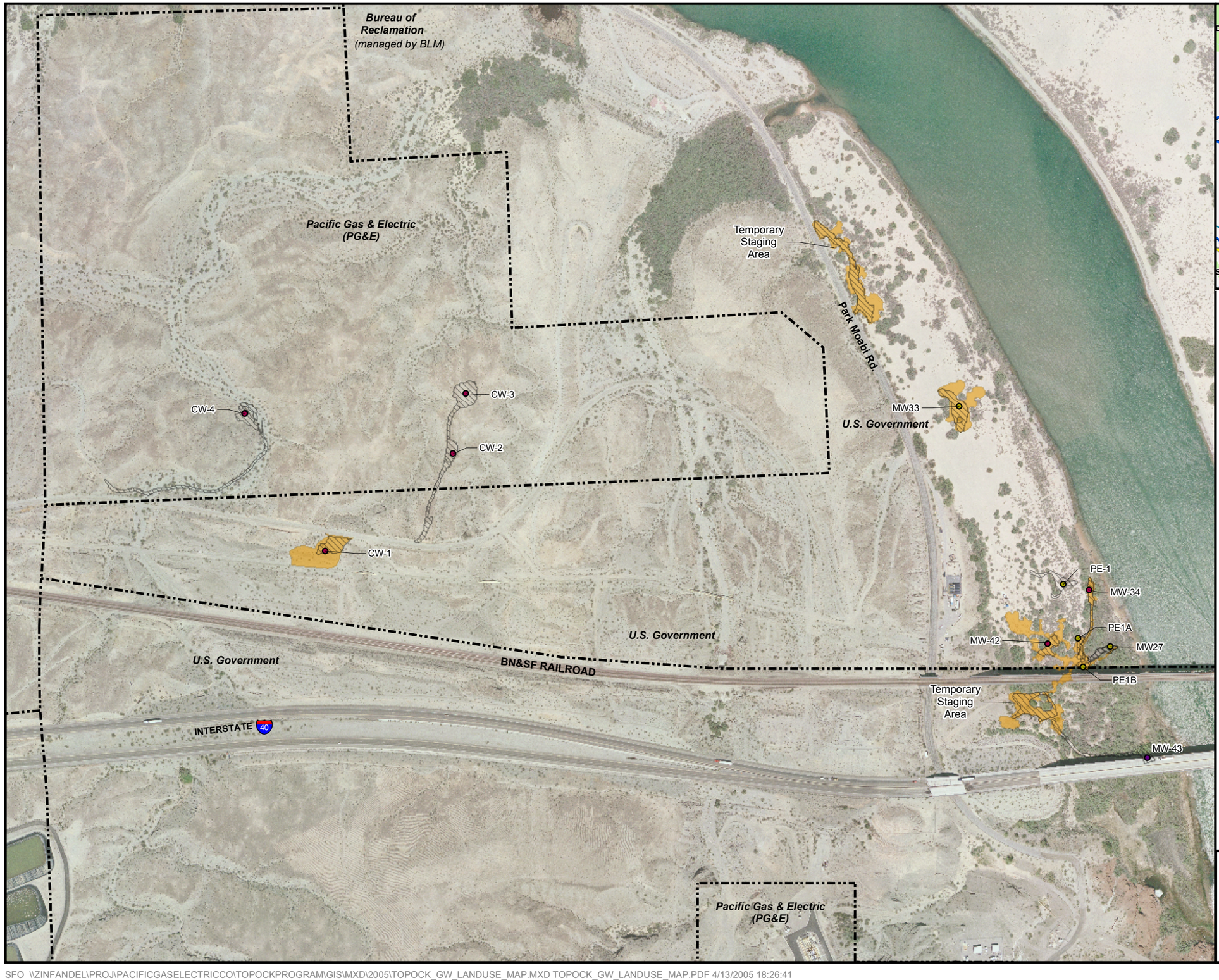
Groundwater wells MW-27, MW-33, MW-34, MW-42, and test bores PE-1A, PE-1B were sited within previous land use areas. With the exception of MW-43 and PE-1, all the newly installed monitoring wells were sited directly adjacent to existing wells. The installation of PE-1 resulted in the crushing of arrow weed (*Pluchea sericea*). As coordinated with the BLM, access to MW-27 was re-routed to avoid native screw bean mesquite (*Prosopis pubescens*) located directly adjacent to the original access route. This action resulted in the removal of exotic salt cedar (*Tamarix chinensis*) and arrow weed. As coordinated with the USFWS, the access route and well site for MW-43 located on the HNWR was cleared of vegetation including salt cedar and arrow weed that was cut, chipped, and hauled offsite by a local landscaper. Access to this well site was from the existing gated dirt road from Park Moabi Road between the I-40 freeway and railroad bridges. A single roll-off bin for MW-43 drill cuttings was staged at the bottom of the access road within a previous land use area.

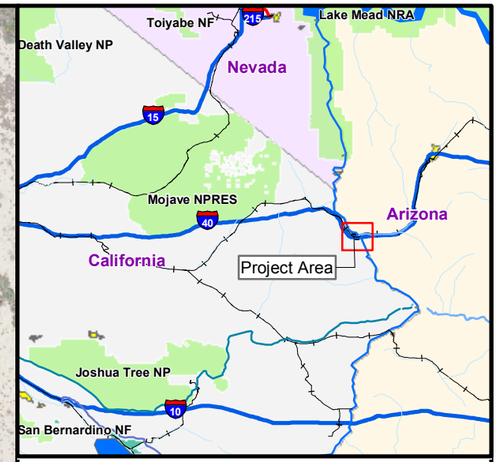
The well coordinates, installation start and end dates, land use acreage, and affected vegetation are presented in Table 1. The total project related land use resulting from installation of the groundwater wells was approximately 2.2 acres. Of these 2.2 acres, approximately 1.2 acres were located within previous land use areas. Therefore, the net project related land use area was approximately 1 acre. Of this 1 acre, approximately 0.4 acre is located on public (BLM and USFWS) land and 0.6 acre is located on private (PG&E) land. The photographs of pre- and post-well site conditions and observed wildlife during the well installations are presented in Appendices A and B, respectively.

Conclusion

The last well (PE-1) installation was completed by 5 March 2005, 10 days before the BLM deadline of 15 March 2005. On 5 March 2005, all drilling equipment and materials were removed from the floodplain and staged at the west mesa for demobilization. The drill rig was loaded and trucked back to Florida. The drill crew attended training from 7 to 11 March 2005 and returned on 14 March 2005 to remove all vehicle tracks from the floodplain. This concluded drilling related activities on the floodplain. The drill crew fully demobilized remaining equipment and materials from the west mesa by 17 March 2005.

The well installation activities occurred in compliance with all regulatory stipulations. In addition to the conditions of the Action Memoranda (Appendix C), additional measures employed upon completion of floodplain well installations included removal of non-project related litter and equipment tracks on the floodplain. As required in the USFWS Action Memorandum, vegetation that was removed for MW-43 will be mitigated by onsite revegetation at a later date.





N

0 200 400 800 Feet

1 inch equals 400 feet

LEGEND

- Property Boundaries
- Land Use* Associated With Well Installation
- Previous Land Use* In Area Of Well Instalation

*The significance of the term "use" means only that some activity has taken place over such land. It does NOT signify that any land has been harmed or that any other adverse effects on the land have occurred as a result of the activity.

Sources: San Bernardino County Assessor, Parcel quest, State Board of Equalization, Pacific Gas and Electric Company, and Plat maps provided by BLM.

TOPOCK GROUNDWATER WELL INSTALLATION LAND USE MAP MARCH 2005

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

TABLE 1. LAND USE ASSOCIATED WITH GROUNDWATER WELL INSTALLATION

Groundwater Well Location		Construction Dates		Public Land		Private Land		Total Public & Private Land	Notes on Vegetation in Area of Well Installation
Groundwater Well	Coordinates	Begin	End	Well Installation Related Land Use (acres)	Total Non-Project Related Land Use[1] (acres)	Total Well Installation Related Land Use (acres)	Total Non-Project Related Land Use[1] (acres)	Total Net Well Installation Related Land Use (acres)	
CW-1	N: 2102702.69 E: 7613260.05	1/4/2005	1/18/2005	0.151	0.458	NA	NA	0	3 creosote bushes removed
CW-2	N:2103107.35 E:7613790.79	1/18/2005	2/8/2005	NA	NA	0.085	0	0.085	
Access Road	-----			NA	NA	0.136	0	0.136	3 beaver tail cactuses transplanted
CW-3	N: 2103353.94 E: 7613855.81	1/19/2005	2/4/2005	NA	NA	0.200	0	0.200	2 creosote bushes removed
Access Road	-----			NA	NA	0.050	0	0.050	2 beaver tail cactuses transplanted
CW-4	N: 2103271.17 E: 7612920.77	1/10/2005	1/18/2005	NA	NA	0.125	0	0.125	
Access Road	------			NA	NA	0	0	0	2 creosote bushes crushed
MW-27	N: 2102293.28 E: 7616536.34	2/9/2005	2/11/2005	0.002	0.002	NA	NA	0	
Access Road	-----			0.073	0	NA	NA	0.073	arrow weed and tamarisk removed
MW-33	N: 2103305.08 E: 7615902.35	2/12/2005	2/24/2005	0.201	0.450	NA	NA	0	
MW-34	N: 2102529.95 E: 7616448.22	1/26/2005	1/30/2005	0.110	0.110	NA	NA	0	
MW-42	N: 2102305.76 E: 7616274.94	1/30/2005	2/2/2005	0.082	0.082	NA	NA	0	
MW-43	N: 2101829.57 E: 7616690.85	2/23/2005	2/25/2005	0.051	0	NA	NA	0.051	salt cedar and arrow weed removed
Access Road	------			0.122	0	NA	NA	0.122	salt cedar removed
PE-1 Extraction Well	N: 2102552.86 E: 7616340.61	3/1/2005	3/5/05	0.126	0	NA	NA	0.126	arrow weed crushed
PE-1A (Bore site)	N: 2102327.73 E: 7616401.20	2/27/2005	2/28/2005	0.033	0.033	NA	NA	0	
PE-1B (Bore site)	N: 2102208.28 E: 7616422.26	2/26/2005	2/27/2005	0.026	0.026	NA	NA	0	
Floodplain Temporary Staging Area	------	1/26/2005	3/17/2005	0.374	0.655	NA	NA	0	
MW-43 Temporary Staging Area	-----	2/23/2005	2/25/20050	0.252	0.293	NA	NA	0	
Total				**1.603**	**2.109**	**0.596**	**0**	**0.968**	

Notes:
1. Non-Project Related Land Use includes those areas within or adjacent to Well Installation Related Land Use, and may comprise a portion of, or be greater than, Well Installation Related Land Use.
NA – Not Applicable
N – Northing
E – Easting

Appendix A

CMW-1 Pre-Construction: Viewing southeast at well site location prior to construction.

CMW-1 Post-Construction: Viewing southeast at well site location after construction.

CMW-2 Pre-Construction: Viewing north at well site location prior to construction.

CMW-2 Post-Construction: Viewing north at well site location after construction.

CMW-3 Pre-Construction: Viewing south at well site location prior to construction.

CMW-3 Post-Construction: Viewing south at well site location after construction.

CMW-4 Pre-Construction: Viewing northwest at well site location prior to construction.

CMW-4 Post-Construction: Viewing northwest at well site location after construction.

MW-27 Pre-Construction: Viewing southwest at well site location prior to construction.

MW-27 Post-Construction: Viewing southwest at well site location after construction.

MW-27 Pre-Construction Access: Viewing east at well site access prior to construction.

MW-27 Post-Construction Access: Viewing east at well site location after construction. Notice new access route cleared on left side of photo in order to avoid impact to native trees.

MW-33 Pre-Construction: Viewing north at well site location prior to construction.

MW-33 Post-Construction: Viewing north at well site location after construction.

MW-34 Pre-Construction: Viewing south at well site location prior to construction.

MW-34 Post-Construction: Viewing south at well site location after construction.

MW-42 Pre-Construction: Viewing north at well site location prior to construction.

MW-42 Post-Construction: Viewing north at well site location after construction.

MW-43 Pre-Construction: Viewing south at well site location prior to construction.

MW-43 Post-Construction: Viewing south at well site location after construction.

MW-43 Pre-Construction Access: Viewing east at well site access route prior to well construction.

MW-43 Post-Construction Access: Viewing east at well site access route after well construction.

PE1 Pre-Construction: Viewing southeast at well site location prior to construction.

PE1 Post-Construction: Viewing southeast at well site location after construction.

PE-1A Pre-Construction: Viewing north at bore site location prior to construction.

PE-1A Post-Construction: Viewing north at bore site location after construction.

PE-1B Pre-Construction: Viewing west at bore site location prior to construction.

PE-1B Post-Construction: Viewing west at bore site location after construction.

Appendix B

Wildlife Observed During Groundwater Well Installation Monitoring	
Common Name	**Scientific Name**
Abert's towhee	*Pipilo aberti*
American coot	*Fulica Americana*
American kestrel	*Falco sparverius*
American white pelican	*Pelecanus erythrorhynchos*
Anna's hummingbird	*Calypte anna*
Bewick's wren	*Thyomanes bewickii*
Black phoebe	*Sayornis nigricans*
Black-tailed gnatcatcher	*Polioptila melanura*
Blue-gray gnatcatcher	*Polioptila caerulea*
Canada goose	*Branta Canadensis*
Clark's grebe	*Aechmophorus clakii*
Coachwhip	*Masticophis flagellum*
Common grackle	*Quiscalus quiscula*
Common raven	*Corvus corax*
Cooper's hawk	*Accipiter cooperii*
Desert cottontail	*Sylvilagus audubonii*
Double-crested cormorant	*Phalacrocorax auritus*
Gambel's quail	*Callipepla gambelii*
Great egret	*Casmerodius albus*
Greater roadrunner	*Geococcyx californianus*
Great-tailed grackle	*Quiscalus mexicanus*
House finch	*Carpodacus erythrinus*
Loggerhead shrike	*Lanius ludovicianus*
Mourning dove	*Falco sparverius*
Northern mockingbird	*Mimus polyglottos*
Northern rough-winged swallow	*Sayornis nigricans*
Phainopepla	*Phainopepla nitens*
Rock dove	*Columba livia*
Sagebrush lizard	*Sceloporus graciosus*
Snowy egret	*Egretta thula*
Turkey vulture	*Cathartes aura*
Verdin	*Auriparus flaviceps*
Violet-green swallow	*Tachycineta thalassina*
Western bluebird	*Sialia mexicana*
Western diamondback rattlesnake	*Crotalus atrox*
Western whiptail	*Cnemidophorus tigris*

Appendix C

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Lake Havasu Field Office
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406-9071

In reply refer to:
CAAZCA 43660 (330)

Yvonne Meeks
Portfolio Manager – Site Remediation
Pacific Gas & Electric Company
4325 South Higuera Street
San Luis Obispo, CA 93401

Dear Ms. Meeks:

This letter is in response to your request dated February 23, 2005 for the Bureau of Land Management (BLM) review of well installation and construction activities on BLM Managed Land. You requested the following:

1. Field Activity Summary for Supplemental Interim Measures No. 2, Well Installation on BLM-Managed Land. These wells are included under Action Memo No. 2 previously approved by the BLM. BLM has reviewed and will approve the drilling of the following monitoring and extraction wells: PE-1, PE-1A and PE-1B. Previous surveys by BLM personnel have identified this location as an area of concern because of possible southwestern willow flycatcher habitat. All drilling must be completed prior to March 15, 2005 because of this concern.

You must continue to comply with the mitigation measures attached to Action Memorandum No. 3, dated September 17, 2004, which authorized Interim Measures No. 3 Work Plan, Revision 1 and Action Memorandum No 2, dated March 3, 2004. Additional special conditions of approval are attached to this letter and should be considered a compliance requirement.

If you have questions, contact Project Manager Cathy Wolff-White at (928) 505-1309 or Archaeologist Sally Murray at (928) 505-1238.

Sincerely,

Robert M. Henderson
Acting Field Manager

SPECIAL CONDITIONS OF APPROVAL

1. All drilling activities will be completed prior to March 15. Completing drilling activities by this date should minimize impacts to wildlife and any local/transient Threatened or Endangered Species that could potentially occur within the project area.

2. Only trimming and minor vegetation removal shall occur to allow access by drilling equipment. A biologist knowledgeable with southwestern flora and fauna will conduct a pre-construction survey and will be present during vegetation removal to identify native tree species.

3. All native tree species shall be avoided if possible. In the event that native trees cannot be avoided, those trees will be transplanted to a nearby location approved by the on-site biologist.

4. Disturbance will be kept to a minimum while conducting monitoring studies in the floodplain.

5. A summary biological report will be submitted within 30 days of completion of Phase 2 Interim Measures No. 2. This report will consist of records for all wildlife sightings by on-site biologists during construction. A list of all vegetation removed and transplanted shall also be provided within the report. Photographs of all well locations prior to and after installation will also be provided for BLM review.

6. Staging for these three wells will be at the MW35 well location, immediately upon completion of the drilling phase all cutting bins will be relocated to the MW20 Bench or onto PG&E properties.

s1M

United States Department of the Interior

U.S. Fish and Wildlife Service
Havasu National Wildlife Refuge
PO Box 3009
Needles, CA 92363

ACTION MEMORANDUM

To: Regional Director

From: Refuge Manager, Havasu National Wildlife Refuge

Subject: Time Critical Removal Action,
Pacific Gas and Electric Topock Compressor Facility

I. PURPOSE

This Action Memorandum documents the basis for authorizing a time critical removal action to respond to the release of hazardous substances from the Pacific Gas and Electric (PG&E) Compressor Station near Topock, Arizona (hereafter PG&E facility). Hazardous substances released from the PG&E facility have migrated onto or under land managed by the U.S. Fish and Wildlife Service (Service). Specifically, hazardous substances including, without limitation, hexavalent chromium released from the PG&E facility have been detected in groundwater under the Havasu National Wildlife Refuge (Refuge). This plume of contaminated groundwater has been detected in groundwater samples collected within 100 feet of the Colorado River and is or may be migrating toward the Colorado River.

This time critical removal action is authorized pursuant to the response action authority of Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA), 42 U.S.C. §9604. Pursuant to Executive Order 12580, as amended, and Department of the Interior (DOI) Departmental Manual, Section 104, response action authority has been delegated to the Service to address the release or threatened release of hazardous substances on or from land under Service jurisdiction, custody, or control. The purpose of the proposed time critical removal action is to monitor groundwater conditions to determine the extent of contamination and, if necessary, initiate hydrolic control measues needed to reduce further migration of hazardous substances.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The PG&E facility comprises approximately 265 acres located 15 miles southeast of Needles, California, south of Interstate 40, in the north end of the Chemehuevi Mountains. The facility is

1M

on private land adjacent to the Refuge and BLM-managed land and is less than one mile from the Colorado River.

PG&E has been the owner and operator of the PG&E facility since 1951 and has owned the property on which the facility is located since 1965. Beginning in 1951, PG&E used hexavalent chromium as a corrosion inhibitor and algaecide in the cooling towers at the facility. The cooling tower water was dumped directly into Bat Cave Wash, an ephemeral stream that flows north from the facility, across the Refuge and BLM-managed lands, and directly into the Colorado River. According to PG&E's estimates, from 1951 to 1969, PG&E disposed annually at least six million gallons of chromium-contaminated wastewater. From 1970 until approximately 1989, PG&E also disposed of wastewater in evaporation ponds on the Refuge adjacent to BLM-managed property. In addition to these evaporation ponds, PG&E disposed of wastewater and/or other waste containing hazardous substances in a percolation bed and an unlicensed injection well at or near the facility.

B. Other Actions to Date

In 1988, PG&E completed a soil investigation in the Bat Cave Wash area at the request of the California Department of Health Services (now known as the Department of Toxic Substances Control; DTSC) and the U.S. Environmental Protection Agency (EPA). The soil investigation documented chromium contamination in the environment around the former percolation bed. A 1989 "Comprehensive Ground Water Monitoring Evaluation," prepared by the California Regional Water Quality Control Board (CRWQCB), identified chromium contamination associated with the injection well.

On 29 May 1995, PG&E reported the presence of chromium in groundwater samples taken on the east side of Bat Cave Wash near the north boundary of the PG&E facility. On 26 February 1996, DTSC and PG&E executed a Corrective Action Consent Agreement pursuant to State law under which DTSC directed PG&E to perform a "Facility Investigation" as well as any "Interim Measures" determined to be necessary to address immediate or potential threats to human health and/or the environment.

In the course of implementing groundwater monitoring required under the Corrective Action Consent Agreement, PG&E has documented an extensive plume of groundwater contaminated with hexavalent chromium that stretches from the PG&E facility under the Refuge and BLM-managed property toward the Colorado River. On 3 February 2004, PG&E reported concentrations of hexavalent chromium of 111 parts per billion (ppb) in groundwater taken from monitoring well (MW) 34-80. This monitoring well is located on BLM-managed property approximately 100 feet from the Colorado River. Based on this finding, DTSC ordered PG&E to prepare and submit Interim Measures (IM) Workplan No. 2 "to immediately begin pumping, transport and disposal of groundwater from existing monitoring wells at the MW 20 cluster." These monitoring wells are located on BLM-managed property. To facilitate the coordination of BLM and DTSC authorities for responding to groundwater contamination from the PG&E facility, by Action Memorandum dated 3 March 2004, BLM authorized PG&E to perform the activities described in IM Workplan No. 2. At that time, no request was made for the Service to authorize IM Workplan No. 2-related facilities or activities on the Refuge.

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In June 2004, the Consultative Working Group (the organization comprised of representatives from Federal, tribal, state, and local agencies and tasked with overseeing clean-up) Technical Subcommittee estimated that extraction rates in excess of IM-2 capabilities would be necessary to maintain hydraulic control of the contaminant plume during low river levels typical in winter. IM Workplan No. 3 was developed to address this need. IM Workplan No. 3 called for an on-site or nearby treatment plant with a direct pipeline connection to the MW-20 cluster wells and placed most facilities on BLM-managed or private lands. BLM authorized the IM-3 facilities with an Action Memorandum. IM Workplan No. 3 identified a location for a potential extraction well on the Refuge and associated piping to connect it to the treatment facility. Because PG&E identified this measure as a time critical emergency, on 21 September 2004 the Service authorized the extraction well and piping with a Special Use Permit. Although authorized, no IM-3 facilities or activities have been installed or conducted, respectively.

In December 2004, PG&E requested authorization from the Service to drill a cluster of three monitoring wells at location SO-2, use a "jeep track" and cleared staging area used previously when drilling monitoring wells, construct a new road to the SO-2 site (including removal of native and non-native vegetation), and maintain the new road to allow routine access with an all-terrain vehicle (ATV). The specific activities for which PG&E seeks authorization are described in the attached Technical Memorandum (Attachment 1).

III. THREATS TO PUBLIC HEALTH, OR WELFARE, OR THE ENVIRONMENT

As documented by groundwater sampling results, hexavalent chromium has been detected in significant concentrations in wells within 100 feet of the Colorado River. The Colorado River is an important drinking water source utilized by more than 20 million people. While investigation to date has not confirmed that contaminated groundwater has reached the Colorado River, the proximity of the groundwater plume to the river constitutes an actual or potential threat of contamination of a significant drinking water supply. In addition, the proximity of the groundwater plume to the river constitutes an actual or potential threat to the environment.

IV. ENDANGERMENT DETERMINATION

The action proposed by PG&E is needed to monitor and assess migration of the contaminant plume. This time critical removal action is necessary to mitigate or abate risks associated with release. The Service has determined, in accordance with Section 300.415(b) (2) of the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan or NCP), 42 U.S.C. §300.415(b) (2), that a time critical response is necessary.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

The proposed time critical removal action is described in the attached technical memorandum and includes drilling and routinely sampling a monitoring well cluster at the SO-2 location. If this monitoring well indicates a spread of the contamination, PG&E has prior approval to drill and operate the extraction well and associated piping identified by IM Workplan No. 3. The extraction well will be operated in such fashion as to obtain hydraulic control of the contaminant plume. The extracted water will be piped to a treatment plant located on private land. These

facilities would be operated for a limited period of time. The proposed activities and/or facilities are described in IM Workplans Nos. 2 and 3.

The proposed removal action would be authorized for a period not to exceed two years from the date this Action Memorandum is signed. In the event that the Service determines it is necessary and appropriate to extend the time period for which these activities and facilities are authorized, the Service will notify PG&E and DTSC in writing of such determination.

Because the proposed facilities and activities will be installed and operated by PG&E, the Service has not determined the estimated costs to implement this time critical removal action.

VI. EXPECTED CHANGE IN SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

In the event response action is delayed or not taken, the potential risk of release of hazardous substances into the Colorado River will not be fully monitored, mitigated, or abated.

VII. OUTSTANDING POLICY ISSUES

The Service is coordinating this time critical removal action with work required of PG&E pursuant to the Corrective Action Consent Agreement issued by DTSC. This coordination of Service CERCLA authorities and State Resource Conservation and Recovery Act authorities is intended to facilitate and streamline PG&E's performance of work necessary to protect the Colorado River. The Service must ensure, however, that such work is performed in a manner consistent with CERCLA, the National Contingency Plan (42 U.S.C. Part 300), and other applicable Federal requirements. In the event that Federal requirements are not satisfied through this coordination effort, the Service may be required to initiate, or require PG&E to perform, activities independent of State law.

VIII. ENFORCEMENT

The Service, BLM, and DOI have determined that PG&E is a responsible party pursuant to Section 107 of CERCLA, 42 U.S.C. § 9607. As defined by CERCLA, PG&E is the owner and operator of the PG&E facility from which hexavalent chromium has been released into the environment. Hexavalent chromium is a hazardous substance under CERCLA.

In a 12 February 2004 letter, DOI notified PG&E of its potential liability under CERCLA and has requested that PG&E enter into an administrative order on consent (AOC) by which PG&E would agree to reimburse DOI, the Service, and other DOI bureaus for response costs incurred in overseeing PG&E's performance of response action on Federal property. In the event that DOI is unable to reach an agreement with PG&E over the terms of this AOC, DOI may decide to take response action unilaterally, may initiate enforcement action or take any other measures necessary to direct or require PG&E to perform response action, and seek to recover all response costs incurred from PG&E.

IX. RECOMMENDATION

This decision document authorizes the installation and use of one monitoring well cluster and associated activities on Havasu National Wildlife Refuge. The monitoring well will be sampled routinely to assess the extent of contaminant spread. This action is consistent with DOI policy, and will provide significant environmental and public health benefits by reducing the risk of potential contaminant spread.

The Service has determined that PG&E is capable of performing this action in a manner consistent with the NCP, contingent on PG&E's full compliance with the requirements of this Action Memorandum including Attachment 1 (Technical Memorandum) and Attachment 2 (Special Conditions). I recommend your approval of the proposed facilities and activities.

_____ _____

Approved Date
Refuge Supervisor AZ/NM

_____ _____

Approved Date
Regional Chief NWRS, Southwest Region

_____ _____

Approved Date
Regional Director, Southwest Region

Attachments

ATTACHMENT 2
Time Critical Removal Action, PG&E Topock Facility

HAVASU NATIONAL WILDLIFE REFUGE
SPECIAL CONDITIONS

The authorization to perform the time critical removal action addressed by this Action Memorandum is subject to Pacific Gas and Electric Company's ("PG&E" or "Permittee") agreement to comply with and be bound by the following Special Conditions.

1. All activities on Havasu National Wildlife Refuge (Refuge) are subject to the laws, regulations, and policies of the U.S. Fish and Wildlife Service (Service).

2. Permittee is responsible for ensuring compliance with the substantive requirements of all applicable or relevant and appropriate requirements (ARARs) identified by the Service including, without limitation, ARARs derived from the Clean Water Act, National Historic Preservation Act, Endangered Species Act, and other Federal or more stringent State laws or regulations.

3. This Action Memorandum authorizes activities and facilities for a period not to exceed two years. The authorized activity and related facilities/property must cease and be removed, respectively, within two years unless an extension is issued by the Refuge Manager at least 14 days prior to the expiration of this time.

4. Permittee agrees to indemnify and hold harmless the United States, including the Department of the Interior, the Service, and their agents and employees, from any and all claims or causes of action arising from or on account of acts or omissions of PG&E, its employees, successors, agents, contractors, subcontractors or other persons, in carrying out activities authorized by this Action Memorandum. Permittee further agrees that the United States, and its agencies and employees, shall not be held as a party to any contract entered into by Permittee in carrying out activities under this Action Memorandum.

5. All project activities will be conducted in a manner that avoids a take of any wildlife, particularly threatened and/or endangered (listed) species. Take is defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Should a listed species enter the project site or become harmed or killed by project activities, the project will be shut down and Permittee will consult immediately with the Service and the California Department of Fish and Game (CDFG). Negative effects to wildlife habitat will also be minimized to the maximum possible extent.

6. Wildlife of any kind will not be handled or harassed. Encounters with listed species will be reported to the CH2MHILL project and Refuge biologists. These biologists will

maintain records of all listed species encountered during project activities. This information will include for each individual: the locations (narrative, vegetation type, and maps) and dates of observations, general conditions and health, any apparent injuries and state of healing, and diagnostic markings.

7. To the maximum extent possible, facilities (e.g., pipelines, wells, and access routes) will be sited within an existing right-of-way and previously disturbed or barren areas to limit new surface disturbance.

8. All PG&E employees and contractors involved with the proposed project will be required to attend PG&E's threatened and endangered species education program prior to initiation of activities. New employees will receive formal, approved training prior to working on-site.

9. Trash and food items will be contained in closed containers and removed daily to reduce attractiveness to wildlife or feral animals.

10. Lights will be angled toward the ground, reduced in intensity to levels compatible with safety concerns, and limited in duration of usage. The hue of lighting will be that which is most compatible with and least disturbing to wildlife.

11. Employees will not bring pets to the project site.

12. Firearms will be prohibited from the proposed project site.

13. Employees will be required to check under their equipment or vehicle before it is moved. If a desert tortoise is encountered, the vehicle is not to be moved until the animal has voluntarily moved to a safe distance away from the parked vehicle.

14. Upon completion of well and piping installation, all unused material and equipment will be removed from the site.

15. Upon locating a dead or injured individual of a listed species, PG&E will make initial notification to the Refuge and the Service within three working days. The notification must be made in writing to the Service's Division of Law Enforcement in Torrance (370 Amapola Avenue, Suite 114, Torrance, California 90501; (310) 328-1516) and by telephone and writing to the Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003; (805) 644-1766). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, probable cause of death (if known), and other pertinent information. Animals injured through PG&E activities will be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the CDFG and the Refuge will be contacted for final disposition of the animal.

16. The CH2MHill project biologist will be responsible for assisting PG&E employees and

contractors in compliance with the minimization measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist will be implemented for special-status wildlife species in areas of planned disturbance immediately prior to initiation of ground-disturbing activities. The inspection will provide 100 percent coverage of the area within the project limits. All desert tortoise burrows and pallets outside of, but near, the project footprint will be flagged at that time so that they may be avoided during work activities. At the conclusion of work activities, all flagging will be removed.

17. Preconstruction surveys for avian nesting pairs, nests, and eggs will occur in areas proposed for any vegetation removal and active nesting areas flagged. If nesting birds are detected, vegetation removal will be avoided and Refuge and CH2MHill biologists will be notified.

18. All native vegetation (particularly Palo verde, ocotillo, mesquite, willow species, cottonwood, cat-claw, smoke tree, and cacti species) are considered sensitive by the Refuge. To the maximum extent practicable, Permittee will avoid negative effects to these species.

19. PG&E will designate a field contact representative (FCR) who will be responsible for overseeing compliance with the minimization measures. The FCR must be onsite during all construction activities. The FCR will have authority to halt all activities that are in violation of any Special Conditions. The FCR will have a copy of all special conditions when work is being conducted on the site. The FCR may be a project manager, PG&E representative, or a biologist.

20. The area of disturbance will be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors. As needed, work area boundaries will be delineated with flagging or other marking to minimize surface disturbance associated with vehicle or equipment straying.

21. All activities will be restricted to a pre-determined corridor. If unforeseen circumstances require project expansion, the potential expanded work areas will be surveyed for listed species prior to use of the area. All appropriate minimization measures will be implemented within the expanded work areas based on the judgment of the Refuge biologist. Work outside of the original Refuge-designated area will proceed only after receiving written approval from the Refuge, Service, and CDFG describing the exact location of the expansion.

22. All open holes and trenches will be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum. PG&E has the option of erecting desert tortoise fencing in lieu of inspection of open trenches. During excavation of trenches or holes, earthen ramps will be provided to facilitate the escape of any wildlife species that may inadvertently become entrapped. If a desert tortoises is trapped, the Refuge biologist

will be notified immediately. The desert tortoise will be allowed to escape before work continues in that location. A final inspection of the open trench segment will also be made immediately before back filling. All open pipe segments will be covered when work activity is not occurring at the site. Trenches must meet the safety requirements of the Occupational Safety and Health Administration before personnel enter open trenches to remove wildlife.

23. All construction vehicles and equipment will be periodically checked to ensure proper working condition and to ensure that there is no potential for fugitive emissions of oil, hydraulic fluid or other hazardous products. The Refuge will be informed of any hazardous spills.

24. Workers will exercise caution when traveling to and from the project area. To minimize the likelihood for vehicle strikes of wildlife, the speed limit when traveling unpaved area roads will be 15 miles per hour.

25. Intentional killing or collection of plants, other than authorized by this Action Memorandum is prohibited. Permittee will notify the Refuge of any such occurrences.

26. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E will notify the Refuge within 24 hours. As a part of this emergency response, the Refuge may require specific measures to protect wildlife. During cleanup and repair, the Refuge may also require measures to recover damaged habitats.

27. Once the well facility and all terrain vehicle access route are no longer needed, PG&E will be required, as directed by the Refuge, to restore disturbed areas in a manner that will assist in the re-establishment of biological values (as per Condition 31). Methods of such restoration will include the reduction of erosion, planting with appropriate native tress, and irrigation of reestablished vegetation for three years following planting.

28. Within 60 days of completion of construction activities, the FCR and PG&E biologist will prepare a brief report for the Refuge documenting the effectiveness of the minimization measures and making recommendations for modifying the measures to enhance species protection. The report will also provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.

29. All areas within the proposed action area and within the potential impact of the action will be monitored semiannually by PG&E during the active period for tortoise by a biologist knowledgeable of desert tortoise ecology. These surveys will be completed throughout the duration of the action to verify the presence or absence of desert tortoise and reports will be provided to the biologists at the Refuge office on an annual basis.

30. PG&E will survey riparian areas surrounding the proposed action site for southwestern willow flycatchers according to the protocol established by the Service. These surveys

will be completed each year by a biologist permitted by the Service to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports will be provided to the biologists at the Refuge office on an annual basis.

31. During December 2005, all areas used (including equipment storage/staging areas and access routes; excepting a six-foot wide ATV access route across and from the staging area to the well site) will be revegetated with native trees according to the following (Refuge biologists will be available for consultation on methods, techniques, and tree sources.).

- Fremont's Cottonwood from the mainstem Colorado River trees will be planted.
- Trees will be planted on a three-foot by three-foot spacing.
- Trees will be irrigated for three years following planting, such that after three years they will survive as historical wildlife habitat without irrigation.
- If, after five years, tree survival falls below 80%, the previously planted areas will be revegetated using native honey mesquite in a five-foot by five-foot spacing. Irrigation and survival expectations will be the same as with the cottonwood.

IX. RECOMMENDATION

This decision document authorizes the installation and use of one monitoring well cluster and associated activities on Havasu National Wildlife Refuge. The monitoring well will be sampled routinely to assess the extent of contaminant spread. This action is consistent with DOI policy, and will provide significant environmental and public health benefits by reducing the risk of potential contaminant spread.

The Service has determined that PG&E is capable of performing this action in a manner consistent with the NCP, contingent on PG&E's full compliance with the requirements of this Action Memorandum including Attachment 1 (Technical Memorandum) and Attachment 2 (Special Conditions). I recommend your approval of the proposed facilities and activities.

Jeannie Wagner-Green (Acting) — 2-10-05

Approved — Date

Refuge Supervisor AZ/NM

Approved — 2/10/2005 — Date

Regional Chief NWRS, Southwest Region

Approved — 2/16/2005 — Date

Acting Regional Director, Southwest Region

Attachments

07-001

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Lake Havasu Field Office
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406-9071

In reply refer to:

CAAZCA 43660 (330)

December 29, 2004

Yvonne Meeks
Portfolio Manager – Site Remediation
Pacific Gas & Electric Company
4325 South Higuera Street
San Luis Obispo, CA 93401

Dear Ms. Meeks:

This letter is in response to your request dated December 22, 2004 for the Bureau of Land Management (BLM) review of well installation and construction activities on BLM managed land. Pacific Gas and Electric Company (PG&E) requested the following:

1. Field Activity Summary for Supplemental Interim Measures No. 2, Well Installation on BLM-Managed Land identifies 8 proposed well locations. These wells are included under Action Memorandum No. 2 previously approved by the BLM. BLM has reviewed the Field Activity Summary and approves the drilling of the following 7 monitoring and extraction wells: MW-27, MW-34, MW-33, SO-1, CW-1, PE-1, and PE-3. Contingency monitoring well location SO-4 is located near a riparian area within Bat Cave Wash. Previous surveys by BLM personnel have identified this location as an area of concern because of possible southwestern willow flycatcher habitat. An on-site field inspection was not conducted for SO-4 and BLM will not approve SO-4 in its current location at this time.

2. Design Plan for Groundwater Compliance Monitoring, Supplemental IM-3 Workplan identifies 7 well locations on BLM-managed land and PG&E private property. BLM has reviewed the Design Plan and approves the following 7 proposed compliance monitoring wells: CMW-1, CMW-5, CMW-6 on BLM property and CMW-2, CMW-3, CMW-4 and CMW-7 located on PG&E property.

3. Field Change for Construction of Valve Vault No. 1 and Extraction Well Vaults (MW-20 Bench). PG&E requests installation of a concrete valve box to be located on the MW-20 bench location with three brine tanks to be set where the last three treatment tanks are currently in place. BLM has reviewed this proposal and approves this location. This action is covered under Action Memorandum No. 2 since it is part of the required work to enable the correct functioning of the facility.

The Workplan included proposed well locations on Havasu National Wildlife Refuge (HNWR). BLM does not have jurisdiction on U.S. Fish and Wildlife Service property, and cannot authorize requests on the HNWR.

You must continue to comply with the mitigation measures attached to Action Memorandum No. 3, dated September 17, 2004, which authorized Interim Measures No. 3 Work Plan, Revision 1 and Action Memorandum No 2, dated March 3, 2004. Additional Special Conditions of Approval are enclosed and should be considered a compliance requirement.

If you have questions, contact Project Manager Cathy Wolff-White at (928) 505-1309 or Wildlife Biologist Mark Howell at (928) 505-1226.

Sincerely,

Patricia A. Taylor
Acting Field Manager

Enclosure

SPECIAL CONDITIONS OF APPROVAL

1. All drilling activities will be completed prior to March 15, 2005. Completing drilling activities by this date should minimize impacts to wildlife and any local/transient Threatened or Endangered Species that could potentially occur within the project area.

2. Monitoring Well MW-27M/D is located in dense vegetation and, because of its location, will be a high priority item in the construction schedule. MW-27M/D shall be completed as early as possible to minimize potential impacts to avian species during the breeding season. Vegetation clearing for installation of MW-27M/D will be kept to a minimum and occur to the north of the access route. Only trimming and minor vegetation removal shall occur to allow access by drilling equipment. A biologist knowledgeable with southwestern flora and fauna will conduct a pre-construction survey and will be present during vegetation removal to identify native tree species.

3. All native tree species shall be avoided if possible. In the event that native trees cannot be avoided, those trees will be transplanted to a nearby location approved by the on-site biologist.

4. Disturbance will be kept to a minimum while conducting monitoring studies in the floodplain. If possible, vehicle travel shall be limited and foot travel will be used to access MW-27M/D. No motorized vehicle travel will occur within the dense vegetation along the southern portion of the floodplain for monitoring data gathering. If possible, vehicles shall stay at least 100' from the area of dense vegetation surrounding MW-27M/D.

5. A summary biological report will be submitted within 30 days of completion of Phase 2 Interim Measures No. 2. This report will consist of records for all wildlife sightings by on-site biologists during construction. A list of all vegetation removed and transplanted shall also be provided within the report. Photographs of all well locations prior to and after installation will also be provided for BLM review.

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAKE HAVASU FIELD OFFICE

In Reply Refer To:
CAAZCA 43660
2640 (AZ-070)

September 17, 2004

ACTION MEMORANDUM

TO: State Director

FROM: Acting Field Manager, Lake Havasu Field Office

THROUGH: Acting District Manager, Colorado River District

SUBJECT: Time Critical Removal Action No. 3,
Pacific Gas and Electric Topock Compressor Facility

I. PURPOSE

This Action Memorandum documents the basis for authorizing a time critical removal action to address the release of hazardous substances from the Pacific Gas and Electric ("PG&E") Compressor Station near Topock, Arizona (hereafter "PG&E facility"). Hazardous substances released from the PG&E facility have migrated onto or under land managed by the Bureau of Land Management ("BLM") on behalf of the Bureau of Reclamation ("BOR"). Specifically, hazardous substances including, without limitation, hexavalent chromium released from the PG&E facility have been detected in groundwater under BLM-managed land. This plume of contaminated groundwater has been detected in groundwater within 100 feet of the Colorado River and is or may be migrating toward the Colorado River.

This proposed time critical removal action is authorized pursuant to the response action authority of Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. 9604. Pursuant to Executive Order 12580, as amended, and Department of the Interior ("DOI") Departmental Manual, Section 104 response action authority has been delegated to BLM to address the release or threatened release of hazardous substances on or from land under BLM's jurisdiction, custody, or control.

The purpose of this proposed time critical removal action is to undertake additional measures, as specified herein, to maintain hydraulic control of the groundwater plume to prevent or abate the release of hexavalent chromium into the Colorado River.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The PG&E facility comprises approximately 265 acres located 15 miles southeast of Needles, California, south of Interstate 40, in the north end of the Chemehuevi Mountains. The facility is on private land owned by PG&E and is situated within the Havasu National Wildlife Refuge. The facility is located within one-half a mile of BLM-managed land and is less than one mile from the Colorado River.

PG&E has been the owner and operator of the PG&E facility since 1951 and has owned the property on which the facility is located since 1965. Beginning in 1951 and continuing to approximately 1989, PG&E conducted onsite disposal of significant quantities of wastewater containing hexavalent chromium from the cooling towers of the compressor station at the facility. According to PG&E's estimates, from 1951 to 1969, PG&E disposed annually at least six million gallons of untreated chromium-contaminated wastewater into Bat Cave Wash, an ephemeral stream that flows north from the facility across Havasu National Wildlife Refuge and BLM-managed land emptying into the Colorado River. From 1970 to 1989, PG&E disposed its wastewater into evaporation ponds on Havasu National Wildlife Refuge property adjacent to BLM-managed property.

B. Other Actions to Date

In 1988, PG&E completed a soil investigation in the Bat Cave Wash area at the request of the California Department of Health Services (now known as the Department of Toxic Substances Control ("DTSC")) and the U.S. Environmental Protection Agency ("EPA"). The soil investigation documented chromium releases to the environment. In 1989, a "Comprehensive Ground Water Monitoring Evaluation" prepared by the California Regional Water Quality Control Board identified chromium releases in groundwater.

By letter dated May 29, 1995, PG&E reported the presence of chromium in groundwater samples taken on the east side of Bat Cave Wash near the north boundary of the PG&E facility. In response, on February 26, 1996, DTSC and PG&E executed a Corrective Action Consent Agreement pursuant to State law under which DTSC directed PG&E to perform a "Facility Investigation" as well as any "Interim Measures" determined to be necessary to address immediate or potential threats to human health and/or the environment.

In the course of implementing groundwater monitoring required under the Corrective Action Consent Agreement, PG&E has documented an extensive plume of groundwater contaminated with hexavalent chromium that stretches from the PG&E facility under National Wildlife Refuge and BLM-managed property toward the Colorado River. On February 3, 2004, PG&E reported concentrations of hexavalent chromium of 111 parts per billion ("ppb") in groundwater taken

from monitoring well MW34-80. This monitoring well is located on BLM-managed property within 100 feet from the Colorado River.

Based on this finding, DTSC ordered PG&E to prepare and submit Interim Measures ("IM") Work Plan No. 2 "to immediately begin pumping, transport and disposal of groundwater from existing monitoring wells at the MW20 cluster." These monitoring wells located on or near the "MW20 bench" are on BLM-managed property. By Action Memorandum issued March 3, 2004, BLM authorized PG&E to conduct a time critical removal action, consistent with IM No. 2, to prevent or abate the release of hexavalent chromium into the Colorado River. The scope of this removal action was to extract contaminated groundwater from existing or, if necessary, new wells to reverse the groundwater gradient away from the Colorado River and maintain hydraulic control of the chromium-contaminated plume.

On May 20, 2004, BLM issued a second Action Memorandum authorizing PG&E to operate, for a limited period of time, a batch treatment system on the MW20 bench. The purpose of this time critical removal action was to reduce the volume of hazardous waste being shipped offsite by allowing treatment of contaminated groundwater onsite prior to offsite transport and disposal as non-hazardous waste.

III. THREATS TO PUBLIC HEALTH, OR WELFARE, OR THE ENVIRONMENT

As documented by recent groundwater sampling results, hexavalent chromium has been detected in significant concentrations in wells within 100 feet of the Colorado River. The proximity of the groundwater plume to the Colorado River constitutes an actual or potential threat to the environment.

To date, the rate of extraction of groundwater has succeeded in maintaining hydraulic control of the chromium plume. However, due to the influence of water levels in the Colorado River on groundwater gradient, increasing groundwater extraction rates is expected to be necessary to maintain hydraulic control of the chromium-contaminated plume. Specifically, during the period of lowest river levels from October 2004, through January 2005, extraction rates between 120-150 gallons per minute may be required to maintain such hydraulic control. Existing storage and treatment capacity on the MW20 bench is insufficient to satisfy these increased extraction rates.

Expansion of the existing facilities on the MW20 bench as the sole means of managing the maximum projected groundwater volume poses several concerns for public health and safety, and ease of implementation. Our review of the Potential Expansion of Facilities on the Monitoring Well 20 (MW20) Bench, submitted on September 17, 2004 shows that transporting the maximum projected volume of groundwater from the MW20 bench would require more than 40 trucks per day, increasing risks of transportation accidents and hazardous waste spills, adverse impacts on local roads and residents, and potential impacts on cultural and biological resources. Additional offsite treatment and disposal facilities that could accommodate the additional volume of hazardous waste on a 24 hours a day, seven days a week basis would be required. Such disposal facilities would be several hundred miles from the Topock site. For these reasons and others, expanding the MW20 bench facilities as the sole means of managing the volume of

extracted groundwater necessary to maintain hydraulic control of the chromium-contaminated plume is undesirable.

IV. ENDANGERMENT DETERMINATION

Actual or threatcned releases of hazardous substances through groundwater may continue to migrate toward the Colorado River and may reach the River if not addressed by implementing the time critical removal action described in this Action Memorandum. This time critical removal action is necessary to prevent or abate the release or substantial threat of release of hazardous substances into the Colorado River. Due to the proximity of the groundwater plume to the River, BLM determines, in accordance with Section 300.415(b)(2) of the National Oil and Hazardous Substances Contingency Plan ("National Contingency Plan" or "NCP"), 42 U.S.C. §300.415(b)(2), that a time critical response is necessary.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

As described specifically in the attached *Interim Measures No. 3 Work Plan, Revision 1* ("Work Plan"), which is incorporated herein, the proposed time critical removal action includes the following actions: (1) installation and utilization of piping from the MW20 bench to a proposed private treatment facility on Parcel 650-151-06; (2) installation and utilization of piping for conveyance of treated water from the proposed private treatment facility to proposed injection wells on Parcel 650-151-06; (3) any necessary improvements to existing access roads to install piping or remove waste materials from the proposed private treatment facility; (4) potential installation of monitoring wells to evaluate the effects on groundwater flow and chemistry due to injection of treated waste water; and (5) expansion of facilities on, and transportation from, the MW20 bench to accommodate, for a limited time period, the potential need to transport treated water and brine until more permanent disposal measures are in place. These activities, as identified in the attached Work Plan, are authorized by this Action Memorandum: provided, however, that prior to implementation all such activities are subject to BLM review and approval. Specifically, all such measures must comply with appropriate mitigation measures as identified by BLM in consultation with affected parties, to address impacts on cultural and biological resources and satisfy all applicable Federal requirements.

In particular, implementation of the activities identified in the Work Plan must comply with all mitigation measures identified in the *Cultural Resources Management Plan for the Topock Compressor Station Expanded Groundwater Extraction and Treatment System, San Bernardino County, California (September 2004)*, as specified by the Memorandum of Agreement executed on September 14, 2004, by BLM, and the California State Historic Preservation Officer regarding Interim Measures No. 3. Furthermore, implementation of the activities identified in the Work Plan must comply with all mitigation measures identified, and to be identified by BLM in the attached Lake Havasu Field Office Wildlife and Threatened or Endangered Species Stipulations, and in consultation with State agencies and the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act, 16 U.S.C. §1536.

Because such actions will be financed by PG&E, BLM has not determined the estimated costs to implement this time critical removal action.

VI. EXPECTED CHANGE IN SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

In the event this time critical response action is delayed or not taken, hazardous substances may be released, or there is a substantial threat of such release, into the Colorado River.

VII. OUTSTANDING POLICY ISSUES

BLM is coordinating this time critical removal action with work required of PG&E pursuant to the Corrective Action Consent Agreement issued by DTSC. This coordination of BLM CERCLA authorities and State RCRA authorities is intended to facilitate and streamline PG&E's performance of work necessary to protect the Colorado River. BLM must ensure, however, that such work is performed in a manner consistent with CERCLA, the NCP, and other applicable Federal requirements. In the event that Federal requirements are not satisfied through this coordination effort, BLM may be required to initiate, or require PG&E to perform, activities independent of State law.

VIII. ENFORCEMENT

BLM and DOI have determined that PG&E is a responsible party pursuant to Section 107 of CERCLA, 42 U.S.C. §9607. As defined by CERCLA, PG&E is the owner and operator of the PG&E facility from which hexavalent chromium has been released into the environment. Hexavalent chromium is a hazardous substance under CERCLA.

By letter dated February 12, 2004, DOI has notified PG&E of its potential liability under CERCLA and has requested that PG&E enter into an administrative order on consent ("AOC") by which PG&E would perform future response action and agree to reimburse DOI, BLM, and other DOI bureaus for response costs incurred in overseeing PG&E's performance of response action on Federal property. In the event that DOI is unable to reach an agreement with PG&E over the terms of this AOC, DOI may decide to take response action unilaterally, may initiate enforcement action or take any other measures necessary to direct or require PG&E to perform response action, and seek to recover all response costs incurred from PG&E.

IX. ADDITIONAL MITIGATION MEASURES

Further review of the proposal revealed that the Mitigation Measures in Section 7.0 of Interim Measures No. 3 Work Plan, Revision 1 need further revision. The attachment entitled Mitigation Measures, Lake Havasu Field Office replaces Section 7.0 of the Interim Measures No. 3 Workplan, Revision 1, in its entirety.

X. RECOMMENDATION

This decision document identifies the current proposed time critical removal action to prevent or abate releases of hexavalent chromium from the PG&E facility from migrating to the Colorado River. BLM has determined that PG&E is capable of performing this removal action in a manner consistent with the NCP, contingent on PG&E's full compliance with the requirements of this Action Memorandum including the attached Work Plan. Conditions at the site meet the criteria for undertaking the proposed time critical removal action, as specified by Section 300.415 (b)(2) of the NCP, 40 CFR §300.415(b)(2). We recommend your approval of the proposed time critical removal action.

Patricia A. Taylor
Acting Field Manager

9-17-04
Date

I Concur:

Wayne King
Acting District Manager

9/17/2004
Date

Elaine Y. Zielinski
Approval
State Director

9/17/04
Date

Disapproval
State Director

Date

Attachments:

Interim Measures No. 3 Work Plan, Revision 1
Memorandum of Agreement between BLM, Lake Havasu Field Office and California State Historic Preservation Officer
Mitigation Measures, Lake Havasu Field Office
Potential Expansion of Facilities on the Monitoring Well 20 (MW20) Bench

MITIGATION MEASURES

LAKE HAVASU FIELD OFFICE

1. All project activities shall be conducted in a manner that avoids take of a Federally listed species. Take is defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Should a listed species enter the project site or become harmed or killed by project activities, the project shall be shut down and the USFWS, BLM and CDFG shall be consulted. Impacts to habitat shall also be minimized to the maximum possible extent.

2. PG&E shall designate a field contact representative (FCR) who shall be responsible for overseeing compliance with the mitigation measures. The FCR must be onsite during all construction activities. The FCR shall have authority to halt all activities that are in violation of the mitigation measures and/or pose a danger to listed species. The FCR shall have a copy of all mitigation measures when work is being conducted on the site. The FCR may be a project manager, PG&E representative, or a biologist.

3. PG&E shall have a qualified biologist responsible for assisting crews in compliance with the mitigation measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist shall be implemented for special-status wildlife species in impact areas immediately prior to initiation of ground-disturbing activities. The inspection shall provide 100 percent coverage of the area within the project limits. All desert tortoise burrows and pallets outside of, but near, the project footprint shall be flagged at that time so that they may be avoided during work activities. At the conclusion of work activities, all flagging shall be removed.

4. Listed species including the desert tortoise shall not be handled or harassed. Encounters with a listed species shall be reported to the project biologist and BLM Lake Havasu (BLM) biologists. These biologists will maintain records of all listed species encountered during project activities. This information will include for each individual: the locations (narrative, vegetation type, and maps) and dates of observations; general conditions and health; any apparent injuries and state of healing; and diagnostic markings.

5. All PG&E employees and contractors involved with the proposed project shall be required to attend PG&E's threatened and endangered species education program prior to initiation of activities. New employees shall receive formal, approved training prior to working on-site.

6. To the maximum extent possible, facilities (treatment facility, pipelines, injection wells, and access routes) shall be sited within an existing right–of-way (ROW) and previously-disturbed or barren areas to limit new surface disturbance.

7. Existing routes of travel to and from the proposed project site shall be used. Cross-country use of vehicles and equipment shall be prohibited.

8. Trash and food items shall be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as common ravens (*Corvus corax*), coyotes (*Canis latrans*), and feral dogs.

9. To minimize effects, lights shall be angled toward the ground, reduced in intensity to levels compatible with safety concerns, and limited in duration of usage. The hue of lighting shall be that which is most compatible with and least disturbing to wildlife.

10. Employees shall not bring pets to the project site.

11. Firearms shall be prohibited from the project site, except as required for security employees.

12. Employees shall be required to check under their equipment or vehicle before it is moved. If a desert tortoise is encountered, the vehicle is not to be moved until the animal has voluntarily moved to a safe distance away from the parked vehicle.

13. Upon project completion, all unused material and equipment shall be removed from the site. This condition does not apply to fenced sites.

14. Palo verde, ocotillo, mesquite, cat-claw, smoke tree, and cacti species are considered sensitive by the BLM. To the extent practicable, these species shall be avoided. If avoidance is not possible, these species shall be transplanted when practical. Should any of the aforementioned plants be destroyed, they shall be replaced.

15. The area of disturbance shall be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors. As needed, work area boundaries shall be delineated with flagging or other marking to minimize surface disturbance associated with vehicle straying.

16. All activities shall be restricted to a pre-determined corridor. If unforeseen circumstances require project expansion, the potential expanded work areas shall be surveyed for listed species prior to use of the area. All appropriate mitigation measures shall be implemented within the expanded work areas based on the judgment of the agencies and the project biologist. Work outside of the original ROW shall proceed only after receiving written approval from the BLM, Fish and Wildlife Service (Service) and CDFG describing the exact location of the expansion.

17. PG&E has the option of erecting desert tortoise fencing in lieu of inspection of open trenches. If the trench is short, personnel may monitor the trench. All open holes and trenches shall be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum. During excavation of trenches or holes, earthen ramps shall be provided to facilitate the escape of any wildlife species that may inadvertently become entrapped. If desert tortoises are trapped, the project biologist shall be notified immediately. The desert tortoise shall be allowed to escape before work continues in that location. A final inspection of the open trench segment shall also be made immediately before back filling. All open pipe segments shall be covered when work activity is not occurring at the site.

18. All construction vehicles and equipment shall be periodically checked to ensure proper working condition and to ensure that there is no potential for fugitive emissions of oil, hydraulic fluid or other hazardous products. The BLM shall be informed of any hazardous spills.

19. Workers shall exercise caution when traveling to and from the project area. To minimize the likelihood for vehicle strikes of listed species, speed limits when commuting to project areas on ROW roads shall not exceed 20 miles per hour.

20. Intentional killing or collection of either plant or wildlife at construction sites and surrounding areas shall be prohibited. The BLM shall be notified of any such occurrences.

21. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E shall notify the BLM within 48 hours. As a part of this emergency response, the BLM may require specific measures to protect listed species. During cleanup and repair, the agencies may also require measures to recover damaged habitats.

22. Once the treatment facility is no longer needed, PG&E shall restore disturbed areas in a manner that will assist in the re-establishment of biological values within the disturbed ROW. Methods of such restoration shall include the reduction of erosion, re-spreading of the top two inches of soil, planting with appropriate native shrubs, and scattering of bladed vegetation and rocks across the ROW, depending upon the appropriateness or effectiveness in a given area.

23. Within 60 days of completion of construction activities, the FCR and biologist shall prepare a brief report for the BLM documenting the effectiveness and practicality of the mitigation measures and making recommendations for modifying the measures to enhance species protection. The report will also provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.

24. Any future construction during the nesting season for migratory birds, generally February to August for most birds, will require preconstruction surveys for nesting pairs, nests, and eggs. These preconstruction surveys shall occur in areas proposed for any vegetation removal and active nesting areas flagged. If nesting birds are detected, vegetation removal will be avoided during the nesting season. All construction activity within 200 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests.

25. All areas within the proposed action area, subject to operations and maintenance activities, and within the potential impact of the action shall be monitored semiannually during the active period for tortoise by a biologist knowledgeable of desert tortoise ecology. Surveys shall be completed throughout the duration of the action to verify the presence or absence of desert tortoise and reports shall be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.

26. Riparian areas surrounding the proposed action site and subject to influence of operations and maintenance activities shall be surveyed for southwestern willow flycatchers according to the protocol established by the Service. These surveys shall be completed each year by a biologist permitted by the Service to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports shall be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.

27. Upon locating an individual of a dead or injured listed species, PG&E shall make initial notification to the BLM and US Fish and Wildlife Service (Service) within three working days of its finding. The notification must be made in writing to the Service's Division of Law Enforcement in Torrance (370 Amapola Avenue, Suite 114, Torrance, California 90501;

(310) 328-1516) and by telephone and writing to the Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003; (805) 644-1766). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities shall be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the CDFG and the BLM shall be contacted for final disposition of the animal.

28. PG&E will immediately notify the BLM Lake Havasu Field Manager (or his designated representative) of any cultural resources (prehistoric/historic sites or objects) and/or paleontological resources (fossils) encountered during permitted operations and will maintain the integrity of such resources pending subsequent investigation. All operations in the immediate area of the discovery must be suspended until written authorization from BLM to proceed is issued. An evaluation of the discovery shall be made by a qualified archaeologist or paleontologist to determine appropriate actions to prevent the loss of significant cultural or scientifically-important paleontological values.

29. No permanent improvements that affect the integrity of the bridge/culvert over Bat Cave Wash on historic Route 66 will be implemented.

30. Actions that result in impacts to archaeological or historical resources are subject to the provisions of the Archaeological Resources Protection Act of 1979, as amended, and the Federal Land Policy and Management Act of 1976.

MEMORANDUM OF AGREEMENT
BETWEEN
THE BUREAU OF LAND MANAGEMENT, LAKE HAVASU FIELD OFFICE
AND
THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
THE PACIFIC GAS & ELECTRIC TOPOCK INTERIM MEASURES NO. 3, EXPANDED GROUNDWATER EXTRACTION AND TREATMENT PROJECT
SAN BERNARDINO COUNTY, CALIFORNIA

WHEREAS, Pacific Gas & Electric Company (PG&E) proposes to construct, operate and maintain in the area depicted as the "Area of Potential Effects" (APE) in Figure 1 of Attachment 1 to this Memorandum of Agreement (MOA), an expanded groundwater extraction and treatment system, called the Topock Interim Measures No. 3 Project (Project), in order to maintain hydrologic control of an area in which groundwater has been contaminated by Chromium VI to prevent Chromium-contaminated groundwater from impacting the Colorado River; and

WHEREAS, the U.S. Department of the Interior, Bureau of Land Management (BLM), Lake Havasu Field Office, proposes to issue an Action Memorandum under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Undertaking) authorizing PG&E to conduct that portion of the Project located on public lands, and will act as lead federal agency for all lands within the current and within any expanded APE of the Undertaking and the Project, regardless of ownership, for purposes of complying with Section 106 of the National Historic Preservation Act, as amended (NHPA) (16 U.S.C. 470f), and its implementing regulations codified at 36 CFR part 800; and

WHEREAS the BLM, in consultation with the California State Historic Preservation Office (SHPO), has determined that construction, operation, maintenance, and subsequent dismantling of the Project will have an adverse effect upon CA-SBr-2910H, a property determined eligible for inclusion in the National Register of Historic Places (NR) and upon CA-SBr-219, a property listed in the NR (historic properties), and notified the Advisory Council on Historic Preservation (ACHP) of the adverse effect finding in accordance with 36 CFR part 800, regulations effective January 11, 2001, implementing Section 106 of the NHPA; and

WHEREAS, PG&E will construct, operate, maintain, and ultimately dismantle the Project, implement the *Cultural Resources Management Plan for the Topock Compressor Station Expanded Groundwater Extraction and Treatment System, San Bernardino County, California* (Applied Earthworks, September 2004) (CRMP) that is Attachment 1 to this MOA, has participated in the consultation, and has been invited to concur in this MOA; and

WHEREAS, the BLM has consulted the Quechan Tribe-Fort Yuma, Ft. Mohave Indian Tribe, Cocopah Indian Tribe, Chemehuevi Indian Tribe, Havasupai Tribe, Hualapai Tribe, Yavapai-Prescott Indian Tribe, Twenty-Nine Palms Band of Mission Indians and Colorado River Indian Tribes (Tribes) regarding the Project and the Undertaking and their effect on historic properties, and will continue to consult with the Tribes throughout the implementation of this MOA and the CRMP;

NOW, THEREFORE, the BLM and the SHPO agree that the Project and the Undertaking shall be implemented in accordance with the following stipulations in order to take into account the effects of the Project and the Undertaking on historic properties, and further agree that these stipulations shall govern the Project and the Undertaking and all of their parts until this MOA expires or is terminated.

Stipulations

The BLM shall ensure that the following measures are carried out:

I. MANAGEMENT OF HISTORIC PROPERTIES AND CULTURAL RESOURCES

A. The BLM shall ensure that known historic properties and other cultural resources, whether known or unknown that may be subsequently identified, within the current APE and within any expanded APE, are managed in accordance with the CRMP. Unsurveyed portions of the current APE and any expanded APE shall be surveyed and inventoried as prescribed in the CRMP.

B. Notwithstanding the current provisions of section 1.3, page 4, of the CRMP, the parties to this MOA agree that copies of survey and evaluation reports and of annual reports will routinely be submitted to the SHPO.

C. The parties to this MOA agree that the effects and any prospective effects of the Project and of the Undertaking on historic properties and cultural resources subject to this MOA shall be resolved by satisfactory implementation and completion of the measures prescribed in the CRMP or in any amendments thereto agreed upon pursuant to stipulation II.C.2., below.

II. ADMINISTRATIVE PROVISIONS

A. **Confidentiality.** The parties to this MOA acknowledge that historic properties and cultural resources covered by this MOA are subject to the provision of § 304 of the National Historic Preservation Act of 1966 and § 6254.10 of the California Government Code (Public Records Act), relating to the disclosure of archaeological site information and, having so acknowledged, will ensure that all actions and documentation prescribed by this MOA are consistent with § 304 of the NHPA and § 6254.10 of the California Government Code.

B. Resolving Objections.

1. Should any party to this MOA object to the manner in which the terms of this MOA are implemented, to any action carried out or proposed with respect to implementation of the MOA (other than the Project and the Undertaking itself) or to any documentation prepared in accordance with and subject to the terms of this MOA, the BLM shall immediately notify the other parties to this MOA of the objection and consult with the objecting party and the other parties to this MOA for no more than fourteen (14) days to resolve the objection. The BLM shall reasonably determine when this consultation will commence. If the objection is resolved through such consultation, the action in dispute may proceed in accordance with the terms of that resolution. If, after initiating such consultation, the BLM determines that the objection cannot be resolved through consultation, the BLM shall forward all documentation relevant to the objection to the ACHP, including the BLM's proposed response to the objection, with the expectation that the ACHP will within thirty (30) days after receipt of such documentation:

   a. advise the BLM that the ACHP concurs in the BLM's proposed response to the objection, whereupon the BLM will respond to the objection accordingly; or

   b. provide the BLM with recommendations, which the BLM will take into account in reaching a final decision regarding its response to the objection; or

   c. notify the BLM that the objection will be referred for comment pursuant to 36 CFR § 800.7(c), and proceed to refer the objection and comment. The BLM shall take the resulting comment into account in accordance with 36 CFR § 800.7(c)(4) and Section 110(1) of the NHPA.

2. Should the ACHP not exercise one of the above options within thirty (30) days after receipt of all pertinent documentation, the BLM may assume the ACHP's concurrence in its proposed response to the objection.

3. The BLM shall take into account any ACHP recommendation or comment provided in accordance with this stipulation with reference only to the subject of the objection. The BLM's responsibility to carry out all actions under this MOA that are not the subjects of the objection will remain unchanged.

4. At any time during implementation of the measures stipulated in this MOA, should an objection pertaining to such implementation be raised by a Tribe, the BLM shall notify the other parties to the MOA in writing of the objection and take the objection into consideration. The BLM shall consult with the objecting party and, if the objecting party so requests, with the other parties to this MOA for no more than fifteen (15) days. Within ten (10) days following closure of this consultation period, the BLM will render a decision regarding the objection and notify all consulting parties hereunder of its decision in writing. In reaching its decision, the BLM will take into account any comments from the consulting parties and the

objecting party regarding the objection. The BLM's decision regarding the resolution of the objection will be final.

5. The BLM shall provide all parties to this MOA, and the ACHP when ACHP comments have been issued hereunder, and any parties that have objected pursuant to paragraph 4. of section B. of this stipulation, with a copy of its final written decision regarding any objection addressed pursuant to this stipulation.

6. The BLM may authorize any action subject to objection under this stipulation to proceed after the objection has been resolved in accordance with the terms of this stipulation.

7. Notwithstanding any provision of stipulation II.B., the Project and the Undertaking may proceed without interruption during the resolution of any objections under this MOA. Following resolution of any objection, the BLM shall ensure that measures required by such resolution are carried out.

C. Amendments.

1. Any party to this MOA may propose that this MOA be amended, whereupon the parties to this MOA will consult for no more than fifteen (15) days to consider such amendment. The amendment process shall comply with 36 CFR §§ 800.6(c)(1) and 800.6(c)(7). This MOA may be amended only upon the written agreement of the signatory parties. If it is not amended, this MOA may be terminated by either signatory party in accordance with Stipulation II.D., below.

2. Attachment 1 (CRMP, including Appendices) to this MOA may be amended through consultation among the parties to this MOA without amending the MOA proper.

D. Termination.

1. If this MOA is not amended as provided for in section C.1. of this stipulation, or if either signatory party proposes termination of this MOA for other reasons, the signatory party proposing termination shall, in writing, notify the other parties to this MOA, explain the reasons for proposing termination, and consult with the other parties for at least thirty (30) days to seek alternatives to termination. Such consultation shall not be required if the BLM proposes termination because the Undertaking no longer meets the definition set forth in 36 CFR § 800.16(y).

2. Should such consultation result in an agreement on an alternative to termination, then the consulting parties hereunder shall proceed in accordance with the terms of that agreement.

3. Should such consultation fail, the signatory party proposing termination may terminate this MOA by promptly notifying the other parties to this MOA in writing. Termination hereunder shall render this MOA without further force or effect.

4. If this MOA is terminated hereunder and if the BLM determines that the Undertaking and the Project authorized by the Undertaking will nonetheless proceed, then the BLM shall either consult in accordance with 36 CFR § 800.6 to develop a new MOA or request the comments of the ACHP pursuant to 36 CFR Part 800.

E. Duration of the MOA.

1. Unless terminated pursuant to section D. of this stipulation, or unless it is superseded by an amended MOA, this MOA will be in effect following execution by the signatory parties until the BLM, in consultation with the other parties to this MOA, determines that all of its stipulations have been satisfactorily fulfilled. Upon a determination by the BLM that all of the terms of this MOA have been satisfactorily fulfilled, this MOA will terminate and have no further force or effect. The BLM will promptly provide the other parties to the MOA with written notice of its determination and of the termination of this MOA. Following provision of such notice, this MOA will have no further force or effect.

2. The terms of this MOA shall be satisfactorily fulfilled within ten (10) years following the date of execution by the SHPO. If the BLM determines that this requirement cannot be met, the parties to this MOA will consult to reconsider its terms. Reconsideration may include continuation of the MOA as originally executed, amendment, or termination. In the event of termination, the BLM will comply with section D.4 of this stipulation if it determines that the Undertaking and the Project authorized by the Undertaking will proceed notwithstanding termination of this MOA.

3. If the Undertaking has not been implemented within ten (10) years following execution of this MOA by the SHPO, this MOA shall automatically terminate and have no further force or effect. In such event, the BLM shall notify the other parties to this MOA in writing and, if it chooses to continue with the Undertaking and the Project authorized by the Undertaking, shall reinitiate review of the Undertaking and the Project in accordance with 36 CFR Part 800.

F. Effective Date of this MOA. This MOA will take effect on the date that it has been executed by the BLM and the SHPO.

EXECUTION of this MOA by the BLM and the SHPO, its transmittal by the BLM to the ACHP in accordance with 36 CFR § 800.6(b)(1)(iv), and subsequent implementation of its terms, shall evidence, pursuant to 36 CFR § 800.6(c), that this MOA is an agreement with the ACHP for purposes of Section 110(1) of the NHPA, and shall further evidence that the BLM has afforded the ACHP an opportunity to comment on the Undertaking and the Project and their effects on historic properties, and that the BLM has taken into account the effects of the Undertaking and the Project on historic properties.

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2004 SEP 16 A 11: 22

LAKE HAVASU CITY, AZ

SIGNATORY PARTIES:

BUREAU OF LAND MANAGEMENT,
LAKE HAVASU FIELD OFFICE

By: Patricia L. Taylor Date: 9-14-04

Title: Acting Field Manager

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

By: [illegible] wayne donaldson Date: 14 SEP 2004

Title: State Historic Preservation Officer

CONCURRING PARTY:

PACIFIC GAS & ELECTRIC COMPANY

By: Robert C. Doss Date: Sept. 14, 2004

Title: Principal Engineer, Environmental Affairs

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAKE HAVASU FIELD OFFICE

In Reply Refer To:
CAAZCA 43660 (070)

March 3, 2004

ACTION MEMORANDUM

TO: Elaine Zielinski
State Director

FROM: Don Ellsworth
Field Manager, Lake Havasu Field Office

SUBJECT: Time Critical Removal Action,
Pacific Gas and Electric Topock Compressor Facility

I. PURPOSE

This Action Memorandum documents the basis for authorizing a time critical removal action to address the release of hazardous substances from the Pacific Gas and Electric (PG&E) Compressor Station near Topock, Arizona (hereafter "PG&E facility"). Hazardous substances released from the PG&E facility have migrated onto or under land managed by the Bureau of Land Management ("BLM") on behalf of the Bureau of Reclamation ("BOR"). Specifically, hazardous substances including, without limitation, hexavalent chromium released from the PG&E facility have been detected in groundwater under BLM-managed land. This plume of contaminated groundwater has been detected in groundwater samples collected within 150 feet of the Colorado River and is or may be migrating toward the Colorado River.

This time critical removal action is authorized pursuant to the response action authority of Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. §9604. Pursuant to Executive Order 12580, as amended, and Department of the Interior ("DOI") Departmental Manual, Section 104 response action authority has been delegated to BLM to address the release or threatened release of hazardous substances on or from land under BLM's jurisdiction, custody, or control. The purpose of the proposed time critical removal action is to prevent or abate the release of hexavalent chromium into the Colorado River.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The PG&E facility comprises approximately 265 acres located 15 miles southeast of Needles, California, south of Interstate 40, in the north end of the Chemehuevi Mountains. The facility is an inholding within the Havasu National Wildlife Refuge, is located within half a mile of BLM-managed land, and is less than one mile from the Colorado River.

PG&E has been the owner and operator of the PG&E facility since 1951 and has owned the property on which the facility is located since 1965. Beginning in 1951 and continuing to approximately 1989, PG&E conducted onsite disposal of significant quantities of wastewater

containing hexavalent chromium from the cooling towers of the compressor station at the facility. According to PG&E's estimates, from 1951 to 1969 PG&E disposed annually at least six million gallons of untreated chromium-contaminated wastewater into Bat Cave Wash, an ephemeral stream that flows north from the facility across Havasu National Wildlife Refuge and BLM-managed land emptying into the Colorado River. From 1970 until approximately 1989, PG&E also disposed of wastewater in evaporation ponds on the Refuge adjacent to BLM-managed property. In addition to these evaporation ponds, PG&E disposed of wastewater and/or other waste containing hazardous substances in a percolation bed and an unlicensed injection well at or near the facility.

B. Other Actions to Date

In 1988, PG&E completed a soil investigation in the Bat Cave Wash area at the request of the California Department of Health Services (now known as the Department of Toxic Substances Control ("DTSC")) and the U.S. Environmental Protection Agency ("EPA"). The soil investigation documented chromium contamination in the environment around the former percolation bed. A 1989 "Comprehensive Ground Water Monitoring Evaluation" prepared by the California Regional Water Quality Control Board ("CRWQCB") identified chromium contamination associated with the injection well.

By letter dated May 29, 1995, PG&E reported the presence of chromium in groundwater samples taken on the east side of Bat Cave Wash near the north boundary of the PG&E facility. In response, on February 26, 1996, DTSC and PG&E executed a Corrective Action Consent Agreement pursuant to State law under which DTSC directed PG&E to perform a "Facility Investigation" as well as any "Interim Measures" determined to be necessary to address immediate or potential threats to human health and/or the environment.

In the course of implementing groundwater monitoring required under the Corrective Action Consent Agreement, PG&E has documented an extensive plume of groundwater contaminated with hexavalent chromium that stretches from the PG&E facility under National Wildlife Refuge and BLM-managed property toward the Colorado River. On February 3, 2004, reported concentrations of hexavalent chromium of 111 parts per billion ('ppb") in groundwater taken from monitoring well MW34-80. This monitoring well is located on BLM-managed property approximately 150 feet from the Colorado River. Based on this finding, DTSC has ordered PG&E to prepare and submit Interim Measures ("IM") Workplan No. 2 "to immediately begin pumping, transport and disposal of groundwater from existing monitoring wells at the MW20 cluster." These monitoring wells are located on BLM-managed property. To facilitate the coordination of BLM and DTSC authorities for responding to groundwater contamination from the PG&E facility, this Action Memorandum authorizes PG&E to perform the activities described in IM Workplan No. 2, as specified herein.

III. THREATS TO PUBLIC HEALTH, OR WELFARE, OR THE ENVIRONMENT

As documented by recent groundwater sampling results, hexavalent chromium has been detected in significant concentrations in wells within 150 feet of the Colorado River. The Colorado River is an important drinking water source utilized by the Metropolitan Water District of Southern California, which provides drinking water to approximately 18 million people. While investigation to date has not yet confirmed that contaminated groundwater has reached the Colorado River, the proximity of the groundwater plume to the River constitutes an actual or potential threat of contamination of a significant drinking water supply. In addition, the proximity of the groundwater plume to the Colorado River constitutes an actual or potential threat to the environment.

IV. ENDANGERMENT DETERMINATION

Actual, ongoing, or threatened releases of hazardous substances through groundwater may continue to migrate toward the Colorado River and may reach the River if not addressed by implementing the time critical removal action described in Attachment 1 of this Action Memorandum. This time critical removal action is necessary to prevent or abate the release or substantial threat of release of hazardous substances into the Colorado River. Due to the proximity of the groundwater plume to the River, BLM determines, in accordance with Section 300.415(b)(2) of the National Oil and Hazardous Substances Contingency Plan ("National Contingency Plan" or "NCP"), 42 U.S.C. §300.415(b)(2), that a time critical response is necessary.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

As described specifically in Attachment 1, which is incorporated herein, the proposed time critical removal action is to pump, and transport and dispose offsite, groundwater from existing monitoring wells at the MW20 cluster in order to achieve a net reversal of the groundwater gradient away from the Colorado River. Activities on BLM-managed land called for in any transportation plan, site health and safety plan, or other plans identified in Attachment 1 that have not yet been reviewed and approved by BLM are authorized by this Action Memorandum: provided, however, that such plans are subject to BLM review and approval prior to implementation.

In the event such reversal of gradient is not achieved by pumping from the existing wells identified in Attachment 1, additional existing wells may be pumped, or new wells may be sited, installed, tested and pumped, to achieve such reversal. Any such additional wells are authorized by this Action Memorandum: provided, however, that utilization of such wells is subject to BLM review and approval prior to installation or pumping.

Because such actions will be financed by PG&E, BLM has not determined the estimated costs to implement this time critical removal action.

VI. EXPECTED CHANGE IN SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

In the event response action is delayed or not taken, hazardous substances may be released, or there is a substantial threat of such release, into the Colorado River.

VII. OUTSTANDING POLICY ISSUES

BLM is coordinating this time critical removal action with work required of PG&E pursuant to the Corrective Action Consent Agreement issued by DTSC. This coordination of BLM CERCLA authorities and State RCRA authorities is intended to facilitate and streamline PG&E's performance of work necessary to protect the Colorado River. BLM must ensure, however, that such work is performed in a manner consistent with CERCLA, the National Contingency Plan (42 U.S.C. Part 300), and other applicable Federal requirements. In the event that Federal requirements are not satisfied through this coordination effort, BLM may be required to initiate, or require PG&E to perform, activities independent of State law.

VIII. ENFORCEMENT

BLM and DOI have determined that PG&E is a responsible party pursuant to Section 107 of CERCLA, 42 U.S.C. § 9607. As defined by CERCLA, PG&E is the owner and operator of the PG&E facility from which hexavalent chromium has been released into the environment. Hexavalent chromium is a hazardous substance under CERCLA.

By letter dated February 12, 2004, DOI has notified PG&E of its potential liability under CERCLA and has requested that PG&E enter into an administrative order on consent ("AOC") by which PG&E would agree to reimburse DOI, BLM, and other DOI bureaus for response costs incurred in overseeing PG&E's performance of response action on Federal property. In the event that DOI is unable to reach an agreement with PG&E over the terms of this AOC, DOI may decide to take response action unilaterally, may initiate enforcement action or take any other measures necessary to direct or require PG&E to perform response action, and seek to recover all response costs incurred from PG&E.

IX. RECOMMENDATION

This decision document identifies the current proposed time critical removal action to prevent or abate releases of hexavalent chromium from the PG&E facility from migrating to the Colorado River. BLM has determined that PG&E is capable of performing this removal action in a manner consistent with the NCP, contingent on PG&E's full compliance with the requirements of this Action Memorandum including Attachment 1. Conditions at the site meet the criteria for undertaking the proposed time critical removal action, as specified by Section 300.415 (b)(2) of the NCP, 40 CFR § 300.415(b)(2). We recommend your approval of the proposed time critical removal action.

Carl Rountree

Approval

3/3/04

Date

Disapproval

Date

Attachment:

Interim Measures Workplan No. 2

Appendix A8:
Pore Water Study Draft Work Plan

Pacific Gas and Electric Company®

Yvonne J. Meeks
Site Remediation - Portfolio Manager
Environmental Affairs

6588 Ontario Road
San Luis Obispo, CA 93405
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E-Mail: YJM1@pge.com

October 31, 2005

Norman Shopay
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

Subject: Revised Pore Water and Seepage Study Work Plan
PG&E Topock Compressor Station, Needles, California

Dear Mr. Shopay:

Enclosed is the *Revised Pore Water and Seepage Study Work Plan* for the Pacific Gas and Electric Company (PG&E) Topock Compressor Station. This work plan reflects revisions described in the Department of Toxic Substances Control comment letter dated October 20, 2005. To accelerate implementation of the study, this revised work plan is being submitted in advance of the November 9, 2005 deadline.

Among the revisions reflected in this work plan is the addition of river bottom sediment sampling to determine whether aerobic or anaerobic conditions are present in the shallow river sediments. The field activities associated with the river bottom sediment sampling are fully described in this work plan. Additional information on specific analytical scope and analytical methods proposed for the sediment samples will be described in a separate Technical Memorandum for DTSC review and approval.

Please contact me at (805) 546-5243 if you have any questions or if you need additional information.

Sincerely,

Julie Eaking for Yvonne Meeks

Enclosure

cc: Kate Burger, DTSC
Karen Baker, DTSC
Aaron Yue, DTSC

Revised Pore Water and Seepage Study Work Plan

PG&E Topock Compressor Station
Needles, California

October 31, 2005

Prepared for

California Department of Toxic Substances Control

On behalf of

Pacific Gas and Electric Company

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, CA 94612

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Acronyms and Abbreviations

BLM	United States Bureau of Land Management
BN&SF	Burlington Northern & Santa Fe
BOR	United States Bureau of Reclamation
Cr(VI)	hexavalent chromium
Cr(T)	total dissolved chromium
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeter
CWG	Consultative Workgroup
DQO	Data Quality Objective
DTSC	California Department of Toxic Substances Control
E&E	Ecology and Environment, Incorporated
ESA	Endangered Species Act
FT/SEC	feet per second
GPS	Global Positioning System
HNWR	Havasu National Wildlife Refuge
HSP	Health and Safety Plan
ID	identification
IDW	investigation derived waste
IM	Interim Measure
IW	injection well
NEPA	National Environmental Policy Act
NPT	national pipe taper
ORP	oxidation-reduction potential
QAPP	Quality Assurance Project Plan
PG&E	Pacific Gas and Electric Company
PWSS	Pore Water and Seepage Study

RFI	Resource Conservation and Recovery Act Facility Investigation
SAFPM	Sampling, Analysis, and Field Procedures Manual
SAP	Sampling and Analysis Plan
SETAC	Society of Environmental Toxicology
SOP	Standard Operating Procedure
TWG	Technical Working Group
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station in Needles, California, under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). On June 9, 2005, DTSC issued a letter entitled "Requirement for Submittal of Pore Water and Seepage Workplan, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California (United States Environmental Protection Agency [EPA])" to PG&E (DTSC 2005a). In that letter, DTSC required that PG&E begin planning for pore water sampling and seepage measurements in the Colorado River.

Figure 1-1 shows the location of the Topock Compressor Station, site features, and the approximate study area for the proposed Pore Water and Seepage Study (PWSS).

1.1 Investigation Background

Per DTSC's June 9 letter, PG&E submitted a technical memorandum entitled *Conceptual Approach for a Pore Water Sampling and Seepage Study* on June 27, 2005 (CH2M HILL 2005a). The technical memorandum presented an approach and focused on a set of pore water sampling methods that may be applicable to the site. In a letter dated June 30, 2005, DTSC provided comments and further recommendations for the PWSS (DTSC 2005b).

PG&E submitted a *Pore Water and Seepage Study Overview* (CH2M HILL 2005b) on July 13, 2005 in compliance with DTSC's letters of June 9, 2005 and June 30, 2005 and following consultation with DTSC during conference calls on June 29 and July 6, 2005. DTSC summarized comments and input by the Technical Working Group (TWG) in an August 9 memorandum (DTSC 2005c). The *Pore Water and Seepage Study Work Plan* (CH2M HILL 2005c) was submitted in accordance with DTSC's September 6 letter (DTSC 2005d), discussions during the TWG meeting on July 20, 2005, and subsequent conference calls.

A TWG meeting on October 18, 2005 discussed technical issues and modifications to the PWSS scope that was described in the September Work Plan. A DTSC letter dated October 20, 2005 provided comments and directives for the PWSS, which included eliminating the seepage portion of the study (DTSC 2005e). This report was developed in response to the October 20 letter.

1.1.1 Overview of Current Site Characterization and Monitoring

In July 2004, PG&E submitted a *Sampling and Analysis Plan, Groundwater and Surface Water Monitoring* (SAP) (CH2M HILL 2004a) that describes the scope, schedule, and sampling and analysis procedures for the ongoing Groundwater and Surface Water Monitoring Program. The SAP, approved by DTSC, establishes specific objectives for surface water monitoring at the Topock site, including routine monitoring of near-shore Colorado River locations both upgradient and downgradient of the Topock site. This program has been augmented by ongoing collection of depth-specific surface water samples in the river channel, which commenced in July 2005 (DTSC 2005f). The depth-specific river channel sampling stations

are located approximately one-third of the river width from the corresponding shoreline stations, on the California side (see Figure 1-2). Samples are collected 1 foot from the bottom of the river channel, halfway through the water column, and within 1 foot of the water surface (Revised SAP) (CH2M HILL 2005f). This pore water sampling and seepage study was developed to yield results that can be used in conjunction with those of the surface water sampling program.

1.1.2 Previous Pore Water Sampling

Two studies of shallow sediment pore water quality have been conducted previously, each using a different method. In both studies, samples were obtained from the edge of the Colorado River in the immediate vicinity of the Topock site and at various upstream reference locations. Samples were collected in 2003 by Ecology and Environment, Inc. (E&E), and the results were reported as part of the Draft and Final Resource Conservation and Recovery Act Facility Investigation reports (RFI) (E&E 2004; CH2M HILL 2005d). In 2001, the United States Geological Survey (USGS) collected and analyzed river sediment samples (May et al. 2002) for the United States Fish and Wildlife Service (USFWS), and reported the results in a report dated March 2004 (Ingersoll et al. 2004).

In their June 9 letter (DTSC 2005a), DTSC concluded that the data set presented in the RFI was inadequate to assess the fate and transport of chromium in site groundwater. Additional discussion of both the 2003 E&E results and the 2004 USGS results, including a discussion of the limitations of that data, is provided in detail in the *Pore Water and Seepage Study Overview* (CH2M HILL 2005b).

1.2 Site Conceptual Model

The Topock site is located at the extreme southern end of the Mohave Valley, just above where the river enters the Topock Gorge. Bedrock outcrops to the south and west of the site create barriers to groundwater flow (Figure 1-1). In contrast to the overall trend of southerly groundwater flow throughout most of the Mohave Valley, groundwater flow directions at the Topock site are predominantly north to northeasterly. Groundwater at the Topock site is recharged primarily from local precipitation rather than from the Colorado River. Consequently, due to the limited amount of local recharge, the groundwater gradients at the Topock site are very slight.

Interaction of groundwater with the Colorado River is complex. The daily fluctuations in river stage, typically several feet each day, cause the surface water-groundwater interaction at this site to be very dynamic. Water levels in wells located several hundred feet from the river fluctuate on the order of feet due to fluctuations in river stage. In this way, the Colorado River can switch between a gaining stream and a losing stream daily.

The stage of the Colorado River also varies seasonally in response to upstream dam discharge for resource management and electricity production. During spring and summer months, the river stage is higher than surrounding groundwater levels, and groundwater gradients indicate recharge to the aquifer occurs. During the fall and winter, river levels drop several feet and groundwater gradients are generally towards the river. Metzger and Loeltz (1973) reported that the Colorado River is by far the principal source of recharge to groundwater in the Mohave Valley. However, this does not appear to be true across most of

the Topock site, where the geochemistry indicates that the groundwater system is recharged from precipitation on the nearby mountains and infiltration from the intermittent flows in the desert washes.

The Colorado River affects groundwater levels at the Topock site. Wells completed in the fluvial sediments near the river often show substantial influence due to river stage fluctuations, caused by Davis Dam release patterns. For a 1 foot change in river level, some wells, such as the MW-34 wells, respond with a corresponding head change of over 0.6 foot. The magnitude of head change observed at a well is in some cases clearly a function of distance from the river. Due to these river fluctuations, groundwater gradient shifts direction daily as well as seasonally in the floodplain area. The alluvial wells are also affected; seasonal river influences on groundwater hydraulic head have been observed as far away as well MW-16, located southwest of the evaporation ponds and more than 4,500 feet from the Colorado River.

1.3 Primary Study Objectives

The primary objectives of this study, as outlined in the August 9 DTSC memorandum (DTSC 2005c), are to:

1. Assess chromium concentrations in pore water at multiple locations within the zone that has been historically downgradient of the chromium plume observed in the floodplain, during the next seasonal low river stand.
2. Assess chromium concentrations in pore water at multiple locations that are historically upgradient of Bat Cave Wash, during the next seasonal low river stand.
3. Assess whether geochemical conditions in shallow sediments below the Colorado River favor chromium reduction.

1.4 Secondary Study Objectives

The secondary objectives of this study, as outlined in the August 9 DTSC memorandum, are to:

1. Conduct a pilot study to assist in selecting certain sampling design elements of the Pore Water and Seepage Study. The pilot study should determine the following:
    a. Depth of influence from diurnal river level fluctuation. The results will be used to select pore water sampling depths with DTSC consultation.
    b. Real-time exchange parameters that can be used to identify zones of groundwater-surface water exchange. The results will be used to determine whether a full scale seepage study should be conducted.
    c. Expected penetration depth capabilities of selected seepage and pore water sampling method(s) in the Colorado River sediments. The results will be used to select the appropriate sampling method.

2. Collect data that will allow estimates of the mixing ratio between surface water and groundwater within the zone of this investigation.

1.5 Data Interpretation and Considerations

Pore water sampling is generally performed as part of an ecological risk assessment on the benthic community, where microbial, meiofaunal, and macrofaunal receptors are the subject of analysis (SETAC 2001). These studies primarily focus on toxicity testing. The term "pore water" has a specific meaning to toxicologists; it refers to interstitial water in the uppermost 10 centimeters (cm) of sediment where the benthic organisms live. However, for the purposes of this PWSS, pore water is characterized as water in pore spaces immediately beneath the river.

The presence of constituents of concern in pore water does not provide direct indication of any impact to the overlying surface water. To evaluate the surface water impact, it is necessary to quantify the concentrations of constituents of concern, the magnitude of pore water flux to the overlying surface water, and the geochemical environment in the river substrate. At the Topock site, a pump-and-haul remediation system operated from March 2004 until August 2005. A pump-and-treat on-site remediation system has been operating since August 2005. The extraction wells have been effective at controlling groundwater gradients in the floodplain near the river and for some distance under the river. Within the zone of influence of TW-2D pumping, located about 600 feet from the Colorado River, constituents in pore water (if present) would tend to migrate downward, away from the river.

Hexavalent chromium [Cr(VI)] is also naturally occurring in aerobic groundwater in the Mohave Basin. Studies are currently underway to evaluate the concentrations of natural background Cr(VI) in the vicinity of the Topock site. Thus, Cr(VI) in pore water could be associated with naturally-occurring Cr(VI). A detection of Cr(VI) in pore water could indicate:

- There is naturally-occurring Cr(VI) in pore water.
- There is naturally-occurring Cr(VI) in nearby groundwater.
- The surface water contains Cr(VI).
- A sampling error occurred (many of the potential pore water sampling techniques are untested or could introduce interference).
- A laboratory error occurred or the limits of the laboratory precision methods were exceeded (as was the case with the USFWS sampling).
- The Cr(VI) is associated with the Topock site.

2.0 Study Approach and Rationale

2.1 Overview of Study/Work Plan Design

In their letter dated September 6 (DTSC 2005d), DTSC directed PG&E to submit a *Draft Pore Water and Seepage Study Work Plan* and to begin the process of obtaining permits, agreements and contractors for implementation. The following activities are proposed to plan, permit, and execute the seepage and pore water study:

- Submittal of a Draft Work Plan to DTSC on September 30, 2005.
- Review the Draft Work Plan by DTSC and, if necessary, the TWG.
- Preparation and submittal of a Final Work Plan.
- Securing of permits, approvals, and certifications.
- Procurement of specialty subcontractors and equipment (which may require significant lead times).
- Performance of an initial river sediment seepage/temperature survey and (utilizing temperature dataloggers), and pilot sampling test to evaluate the proposed pore water sampling methodologies (see Section 3.0).
- Pore water sampling to determine if Cr(VI) is in the pore water below the river - both upgradient and downgradient of the Bat Cave Wash outlet (see Section 4.0).

This Work Plan summarizes the approach and proposed investigations for the pore water and seepage study based on the October 20 DTSC letter. It presents the background, study approach, methods review, permitting, procurement, implementation plan, reporting, and schedule for the PWSS. The preferred and alternative methods for the pore water and sediment sampling are discussed. The appendices contain additional technical information on the proposed sampling methods, standard operating procedures, and the Health and Safety Plan (HSP).

2.2 Study Design Considerations

The physical location of the sediment, its particle size distribution and level of compaction, and the final use of the data typically dictate the type of sampler used and the collection methodology that is chosen (USEPA 2001, SETAC 2001). Site conditions of particular importance include the depth of the water body overlying the sediment and the strength of the river current.

The potential sampling locations at the Topock site will be subject to water turbulence and high water velocities (2 to 3 feet per second [ft/sec]), resulting in conditions where it may be difficult for a boat to maintain a fixed position. The Colorado River level at the Topock site varies almost continuously in response to the variable release of water from Davis Dam, and

to a lesser degree in response to changes in the water level of Lake Havasu. Seasonally, the average river level at the I-3 gauge varies by about 5 feet. Daily variations at I-3 can exceed 4 feet in the summer and 1 foot in the winter.

3.0 Phase I Investigations and River Sediment Sampling

3.1 Phase I Pilot Study

This section describes the proposed methods and locations for conducting the Phase I investigation and pilot testing, and the additional river sediment sampling activity. The specific methods, procedures, and sampling details are presented in Section 6.0.

An aerial photograph of the Topock Compressor Station, Colorado River, and the downstream area of the PWSS is provided in Figure 3-1. The Colorado River in this area ranges from approximately 600 feet wide (north of Burlington Northern & Santa Fe [BN&SF] railroad bridge) to approximately 450 feet wide south of the I-3 gas transmission crossing. Based on three depth transects measured in July 2005, the depth of the river is approximately 12 feet in most study areas, with a maximum recorded depth of 22 feet near the southern portion of I-3 river crossing. The locations of the three depth transects on the river are also presented in Figure 3-1. Figure 3-2 presents the cross sections of the depth transects.

To determine the effectiveness and feasibility of the proposed methods for the pore water sampling, a pilot study (Phase I) will be conducted. This study will involve the deployment of TidbiT® temperature sensors and testing of the pore water sampling methods. Figure 3-3 presents the proposed Phase I study area.

3.1.1 Pilot Study Methods and Locations

The TidbiT® temperature sensors will be placed at ten locations in the river, at 1-foot 3-feet, and 6-feet depth intervals below the river bottom. The results would ideally provide an estimate of the depth of temperature fluctuation caused by diurnal river level changes. The depth of investigation for the pore water sampling would be selected based the results of the pilot study. The TidbiT® sensors will be deployed by pumping river water down an installing pipe from a stationary boat. After emplacement of the sensors, the pipe will be removed, leaving the sensors buried in the river bottom. A cable will be attached to the sensors and will extend above the river bottom. After approximately 1 week of exposure time, the sensors will be retrieved using the attached cable and the data will be downloaded.

3.1.2 Pilot Testing of Sampling Methods

During the same mobilization as the TidbiT® sensors deployment, two drive-point methods (the Harpoon™ sampler and the drive-point piezometer) will be tested to determine the depths below the river bottom to which each method can penetrate, evaluate the proposed sampling methodology, and test the disturbance to the bottom sediments and noise levels. These methods are described in detail in Section 4.0. A test pore water sample will be collected and sent to the laboratory to determine if there is matrix interference but the sample will not be analyzed for chromium. The TidbiT® deployment and the pore water

sampling method testing will be conducted from an anchored boat. Details of the pilot study design were presented in a September 16, 2005 technical memorandum that has been shared with the permitting agencies.

3.2 River Bottom Sediment Sampling

Sediment cores will be collected from 10 locations on the Colorado River adjacent to the site, and analyzed for a variety of indicator parameters to assess whether anaerobic conditions are present in the shallow river bottom sediments. The proposed analytes are geochemical indicators that distinguish aerobic zones from anaerobic zones. A multiple lines-of-evidence approach, in conjunction with the results from the pore water sampling will be used to evaluate the encountered sediment conditions.

3.2.1 Objective

The objective of river bottom sediment sampling is to assess the geochemical conditions in shallow sediments below the Colorado River, primarily to determine whether aerobic or anaerobic conditions are present in the shallow river sediments.

3.2.2 Sample Locations and Timing

Figure 3-4 presents the proposed sediment sampling locations. The samples will be collected from the approximate location of 10 of the 16 pore water sampling transects. GPS (Global Positioning System) coordinates will be recorded for each sediment sampling location on the river.

The river sediment sampling is an independent PWSS activity that could be performed either concurrent with the Phase 1 or Pore Water Sampling (Section 4.3) mobilizations, or as a separate mobilization. Additionally, the timing for conducting the river sediment sampling does not need to be as tightly coordinated with seasonal or diurnal river stage conditions as does the pore water sampling. The geochemical conditions of the sediments are not as likely to change as quickly as the conditions of the pore water. The scheduling of the river sediment sampling will be assessed after permits and approvals are obtained and the implementation schedules for the Phase 1 and Pore Water Sampling have been confirmed.

3.2.3 Analytical Parameters and Testing

The sediment samples will be analyzed for geochemical parameters and particle- size distribution to assess the geochemical and physical conditions of the Colorado River sediments in the PWSS area. The proposed sediment collection and preservation methods are described in Section 6.1.2.2. The rationale and specific analytical scope and analytical methods proposed for the sediment samples are being developed and will be described in a separate Technical Memorandum for DTSC review and approval. The Technical Memorandum will be submitted prior to the sediment sampling.

4.0 Pore Water Sampling

4.1 Review of Methods

A review of the potential methods for pore water sampling was presented in the *Pore Water and Seepage Study Overview* submitted in July 2005 to DTSC (CH2M HILL 2005b). Table 4-1 provides a list of pore water sampling methods that were discussed and evaluated.

4.2 Rationale for Preferred Method

As specified by DTSC's August 9 memorandum (DTSC 2005c), drive-point samplers are to be used to conduct the pore water sampling activity. With this methodology, drive-point samplers are advanced into river sediments for collection of pore water samples via a purge pump (i.e., a peristaltic pump). The objective is to penetrate to depths below the zone of influence from diurnal river level fluctuation, if possible. Drive-point sampling should prove effective for the following reasons:

1. Divers are not required for drive-point sampling. The section of the Colorado River near Topock has fairly heavy boat traffic and a fast current, posing a significant health risk to divers.
2. Diffusion sampling would require two diver mobilizations, one to deploy the samplers, the other to retrieve the samplers a week later.
3. Diffusion samplers are unproven for chromium studies and would require a separate pilot study to evaluate their effectiveness.
4. Drive-point samplers will allow sampling of a wider area and multiple depths over a shorter period of time compared to diffusion samplers.
5. Drive-point sampling should be effective under conditions of moving currents and during various river level stages.
6. Drive-point sampling will not cause excessive disturbance to the river bottom.
7. Drive-point sampling will enable the collection of field water quality parameters.
8. Drive-point samplers are a demonstrated technology.

Disadvantages of drive-point sampling include: (1) limitations of discrete sampling events that do not capture average conditions, (2) potential difficulty in completely sealing the drive points from river water infiltration, and (3) potential difficulty in advancing drive points in coarse river bottom material.

Two specific types of drive-point sampling methods will be tested during the pilot study: the Pushpoint Harpoon™ sampler and drive-point piezometers. Below are descriptions of these two methods, with more detailed technical specifications and photographs included in Appendix A.

Harpoon™ Sampler: Consists of a ¼" diameter stainless steel drive point that is 22" long. It is attached to a 7/8" diameter coupler that is connected to ½" diameter metal tubing which extends to the surface. The sampler is advanced by hand up to 22" deep into sediment. Pore water is pumped to the surface with a peristaltic pump through 3/8" diameter polyethylene or Tygon® tubing inside the sampler piping.

Drive-Point Piezometers: Consists of ¾" to 1.5" diameter stainless steel drive point attached to steel pipe of same diameter. It can be advanced by hand or with a manual or vibrating power hammer. The screened interval from which the sample is drawn is approximately 6" in length. Similar to the Harpoon™ sampler, water is pumped to the surface through polyethylene or Tygon® tubing for sampling.

Of the two drive-point sampling methods presented, the Harpoon™ sampler is the preferred method. Although the depth of sample collection is limited, it will have less impact on the river bottom than the drive-point piezometer. The pilot study will determine the effective sampling depths of these methods. If the Harpoon™ proves incapable of reaching the desired sampling depths then the drive-point piezometer will be used to collect samples at the desired depth.

4.3 Locations and Sample Timing

Figure 4-1 presents the 16 proposed transect locations for the PWSS – eight transects upgradient of the site, and eight transects adjacent to or downgradient of the site. DTSC's June 30 letter recommended that each upgradient transect have three to four sampling locations and each downgradient transect have four to five sampling locations (DTSC 2005b). To develop robust sample populations both up- and downgradient of the site, each transect will have four sampling locations, for a total of 64 sampling locations in the study area. Some locations may be revised based on the encountered channel depth, morphology, current, and sediment conditions. A depth-discrete sample will be collected at each sampling location, with the appropriate depth of investigation to be determined by the results of the pilot study. In response to the daily river level fluctuations, the hydraulic head in the shallow sediments beneath the river is expected to shift daily. The objective therefore will be to sample at a depth that is below the zone of diurnal surface water influence in the river bottom, as indicated by consistent temperature measurements over a daily cycle.

Pore water sampling is planned as a one-time event in mid-December, pending agency approvals and permissions. The duration of the event will be determined based on the results of the pilot study. PG&E is planning to request that BOR temporarily stabilize the river levels before and during the sampling period to minimize the effects of daily river fluctuations on pore water characteristics. Low water levels will enable sampling in shallower water from a watercraft. CH2M HILL will coordinate the sampling dates with the BOR. To minimize the risk of accident or injury to sampling personnel and the boating public, the pore water sampling will be conducted during daylight hours, when visibility on the water is greatest.

4.4 Analytical Parameters

All pore water samples will be analyzed for the following analytes: Cr(VI), total dissolved chromium [Cr(T)], specific conductance, and pH. Samples collected for Cr(VI) and Cr(T) will be filtered and preserved at the time of collection in the field, similar to the depth-discrete river channel water sampling procedures. The water quality field parameters that will be measured at each of the sampling locations with a flow-through cell include: specific conductance, temperature, pH, oxidation-reduction potential (ORP), and dissolved oxygen. Analytical methods and reporting limits for both the laboratory and field parameters are presented in Table 4-1. Quality control procedures for both field and laboratory work are discussed in Section 7.0.

Stable isotopes (oxygen 18 and deuterium) were considered for inclusion in the pore water analyte set. If there was a distinct difference between stable isotope ratios in pore water and river water, comparison of stable isotope ratios between river and pore water could provide an estimate of the degree of mixing between river water and groundwater. A review of the existing stable isotope data was undertaken to determine if the pore water might have a stable isotope signature distinct from the river. Shallow floodplain wells near the river provide the closest analog to pore water. These wells include MW-27-20, MW-28-25, MW-29, and MW-43-25. The stable isotope data from this set of shallow wells is plotted along with the stable isotope data from river samples in Figure 4-2. There is no distinguishable difference in the stable isotope data from the shallow wells and the river. Pore water represents a mixture of river water and shallow groundwater and would be expected to have an isotopic signature between river water and shallow groundwater. Because the two end members that make up pore water (river and shallow groundwater) are isotopically indistinguishable, pore water would also be expected to be isotopically indistinguishable from either river water or shallow groundwater. Stable isotope analysis was therefore not included in the pore water study analyte set.

5.0 Permitting and Procurement Activities

5.1 Permitting Agencies and Preliminary Permit Requirements

Both the California and Arizona sides of the Colorado Riverbed in the proposed study area are owned by the California State Lands Commission. However, activities at the surface of the river and above the riverbed in the study area are subject to the jurisdiction of the USFWS Havasu National Wildlife Refuge (HNWR). The HNWR encompasses the entire Colorado River south of the BN&SF railway, and the Arizona portion of the river north of the railway. The United States Bureau of Land Management (BLM) manages the California portion of the Colorado River north of the BN&SF railway, on behalf of the BOR. PG&E will seek approval to perform the PWSS pursuant to the February 2005 Consent Agreement, which was entered into by PG&E and the USFWS, BLM, and BOR. The State Lands Commission has indicated that a "letter of non-objection" will be issued to approve the proposed PWSS.

Based on discussions with the USFWS HNWR staff, approval to implement the PWSS will involve review of the PWSS work plan and consultation with the ecological services section of the USFWS, to ensure compliance with the federal Endangered Species Act (ESA). This consultation process may be completed within a 30- to 45-day period following submittal of the final PWSS work plan. It is expected that final approval by the USFWS HNWR will include stipulations related to ecological resources. A similar process will apply to obtain approval from the BLM Lake Havasu field office, to implement the PWSS north of the BN&SF railway in the California portion of the river.

It is anticipated that the federal agencies will conduct formal government-to-government consultation with potentially affected Native American tribes, during which the tribes will have the opportunity to provide input on the proposed PWSS. BLM has indicated that no consultation with the State Historic Preservation Office (SHPO) will be required for this activity.

Activities that involve dredge and fill activities in the Colorado River are subject to Sections 401 and 404 of the federal Clean Water Act. The United States Army Corps of Engineers (USACE) administers Section 404 of the Clean Water Act, and have previously indicated that actions undertaken pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) are considered exempt. A similar exemption has been provided by the California Regional Water Quality Control Board, which administers Section 401 of the Clean Water Act. Because the PWSS is considered a CERCLA activity, it is expected that this exemption would apply.

Other agencies with jurisdiction over the proposed PWSS activities include the California Department of Fish and Game, and the Arizona Department of Game and Fish. It is expected that the USFWS consultation process will satisfy any state requirements, such that a separate consultation with these agencies will not be required.

Final approval to implement the PWSS will come from the DTSC. Because this approval is considered a discretionary action, approval of the PWSS is subject to the provisions of the California Environmental Quality Act (CEQA). DTSC has indicated that a Categorical Exemption will be the appropriate mechanism for compliance with CEQA.

5.2 Subcontractors and Procurement

Preliminary work scoping and scheduling has been conducted with subcontractors to ensure that work can proceed according to the schedule outlined in Section 9.0. Anticipated subcontractors include: California-certified analytical laboratories, subcontractor for the pilot study, and up to three boats for the pore water sampling event. Other subcontractors will be procured as the investigation progresses. Materials and supplies will also be procured as needed.

6.0 Study Implementation Plan

This section outlines the necessary procedures to implement the PWSS. Deployment, investigation and sampling techniques, contingency plans and health and safety issues are discussed.

6.1 Field Activity Procedures

6.1.1 Sampling Deployment

All three phases of the project (pilot study, sediment sampling, and pore water sampling) will be conducted from one or more boats in the Colorado River channel. During sampling procedures, the boat will be held stationary by deploying anchors upstream if it is to remain at the location for a relatively long period. For quick measurements, the boat may remain stationary by utilizing the engine.

6.1.2 Sampling Procedures

Sampling procedures for the three phases of the Pore Water and Seepage Study are discussed below. Detailed procedures are included as Standard Operating Procedures (SOPs) in Appendix B.

6.1.2.1 Temperature Survey

TidbiT® temperature sensors will be deployed for an initial temperature survey during the pilot study. The TidbiT® is a self-contained unit approximately 1.5" in diameter. A metal pipe 0.75 to 1.5" in diameter, deployed from a stationary boat, will be used to install the TidbiT® sensors in the river bottom by 'jetting'. River water will be pumped down the pipe and out a nozzle at the end. The water jet emanating from the nozzle of the pipe will loosen and temporarily displace the sediments in the immediate vicinity, allowing advancement of the pipe into the river bottom. Depending on the characteristics of the sediment, temporary increases in river turbidity may occur near the river bottom in the immediate vicinity of the pipe during the jetting process. Each hole is expected to take approximately 10 minutes to complete.

A TidbiT® sensor will be attached to the jet pipe as it advances, and will be released when the jet pipe is pulled back. Alternatively, a TidbiT® sensor may be inserted through the center of the jetting pipe after it has been inserted into the river bottom. The TidbiT® sensors will be left behind in the river bottom as the pipe is extracted. The surrounding sediments are expected to collapse around the sensor upon removal of the jet pipe. Each TidbiT® will be attached to a stainless steel wire or small diameter cable that extends to the river bottom surface and is marked with brightly-colored nylon rope. The rope will be weighted so that it does not float up off the river bottom and into the path of passing boats. (GPS) coordinates will be logged to enable recovery. After approximately 1 week, a crew in a boat will use a winch to retrieve the TidbiT® sensors.

6.1.2.2 River Bottom Sediment Sampling

Sediment cores will be collected using the GeoProbe® Macro-Core® drive point system. The Macro-Core® consists of a 1 ½" diameter piston operated sampler with a PVC liner. It can be advanced by hand or with a manual or vibrating power hammer. An O-ring on the tip ensures that the sampler remains sealed until the desired sampling depth is reached. Once the top of the sampling interval is reached, the stop-pin and piston rod are pulled up and the sampler is driven to collect the sediment sample at the desired interval. See Appendix A for technical details on the Macro-Core® drive point system.

Sediment cores will be up to 2 feet long and will be collected from approximately 6" to 30" below the river bottom. The exact depth of penetration of the Macro-Core® will depend upon the grain size and degree of consolidation of bottom material.

In the event that the 1 ½" diameter core samplers are not successful in recovering river sediments, smaller (1" diameter) or larger (4" diameter) core samplers may be used, depending on the nature of difficulty encountered with the 1 ½" diameter samplers.

The 2-foot long PVC Core liners will be removed from the Macro-Core® sampler and immediately capped with plastic tube caps. Any head space within the liners will be purged with nitrogen prior to capping. The cores will then be sealed using "Protecore" (plastic/aluminum laminate) sleeves. The Protecore sleeves will also be purged with nitrogen during sealing to remove any oxygen. The Protecore sleeve will be labeled, and placed in an ice chest. Selected cores will be submitted to a state-certified laboratory under proper chain-of-custody documentation, for analysis of the parameters proposed in the subsequent Technical Memorandum.

6.1.2.3 Pore Water Sampling

The pore water sampling method (Harpoon™ or drive-point piezometer) will be determined by the outcome of the pilot test and with regulatory approval. A drive-point sampler will be driven by hand or a power hammer to the desired sampling depth. Once the sampling depth has been reached, pore water will be pumped to the surface through a $^{3}/_{8}$"diameter polyethylene or Tygon® tube. Pumped water will be diverted to a flow-through cell that measures basic water quality parameters (temperature, specific conductance, dissolved oxygen, salinity, oxidation-reduction potential, etc.). Approximately three sampler volumes will be pumped to purge the drive-point sampler and a water sample will be collected. No more than 10 liters of water will be pumped from each sample location. Pumped water will be collected on the boat. The sampling device will be pulled back to the surface and the hole will collapse behind it. Nothing will be left on the river bottom. Very little sediment disturbance is anticipated with this method. At the end of the day, or when water storage on the boat reaches capacity, the purge water will be transferred to the investigation derived waste (IDW) tank on the Topock site. This tank is used to store all purge water from groundwater sampling at the site. A PG&E subcontractor is responsible for analyzing and disposing of the water in the IDW tank.

6.1.3 Health and Safety

The *Topock Health and Safety Plan* (Revision 8) covers the work described in this Work Plan and is presented in Appendix C. The reach of Colorado River near the Topock site is subject

to a significant amount of boat traffic. The sampling procedures must address the health and safety of personnel during sampling, potential hazards to navigation or recreational users, and the security of any dedicated equipment deployed on the river bottom. In the past year, boat collisions have resulted in fatalities near Topock.

All of the proposed methods will require boats to be anchored in the river channel, which would be much a greater navigation hazard at night when anchor cables would not be visible. To minimize the risk to sampling personnel and the boating public, all parts of the study will be conducted during daylight hours when visibility on the water is greatest.

6.2 Contingency for Alternative Study Methods

6.2.1 Pore Water Sampling

The sample depth of the pore water sampling will be determined from the results of the Phase I TidbiT® temperature survey. If the results of the pilot study are inconclusive, samples will be collected from the maximum achievable depth for the selected pore water sampling method. Subsurface conditions may prevent pore water sampling at all proposed locations. The Harpoon™ sampler is anticipated to penetrate up to 50 cm while the drive-point piezometer is expected to penetrate 3 to 6 feet below the river bottom.

7.0 Quality Control and Data Management

Quality control procedures will be implemented for both field activities and laboratory work associated with the PWSS. Detailed descriptions of quality control procedures at the Topock site are provided in the Quality Assurance Project Plan for Water Quality Sampling and Analysis (QAPP), which is found in Appendix D of the *Sampling, Analysis, and Field Procedures Manual* (SAFPM) (CH2M HILL 2005e). This plan ensures that data quality objectives (DQOs) are achieved and that validated results may be used for project decision-making purposes.

7.1 Field Quality Control

The QAPP presents requirements for quality control sampling and sample handling and custody procedures to be implemented in the field. Due to the importance of attaining good ORP and other field data, careful measures will be taken to ensure that all field instruments are calibrated and that routine maintenance is performed. Field duplicates and equipment blanks will be collected as specified in the QAPP. Proper decontamination procedures and handling investigation derived waste from the river are described in the SAFPM.

7.2 Laboratory Quality Control

The QAPP outlines quality control requirements for laboratory analyses to be conducted for all PG&E Topock projects. The QAPP addresses data quality objectives; method detection limits, reporting limits, and instrument calibration requirements; laboratory quality control samples; laboratory data management procedures; performance evaluations; preventive maintenance; corrective action; and quality assurance reports. The laboratory analytical data generated from the pore water sampling will be independently reviewed by project chemists to assess data quality and identify deviations from analytical requirements.

7.3 Data Validation

The analytical results of groundwater and surface water samples will be evaluated to verify whether the data are sufficiently accurate, precise, and representative of site conditions for decision-making purposes in support of ongoing site investigation and remediation activities. Details regarding data validation for the Topock PWSS are provided in the QAPP.

7.4 Data Management

Management of data generated from the Topock PWSS will be conducted in accordance with the *PG&E Program Data Management Plan* (CH2M HILL 2004b). The Data Management Plan outlines standardized procedures for field data collection and review, analytical data loading into the information system (environmental database), verification of the uploaded data, quality assurance/quality control procedures associated with data management, and reporting formats.

8.0 Contingency Plan and Reporting

8.1 Contingency Plan

In the event that Cr(VI) is detected in pore water in the downgradient sampling locations, the PWSS Contingency Plan will go into effect. Figure 8-1 presents the events that would occur in the event of a Cr(VI) detection in pore water downstream of the Topock site. The necessity for additional sampling will be determined by a statistical comparison between data from downstream locations and data from background locations. If a Cr(VI) detection at a downstream location is demonstrated to be significantly greater than background detection, the appropriate regulatory agencies will be notified immediately. Additional sampling will then be performed to confirm the detection and further define the distribution of Cr(VI) in the pore water of the river bottom. The contingency sampling would involve the following steps:

a. Re-sampling pore water at location(s) where there was a significant Cr(VI) detection.

b. Sampling pore water 20 feet from the location of the significant detection in four directions. Samples will be collected at the depth of the original detection.

c. Collecting a surface water sample above the pore water detection to determine if Cr(VI) is present in the river channel. Surface water samples will be collected in accordance with the *Revised Sampling Plan and Standard Operating Procedure for Depth-Specific Surface Water Sampling* (CH2M HILL 2005f).

8.2 Data Reporting

The results of the pilot study will be submitted in a technical memorandum approximately 10 days after the recovery and data download of the TidbiT® sensors. Preliminary results from the sediment sampling investigation will be submitted approximately 30 days following the conclusion of data collection. As specified in the DTSC June 30 memorandum (DTSC 2005f), pore water sampling results will be submitted in a tabular format within 7 days of data validation completion.

8.3 Pore Water and Seepage Study Report

A PWSS report with interpretation of findings will be submitted to DTSC 45 days after validation of the pore water sampling data. The report will summarize the findings of the pilot study, the sediment sampling investigation, and the pore water sampling study. Results will be presented in tabular and graphical formats. Distribution and trends of pore water seepage and detects and non-detects of Cr(VI) will be discussed.

9.0 Schedule

Table 9-1 presents the proposed PWSS schedule, with estimated sampling dates for the pilot study, the sediment sampling, and the pore water sampling. The start of each field event is dependent on obtaining all required agency approvals and permissions. The table does not include contingency events and follow-up sampling if required. All days presented are working days.

TABLE 9-1
Project Implementation Schedule
Pore Water and Seepage Investigation
PG&E Topock Compressor Station

Event	Proposed Event Timing	Estimated Duration	Notes
Pilot Study (Phase I)	November 2005	10 days	To begin after all permits have been obtained.
River Sediment Sampling	December 2005 or later	5 Days	Independent activity. Can be combined with Pilot Study, Pore Water Sampling, or performed as a separate mobilization.
Pore Water Sampling	December 2005 (middle)	10 Days (approx)	Duration to be determined after pilot study.

10.0 References

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May, T., R. Wiedmeyer, and W. Brumbaugh. 2002. *Determination of Cr and other Elements in Samples from the Colorado River in the Vicinity of Needles, CA*. United States Geological Survey, Biological Resources Division, Columbia Environmental Research Center. Final Report 02-32-02. Prepared for United States Fish and Wildlife Service, Arizona Ecological Services Field Office. January 18.

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Tables

Table 4-1
Summary of Pore Water Sampling Methods
Pore Water and Seepage Investigation
PG&E Topock Compressor Station, Needles, California

Sampler Type	Description	Sampling Depth Below River Bottom	Sample Volume	Advantages	Disadvantages or Limitations	Proven Applications / References
Discrete Sampling Methods				Provides the most representative sample of pore water at the time of sampling. Much faster and easier to deploy than either diffusion or seepage sampling methods.	Influence of diurnal fluctuations in river level may require sampling only during low water times and limit working hours per day.	
Drive-point piezometers	1.5 to 2-inch diameter pipes driven by hand into river bottom from a boat	Up to 6 ft	Only limited by soil type	- no sample volume limitations - field parameters (e.g., such as DO, ORP, etc.) can be measured with flow-thru cell; limited to suction lift; - could allow for repeat sampling at same locations if drive points were left in place	- Difficult to install in deep water or in swift currents - could not be installed in hard bottom sediments - large diameter of drive points may provide more chance of downward leakage of surface water	Drive points commonly used for Sampling shallow groundwater and have been previously used for pore water sampling at Topock
Harpoon Sampler	1/4-inch diameter probes driven by hand into river bottom from a boat.	Up to 2 ft	Only limited by soil type	- simple and low-cost sample tool - no sample volume limitations - field parameters (e.g., such as DO, ORP, etc.) can be measured with flow-thru cell; limited to suction lift; - could allow for repeat sampling at same locations if Harpoons were left in place - could allow for shore based sampling by routing tubing to river bank	- relatively new and unproven sampler design	None found
Trident® Probe (temperature/ conductivity/pore water probe)	Installed from boat; may require diver assist	Up to 2 ft	50-ml (syringe) or greater in sample bottle	- Can be used manually near the shore or from a boat - provides real-time readout and profiling of temp and SC - can be used to estimate the location of the groundwater/ surface water interface by looking at temperature gradients - air hammer allows installation in harder sediments	- limited to 2 ft sample depth - probe subject to damage if cobbles are encountered	Developed by Space and Naval Warfare Systems Command (SPAWAR); has been used at numerous coastal, lake, stream, and river sites.
Diffusion Sampling Methods				Diffusion sampling methods would provide integrated samples over a long period of time and could provide the most representative samples of the average concentrations present in pore water.	Diffusion samplers have not been widely used for metals. Because equilibration time is likely to be several days, the 24 hour holding time for Cr(VI) analysis could not be met.	
Drive Point Piezometer with LDPE diffusion bottles and temperature loggers (Tidbit)	Boat and/or diver-installed	Up to 6 ft with samples collected at multiple depths	Up to 0.4 L in 10 vials	- easy to construct 1.5-inch diameter drive point piezometers that can be stacked with multiple diffusion bottles and temperature loggers. - can be installed by hand in shallow water or by boat in deeper water (may need diver assist). - samples are time-integrated and can be at multiple depths. - temperature can be logged for the period of installation. for evaluation vertical groundwater flow conditions.	- may require diver assist for installation and will require diver assist for removal. - could allow for resampling at exact same location - not a commercially available product - permitting may be more difficult because pipes are left in river bottom	PDB Demonstration at Grissom ARB, Indiana
LDPE Diffusion bottles buried with temperature loggers (Tidbit)	Diver-installed	Up to 2 ft	Up to 0.3 L in 3 x 100 ml plastic bottles	- bottles may be placed at multiple depths depending on sediment type - temperature loggers can be placed with samplers for evaluation of vertical groundwater flow conditions	- divers required for installation and retrieval - doesn't allow for resampling at exact same spot	Naval Industrial Reserve Ordnance Plant (NIROP), Naval Air Station, Fridley, MN; Fort Worth Joint Reserve Base (NAS Fort Worth JRB), Texas.

Table 4-1
Summary of Pore Water Sampling Methods
Pore Water and Seepage Investigation
PG&E Topock Compressor Station, Needles, California

Sampler Type	Description	Sampling Depth Below River Bottom	Sample Volume	Advantages	Disadvantages or Limitations	Proven Applications / References
Seepage Sampling Methods				Sampling bottom seepage provides a better measure of what is entering the river rather than just what is present in pore water. Seepage samplers can provide measurements of seepage rate.	If no groundwater seepage is occurring at the location where the sampler is deployed, no samples would be obtained. The effects of currents may disrupt the samplers ability to accurately measure and collect seepage samples.	
UltraSeep® (multi-sample seepage meter)	Boat and diver-installed	0 ft	Up to 3 L Dependent on seepage rate	- direct measurement of groundwater and contaminant discharges at the sediment/surface water interface. - unit stores data and controls sampling events based on seepage rate, which is continuously monitored. - up to six samples can be collected for chemical analysis -can be programmed to sample when discharge rate or conductivity reaches a threshold value	- difficult to use and install in high currents - proprietary technology only available through U.S. Navy - sampler cost significantly greater than other methods - would require 24 - 48 deployment hours for each sample location - would only provide samples at locations where groundwater was discharging	U.S. Navy (numerous sites) Currently undergoing further technical evaluation under the DOD's ESTCP program http://www.estcp.org/projects/cleanup/cu-0422.cfm
Benthic Flux Sampler	Diver-installed	0 ft	Dependent on seepage rate	- can operate unattended from a few days to months depending upon size and design - can operate in deep water - some are equipped with coring capabilities, advective flow volume measurement (from sediment to surface water), and current measurement instrumentation	- difficult to use and install in high currents - not able to program sample times to coincide with indications of groundwater discharge - would require 24 - 48 deployment hours for each sample location - would only provide samples at locations where groundwater was discharging - may not be commercially available	Developed by U. S. Navy and tested in several sites Certified by CalEPA.
Lee-type Seepage Sampler	Diver-installed	0 ft	Dependent on seepage rate	- low cost and light weight -low profile less likely to be tipped by current	- may not be usable in current velocity at Topock dynamic pressure on exposed sample bag - would require 24 - 48 deployment hours for each sample location - would only provide samples at locations where groundwater was discharging	Developed in 1970's and has been widely used

TABLE 4-2
Site Analytical Parameters, Test Methods, and Reporting Limits
Pore Water and Seepage Study
PG&E Topock Compressor Station, Needles, California

Analytical Parameter	Units	PoreWater	
		Analytical Method	Minimum Reporting Limit [1]
Laboratory Measurements			
Hexavalent Chromium	µg/L	SW 7199	0.2
Total Chromium, dissolved	µg/L	SW 6010B	1
pH	pH units	EPA 150.1	---
Specific conductance	µS/cm	EPA 120.1	2
Field Measurements			
Temperature	ºC	Field Instrumentation	---
Specific Conductance	µS/cm	Field Instrumentation	---
Dissolved Oxygen	mg/L	Field Instrumentation	---
Oxidation-Reduction Potential	mV	Field Instrumentation	---
pH	pH units	Field Instrumentation	---
Turbidity	NTU	Field Instrumentation	---

Notes:

[1] Minimum reporting limit for undiluted samples. Reporting limits are increased when sample dilution is required.

Figures

N

0 2,000 4,000 Feet

1 inch equals 2,000 feet

Map Source: USGS 7.5 minute quads Topock AZ, and Whale Mountain CA.

Upstream Study Area

Downstream Study Area

PG&E Topock Compressor Station

FIGURE 1-1
SITE LOCATION AND STUDY AREA

PORE WATER AND SEEPAGE INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

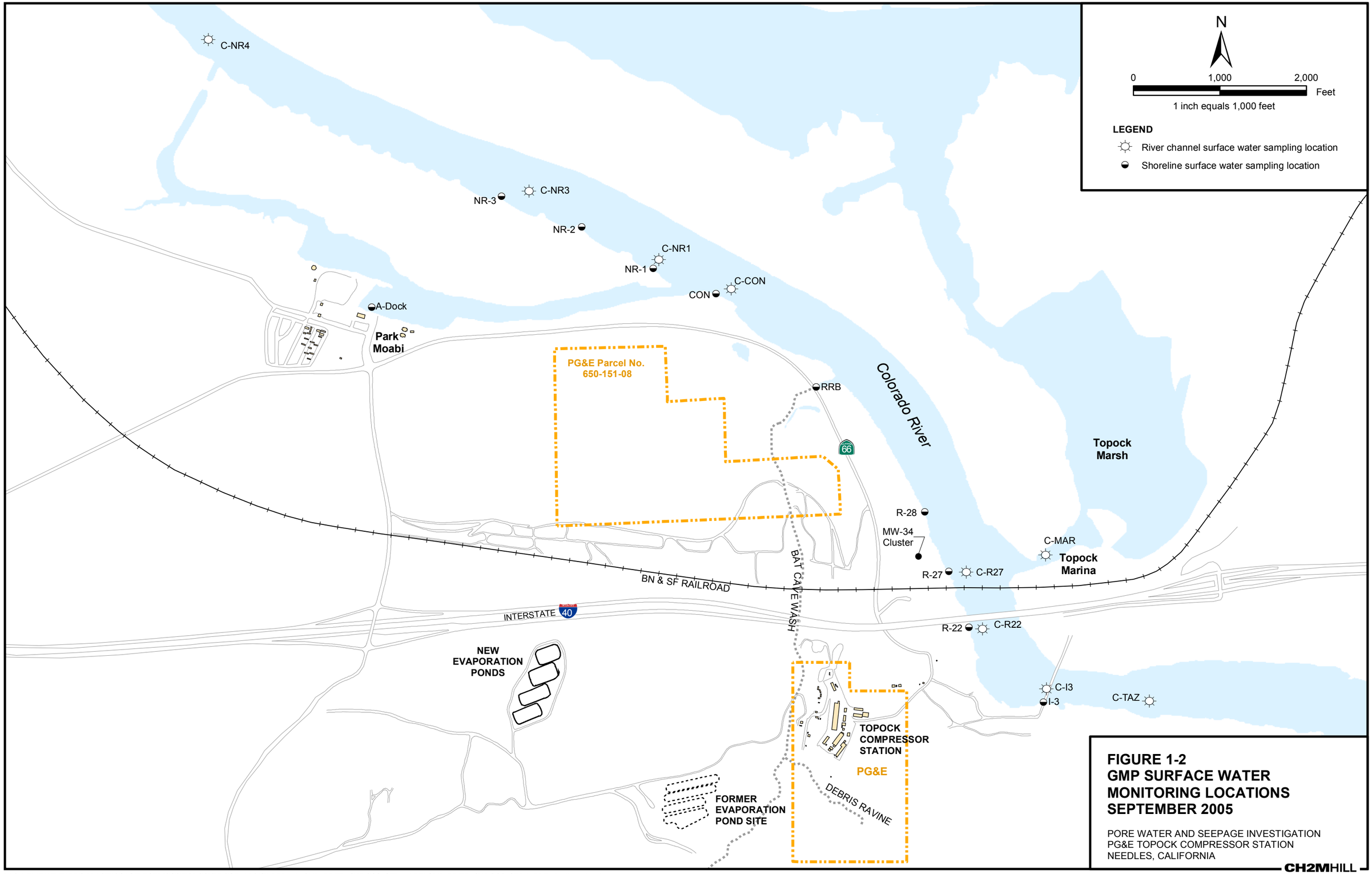

FIGURE 1-2
GMP SURFACE WATER MONITORING LOCATIONS SEPTEMBER 2005

PORE WATER AND SEEPAGE INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

0 500 1,000 Feet

1 inch equals 500 feet

LEGEND

- River Depth/Transect Sample points (depths in Feet)
- Monitoring Well
- Extraction Well
- Planned River Channel Depth Profile Line
- Approximate limits of hexavalent chromium greater than 50 ppb in Alluvial Aquifer March 2005

Colorado River

Topock Marsh

Topock Marina

50 ppb

TW-2D

MW-34 Cluster

A: 4, 6, 4, 11, 11, 12, 12, 13, 4, 11

B: 4, 13, 13, 11, 12, 10, 10, 12, 9, 4

C: 5, 8, 7, 10, 9, 13, 13, 11, 22

TOPOCK COMPRESSOR STATION

PG&E

DEBRIS RAVINE

FIGURE 3-1
DOWNGRADIENT PWSS AREA AND DEPTH TRANSECTS JULY 2005

PORE WATER AND SEEPAGE INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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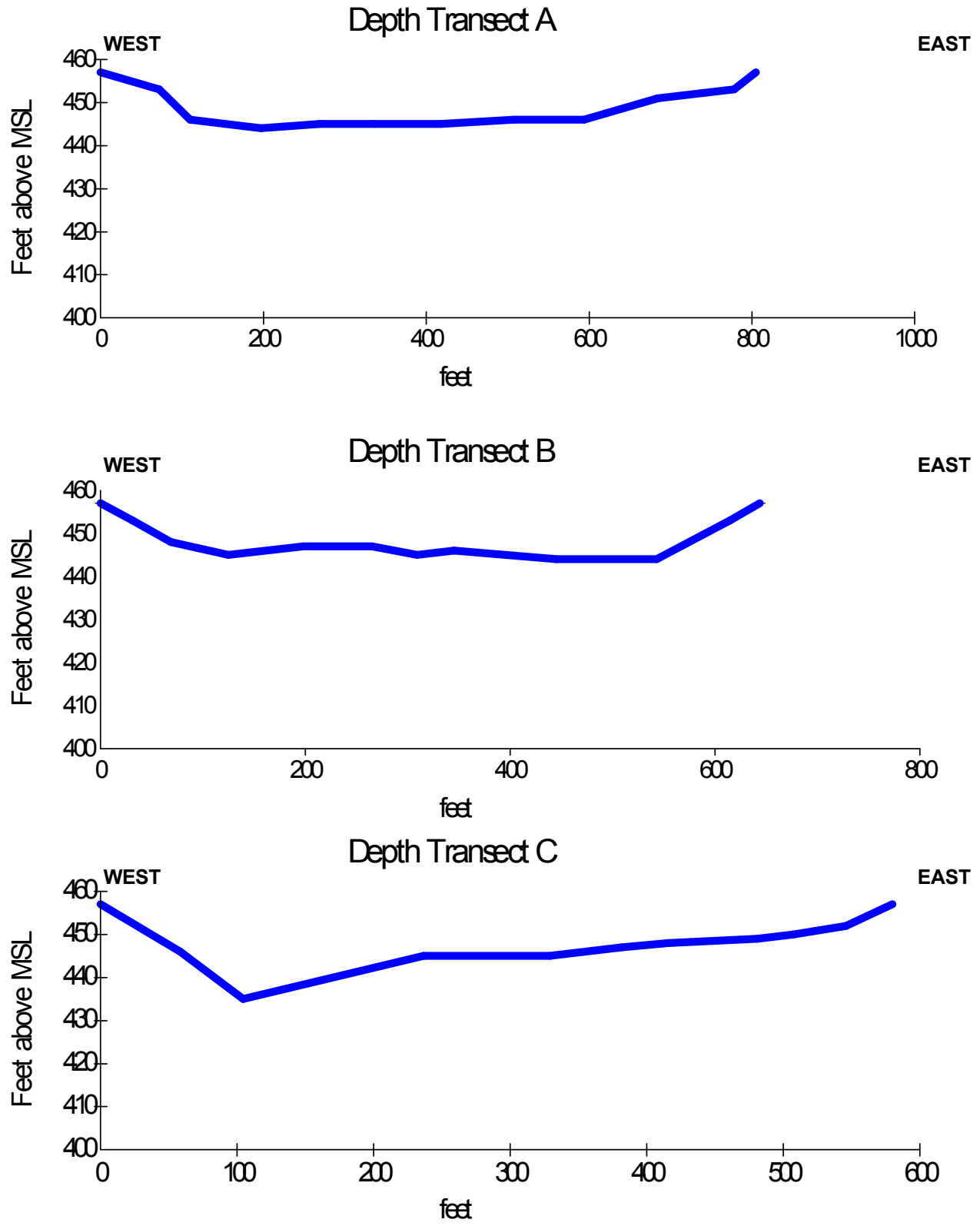
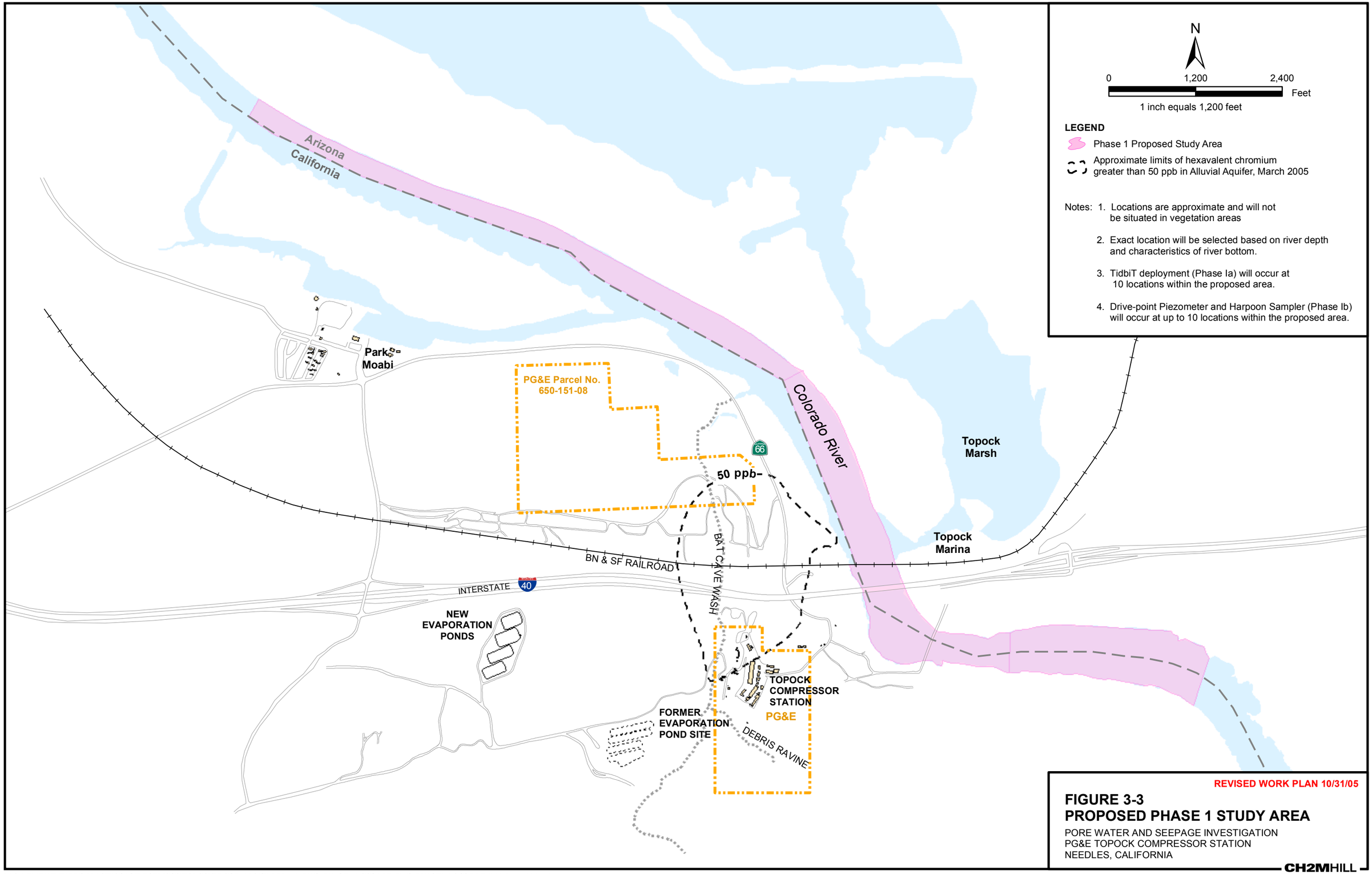


FIGURE 3-2
COLORADO RIVER DEPTH CROSS SECTIONS
JULY 2005

PORE WATER AND SEEPAGE INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



REVISED WORK PLAN 10/31/05

FIGURE 3-3
PROPOSED PHASE 1 STUDY AREA

PORE WATER AND SEEPAGE INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

N

0 1,200 2,400 Feet

LEGEND

Approximate limits of hexavalent chromium greater than 50 ppb in Alluvial Aquifer, March 2005

Approximate Sediment Sampling Locations

Notes: 1. Locations are approximate and will not be situated in vegetation areas

2. Exact location will be selected based on river depth and characteristics of river bottom.

Park Moabi

PG&E Parcel No. 650-151-08

Colorado River

Topock Marsh

66

50 ppb

MW-34 Cluster

Topock Marina

BN & SF RAILROAD

BAT CAVE WASH

INTERSTATE 40

NEW EVAPORATION PONDS

TOPOCK COMPRESSOR STATION

PG&E

FORMER EVAPORATION POND SITE

DEBRIS RAVINE

REVISED WORK PLAN 10/31/05

FIGURE 3-4
PROPOSED RIVER SEDIMENT SAMPLING LOCATIONS

PORE WATER AND SEEPAGE INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

N

0 1,200 2,400 Feet

LEGEND

Approximate limits of hexavalent chromium greater than 50 ppb in Alluvial Aquifer, March 2005

Generalized area for pore water sampling transects

Notes:
1. Locations are approximate and will not be situated in vegetation areas
2. Exact location will be selected based on river depth and characteristics of river bottom.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

Park - Moabi

PG&E Parcel No. 650-151-08

50 ppb

Colorado River

Topock Marsh

Topock Marina

MW-34 Cluster

BAT CAVE WASH

BN & SF RAILROAD

INTERSTATE 40

66

NEW EVAPORATION PONDS

FORMER EVAPORATION POND SITE

TOPOCK COMPRESSOR STATION

PG&E

DEBRIS RAVINE

REVISED WORK PLAN 10/31/05

FIGURE 4-1
PROPOSED LOCATIONS OF PORE WATER SAMPLING

PORE WATER AND SEEPAGE INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

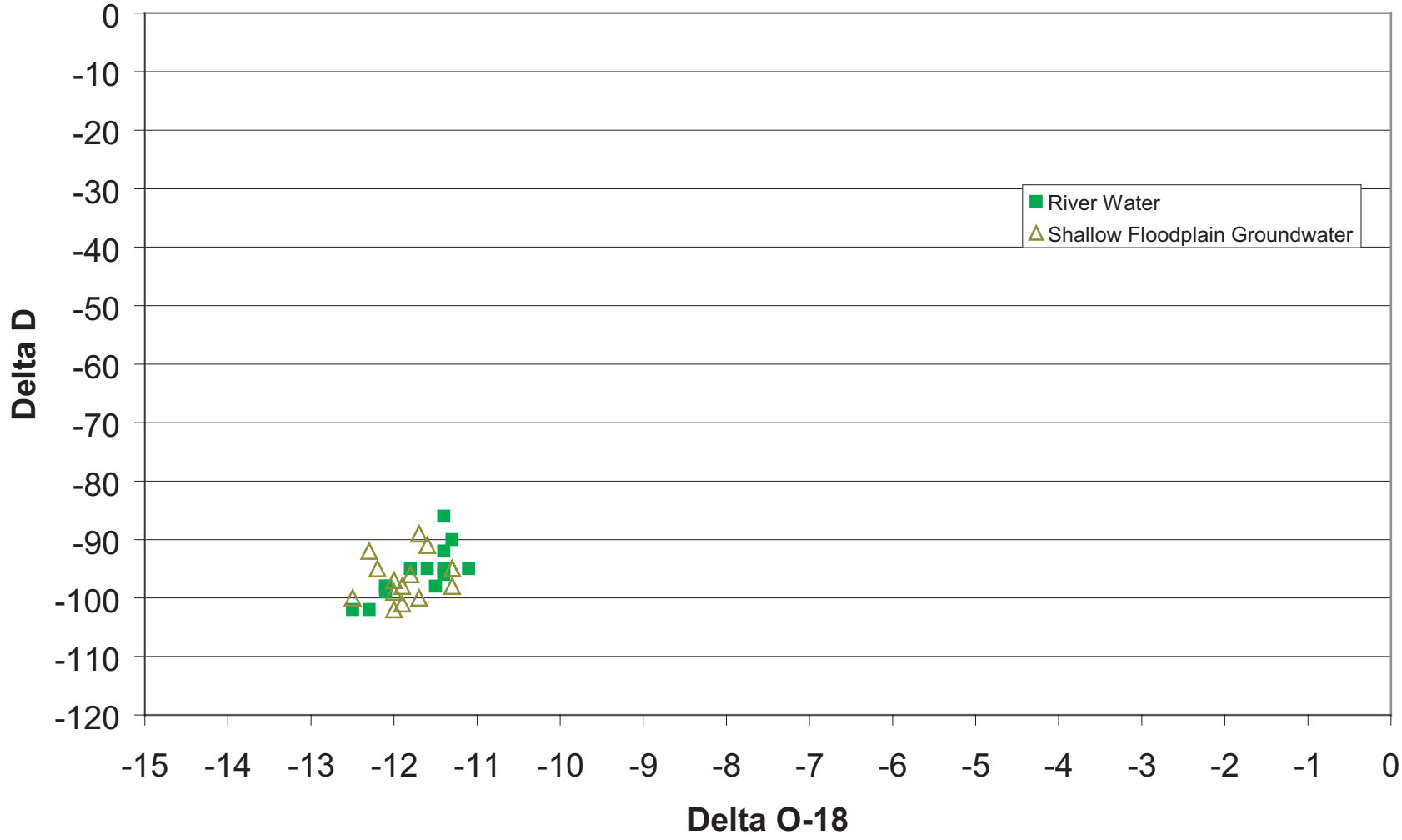
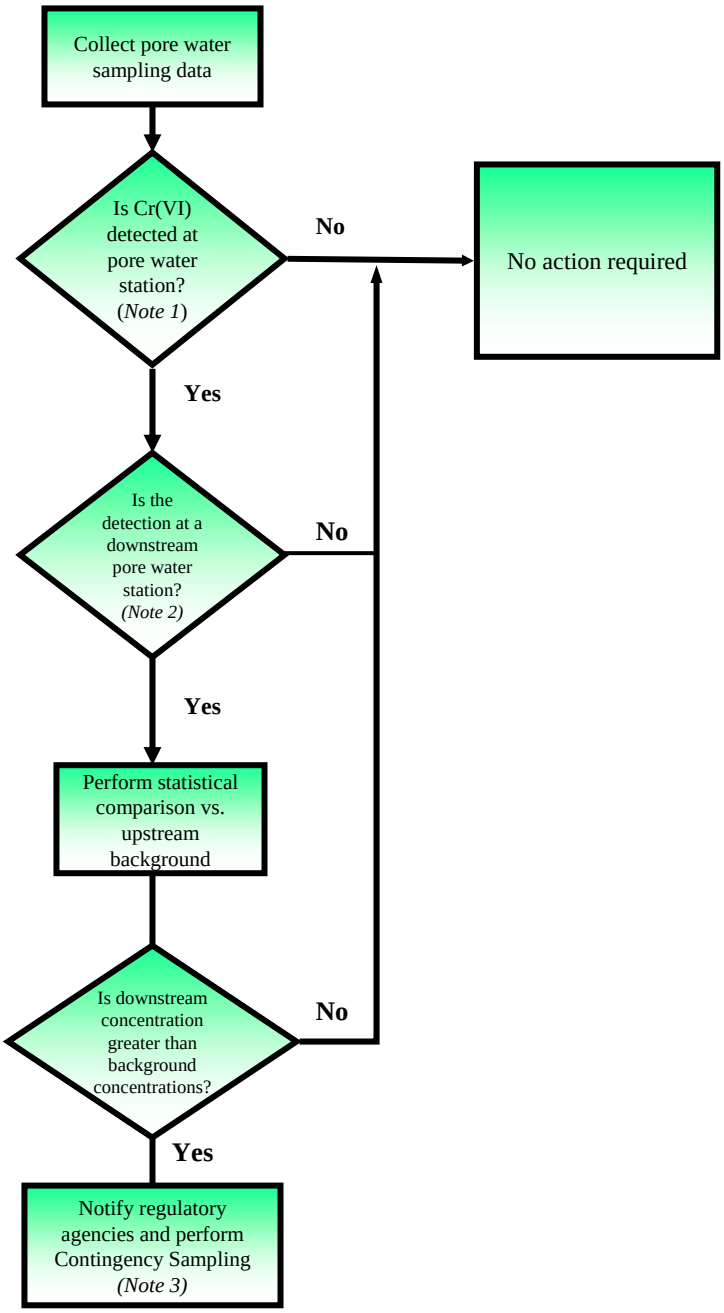


FIGURE 4-2

COMPARISON OF STABLE ISOTOPE RATIOS BETWEEN RIVER WATER AND SHALLOW WELLS NEAR RIVER

PORE WATER AND SEEPAGE INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Contingency Planning for Pore Water Sampling
September 2005
Draft Revision 0



NOTES:

1. The trigger concentration is assumed to be any concentration greater than ND (above the reporting limit using USEPA Method 7199).
2. Downstream locations are those located to the south of the Bat Cave Wash outlet (Figure 1-1).
3. Contingency sampling as outlined in Section 8.1 of this Work Plan.

FIGURE 8-1
CONTINGENCY PLAN
PORE WATER AND SEEPAGE INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Appendix A
Technical Information for Investigation Methods

StowAway® TidbiT®

$119

Small size: approx.
3.0 x 4.1 x 1.7 cm thick
(1.2 x 1.6 x 0.65"); 23 gm (0.8 oz)

The StowAway TidbiT is Onset's smallest data logger and is widely used for monitoring temperatures in streams, lakes and oceans. Small size, rugged case and alarm indication also make this a popular choice for monitoring conditions during shipment.

Key Specifications

Ideal for underwater applications up to 30° C

StowAway TidbiT: -5°to 37°C model:

Range†: -4° to 37°C (24° to 99°F)
Accuracy: ±0.2° at 20°C (±0.4° at 70°F)
Resolution: 0.16° at 20°C (0.29° at 70°F)

StowAway TidbiT: -20°to 50°C model:

Range†: -20° to 50°C (-4° to 122°F)
Accuracy: ±0.4°at 20°C (±0.8° at 70°F)
Resolution: 0.3°C at 20°C (0.6° at 70°F)

Capacity: 32,520 measurements

† *Specified range is narrower than nominal range due to precision calibration process. Using TidbiT Temp loggers in wet environments (>90% RH) over 86°F (30°C) for extended periods of more than 8 weeks cumulative may lead to premature failure. For applications over 30°C, use the HOBO Water Temp Pro (pg 14).*

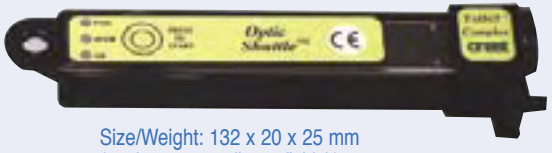
Note: For Onset's lowest cost underwater temperature monitoring solutions, use the HOBO H8 Temp (pg. 4) in combination with a waterproof submersible subcase (pg. 20) or see Water Temp Pro (pg. 14)

Features and Specifications

Waterproof to 300 m (1000 feet)
IR communications and Optic Shuttle for readout when wet—even underwater!
Programmable start time/date or triggered start on location with Optic Coupler or magnet
Small Size and Alarm Indication
5-year, non-replaceable battery (typical use*)
NIST-traceable temperature accuracy certificate available
Multiple sampling with minimum, maximum or averaging
Mounting tab
Time accuracy: ±1 minute per week at 20°C (68°F)
Memory modes: Stop when full, Wrap-around when full
Response time in water: 5 minutes (typical to 90%)
Response time in air moving 1m/second: 20 minutes

** 16 three-month deployments in water (35° to 80°F) with 4 minute or longer intervals (no multiple sampling)*

Optic Shuttle™



Size/Weight: 132 x 20 x 25 mm
(5.2 long x 0.8 tall x 1.0" thick)
without coupler; 28.35 g (1 oz)

$199

The pocket-sized Optic Shuttle provides a convenient way to readout and relaunch TidbiT data loggers and bring the data back to your host PC.

Features and Specifications

Waterproof to 15 psi (30 feet)
128K capacity enough for 4 full 32K loggers
Data offload time from logger: 6 minutes typical from 32K logger
Data readout time to PC: 3 minutes typical for complete offload
TidbiT Coupler and Optic Coupler included
Uploads the same data to a PC as if the data were read out directly from the logger
6 year factory-replaceable battery (typical)

Optic Base Station™

$80 to $120

Size/Weight: 132 x 20 x 25 mm
(5.25 long x 0.8 tall x .95" thick)
without coupler; 56.7 g (2 oz)

The Optic Base Station is used to communicate between the host computer** and either a StowAway TidbiT data logger or an Optic Shuttle. An Optic Coupler and TidbiT Coupler for connecting the base station to loggers are also included.

*** A battery-powered version of the Optic Base Station is available (part #DSB) for palmtop and portable computers.*

StowAway TidbiT Ordering

Description	Part No.	Qty. 1-9	10-99	100+
32K StowAway TidbiT				
(-5° to 37°C)	TBI32-05+37	$119	$110	$101
(-20° to 50°C)	TBI32-20+50	$119	$110	$101
Optic Base Station for TidbiT	DSA	$80	$74	$68
Battery-powered Optic Base Station	DSB	$120	$111	$102
Optic Shuttle for TidbiT	DTA128B	$199	$183	$169
Software				
BoxCar Pro 4.3 Starter Kit (Windows)	BCP4.3-ON	$95	$88	$81
BoxCar 3.7 Starter Kit (Windows)	BC3.7-ON	$14	$13	$12

Note: A BoxCar Pro 4.3 or BoxCar 3.7 starter kit and an Optic Base Station are required to operate the TidbiT loggers. Each starter kit includes software, computer interface cable and software manual. The Optic Base Station includes an Optic Base Station, Optic Coupler and TidbiT Coupler. See pages 31-33 for software information. Use with USB port requires USB-Serial Adapter (pg 33) and BoxCar Pro 4.3+.

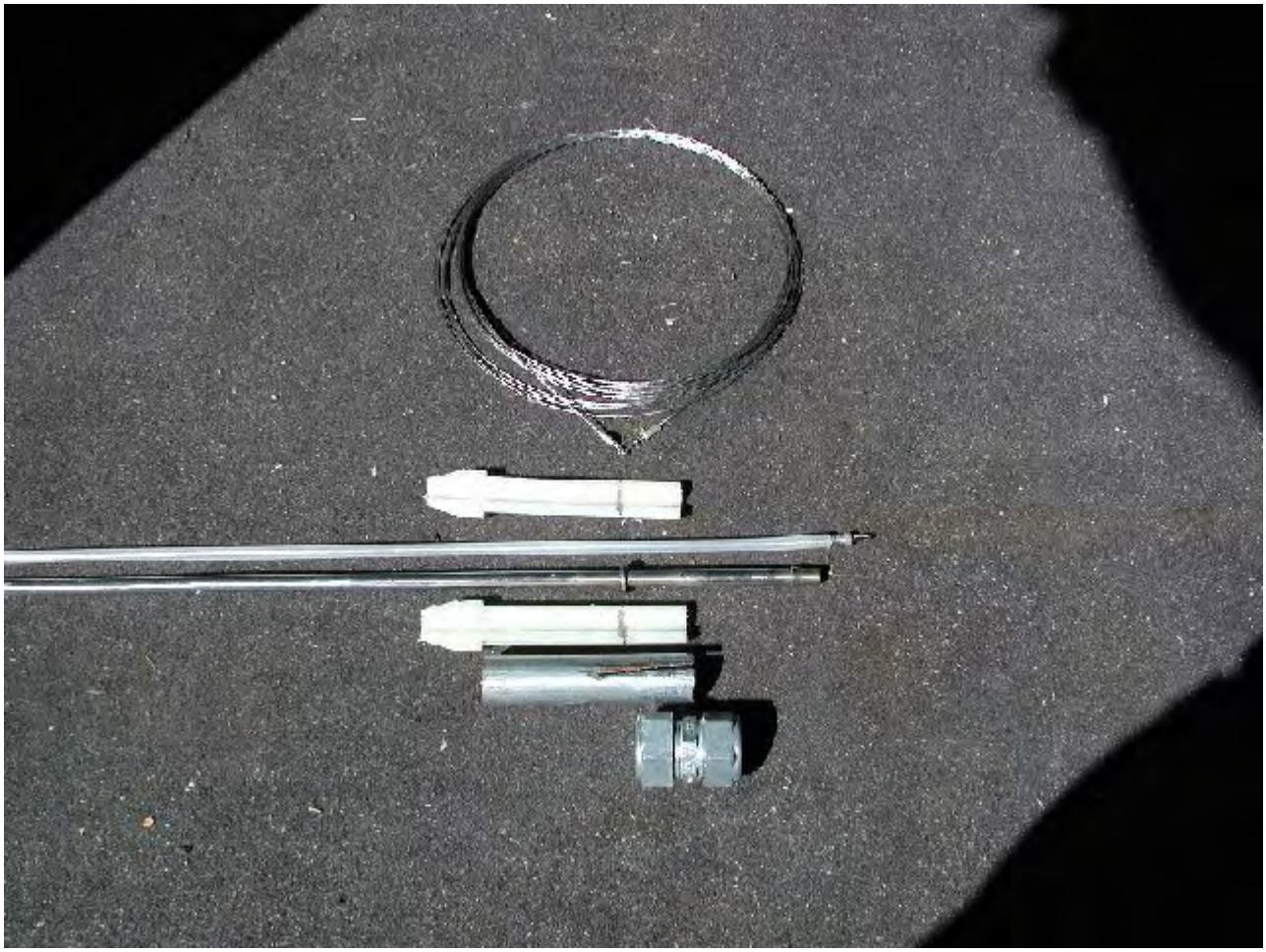
CE Compliant with all relevant directives in the European Union (EU)

MHE Products - PushPoint Harpoon Instructions Ver 1.01 7/23/03 www.MHEproducts.com

The Harpoon is the newest in the line of PushPoint sediment pore-water sampling tools.
This tool incorporates the function of a PushPoint Extreme sampler into a device that can be used from a boat or through the ice in 20+ feet of water to sample sediment pore water. If the bottom is composed of loose sediment, the sampler can be pushed 15+ feet into sediments to gather pore water samples. One of the advantages of the tool is that the investigator can purchase commonly available materials to custom configure the sampler to meet their sampling depth requirements. The extendable body of the sampler is made of ½" EMT conduit (~$2/10 foot), and the sampling tubing is 3/8" OD polyethylene tubing. Multiple lengths of 3/8" polyethylene tubing inside lengths of ½" EMT may be connected together as needed to form a very long, remotely-operated PushPoint sampler that can be connected to a peristaltic pump to collect sediment pore water.

MHE PushPoint Harpoon installed in the Harpoon Holder, clamped together by EMT compression coupler nut.
This is the MHE Harpoon assembly ready to go.
Attach the Shuttle Cable, 3/8" poly tubing and ½" EMT conduit and you're ready to sample.
Pore water sampling is possible from a boat or through the ice at depths of 20+ feet of water and through 20+ feet of loose sediments..

Caution: the tip of the Harpoon is very sharp to facilitate penetrating sediments. When you are working with the Harpoon, especially when disassembling the Harpoon Holder, be careful not to poke anything (or anyone) with the point of the Harpoon. During disassembly, when pulling off the compression sleeve from the Harpoon Holder,
it can suddenly pull free from the nylon jaws as you are pulling the assembly apart, and the tip of the Harpoon has been known to stick into things like car seats, etc.



EXPLODED VIEW

The MHE Harpoon system:
1) stainless steel Shuttle Cable with clasp on one end and loop on the other
2) top jaw of nylon Harpoon Holder assembly
3) 3/16': OD polyethylene Shuttle with stainless steel support inside and Cable Attachment Screw on top
4) 316 SS body of the 24" MHE Harpoon
5) bottom jaw of nylon Harpoon Holder assembly
6) split compression sleeve is the outer sleeve of Harpoon Holder

7) ½” EMT conduit compression-type coupler

This is how the Harpoon Holder attaches to the EMT compression coupler. Note that the Shuttle has been installed in the Harpoon body (only a small amount of the Shuttle poly tubing is visible) and the loop of the Shuttle the ready for attachment to the Shuttle Cable.

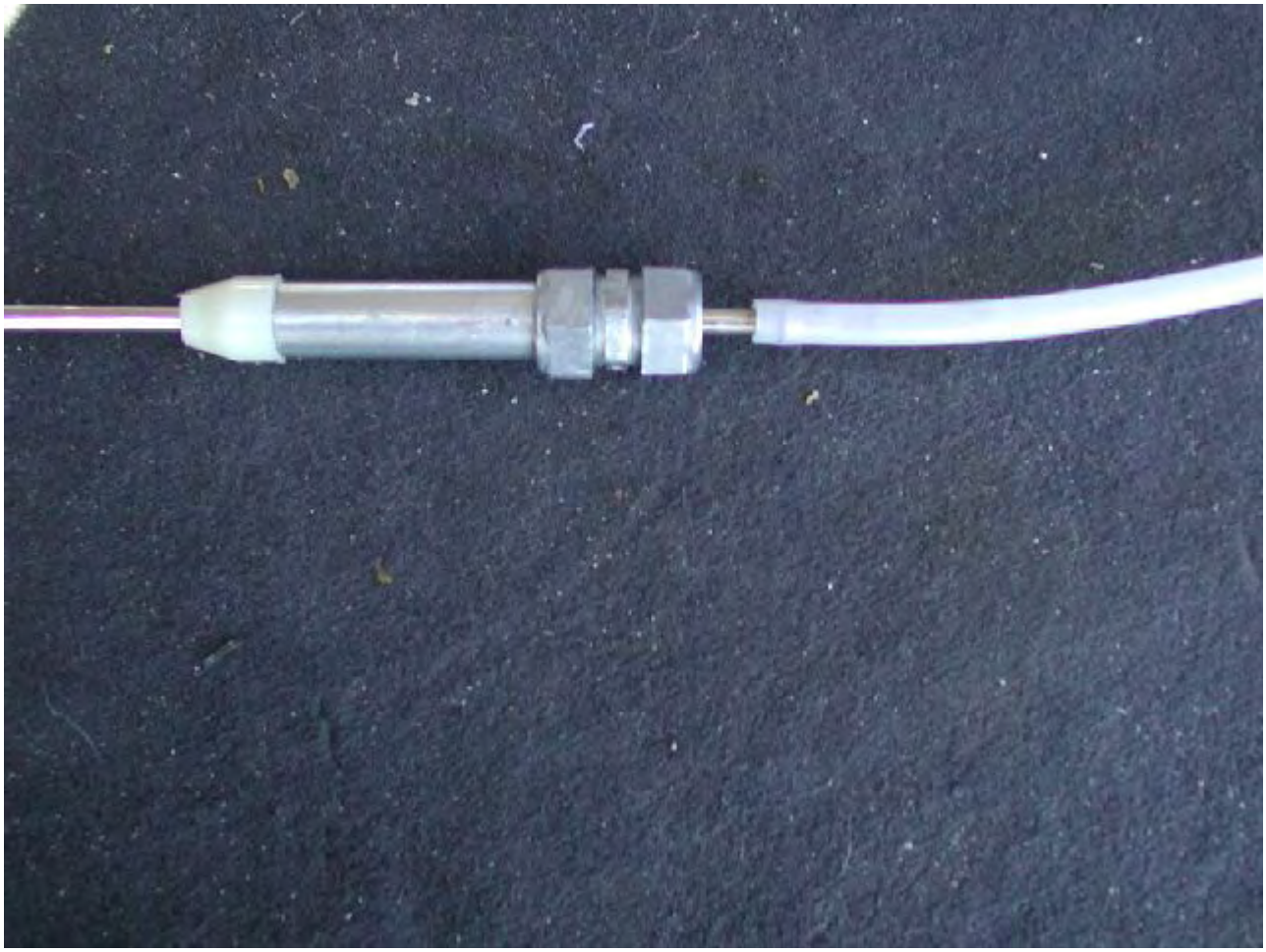
Tighten the EMT coupler to the MHE Harpoon, leaving the other EMT coupler nut that will connect to the long length of EMT loose.

Before you attach the Shuttle Cable and the poly tubing to the Harpoon you will need to feed the looped end of the Shuttle Cable through your 3/8" poly tubing until only the clasp of the Shuttle Cable sticks out of poly tubing.

It is far easier to feed the Shuttle Cable through the poly if the poly tubing is straight rather than coiled. Shuttle Cable lengths of up to 30' are available.

Sometimes it's helpful to just have a bunch of Shuttle Cables already strung inside poly tubing for quick and easy attachment to a single Harpoon. I recommend leaving as little of the clasp of the Shuttle Cable exposed as you need to attach to the Shuttle Screw; this will reduce the effort needed to push the poly tubing over the barbed fitting at the sampling port of the Harpoon.

Make sure that the poly Shuttle is fully inserted into the Harpoon body.
Only friction holds the Shuttle in place within the Harpoon body.
Attach the clasp end of the Shuttle Cable to the loop of the Shuttle Cable Screw.
Do not disturb the Shuttle position in the Harpoon or pull the Shuttle Cable attached to the Shuttle until you have deployed the sampler and you are ready to sample as you may pull the Shuttle from the Harpoon and expose the inside of the screened-zone of the Harpoon to the sediments during insertion - this may clog the sampler.



Push the 3/8” OD poly tubing past the barb at the sampling port of the Harpoon, at least ¼” (6mm).
It is nearly impossible to pull the poly tubing off after it has been pushed much past the barb.
After that, it will be necessary to cut the poly off to remove it (more on this later).
Slide the loose end of the poly through a length of ½” EMT conduit and connect to the EMT coupler on the Harpoon Holder.
If you are having a lot of trouble pushing the poly past the barb, try heating ½” of the end of the poly in the flame of a butane lighter for 1 or 2 seconds to soften the polyethylene a little.

MHE Harpoon attached to a 10’ piece of EMT and ready to go into the water.
You can add additional lengths of EMT, poly tubing and Shuttle Cable as needed to reach the desired depth. Shuttle Cables have a loop at the end so that they may be joined end-to-end to achieve longer lengths.
We recommend using a 1.25 inch piece of 3/8”ID clear vinyl or Tygon tubing to connect successive lengths of 3/8”
poly together if a longer sampler is needed to push through deeper water or deeper into the sediments than originally anticipated. Use a nylon wire-tie (zip-tie) or other means to clamp both connections to the poly.

Push the Harpoon straight down into sediments to the desired depth.
Once the sampling system is inserted into the sediments, I usually cut off the EMT at a convenient height and then slip
the excess EMT off the poly.
Cut the poly so that approximately 3 inches of the poly extend past the top of the EMT. This reduces the amount of curve that
the will be in the poly. The Shuttle Cable likes straight poly tubing to travel through – each curve adds quite a bit of friction.
Be careful to not cut the Shuttle Cable when you cut off the excess poly tubing.
To sample the sediment pore water, have a peristaltic pump ready with enough tubing on it to allow for movement of the boat during sampling without pulling the sampler sideways.
Hold the end of the EMT and then pull the Shuttle Cable with the attached Shuttle completely out of the 3/8" poly.
Immediately attach the peristaltic pump tubing to the end of the 3/8" poly and pump the pore water – don't waste any
time getting the development water out of the system.
Do your sampling as you would with any PushPoint sampler.

To easily remove the poly tubing from the Harpoon, take a sharp knife and cut the poly tubing until you reach the flat back-end of the barb. Do the same on the other side of the sampler. The tubing should come off easily.

If you have several Harpoon bodies and several Shuttles and Shuttle Cables, you can pre-assemble the cores of the Harpoon sampling systems to lengths of poly tubing, and have them ready (locked-and-loaded) for easy deployment.

In this way, all you need is one Harpoon Holder which would be interchangeable to all the preassembled Harpoon cores.

MHE has developed a “screen-sok: constructed of polyethylene and a 52TPI polypropylene fabric for use in highly organic, “mucky” sediments. This allows the sampler to extract pore water under conditions that one would think impossible. The Screen-Sok can be taped (electrical tape or the tape of your choice) to the sampler if you want to reuse it ; if not taped, it will probably stay in the sediments as the sampler is withdrawn. The Screen-Sok can also be used effectively on all the other PPX PushPoint samplers.

If you have questions about these instructions or applications, the fastest way to contact us is by e-mail at sales@MHEproducts.com

We can also be reached at: phone/voice 989 362 5179
Phone/voice/fax 517 393 0948

Drive-Point Piezometer

Stainless Steel

Stainless Steel Drive-Point Piezometers

The Model 615 Drive-Point Piezometers are designed to give field personnel a truly inexpensive method to monitor groundwater in suitable conditions.

Solinst 615 Drive-Point Piezometers attach to inexpensive 3/4" NPT steel drive pipe which is widely available through local plumbing and hardware stores.

Solinst Drive-Point Piezometers are most often installed permanently as wells, for short-term or long-term monitoring of groundwater level and quality. They can also be used once and removed. Drive-point, tubing and pipe alternatives are available to suit almost every situation.

High quality samples can be obtained as polyethylene or Teflon® lined tubing is attached to the stainless steel drive point piezometers. A shielded version is available which avoids clogging or smearing of the screen during installation. Sampling and head measurements are taken within the tubing with small diameter equipment.

Solinst Drive-Point Piezometers can be driven into the ground, or the soil at the bottom of a borehole with any direct push or drilling technology, including a vibrating power hammer or the manual slide hammer shown at right.

High Quality Samples

Model 615 Piezometers are composed of a stainless steel cylindrical filter screen protected within a 3/4" (20 mm) stainless steel drive-point body with an internal filter support and a barbed fitting for attachment of sample tubing.

The inner barbed fitting allows connection of 5/8" x 1/2" (16 mm x 12 mm) LDPE or Teflon® sample tubing. This prevents sample water from contacting the steel extension casing, and maintains high sample integrity even when inexpensive carbon steel extensions are used.

615S shielded drive-point piezometers have a single use, optional filter shield to avoid smearing and plugging of the filter during driving. The strengthened connector at the top of the drive-point acts as an annular seal which avoids contamination from higher levels in the hole. Optional heavy duty extension couplings strengthened to create a more rugged piezometer are also available.

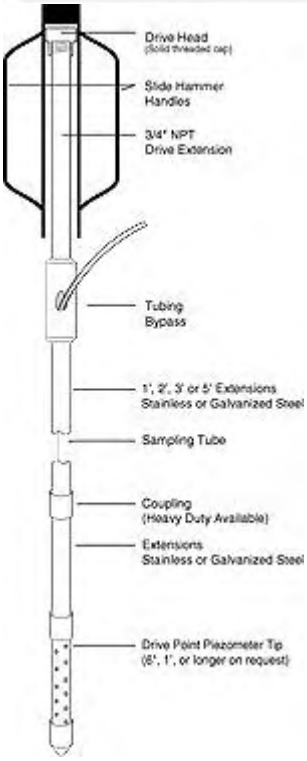
615N Drive-Point Piezometers are designed for hydraulic head measurements with no barb for tubing. This saves money and frees up more space for easier use of a water level meters.

High Quality Groundwater & Surface Water Instrumentation

Drive-Point Piezometer

Model 615 Drive-Point Piezometers

Manual Slide Hammer



For the most inexpensive wellpoint installations, the Manual Slide Hammer can be used to install the Solinst Drive-Point Piezometers without the need for any expensive equipment on site. The slide hammer and all other equipment can easily be transported in a car or truck to most sites.

A heavy duty drive head is used, on which the slide hammer impacts, and a tubing by-pass ensures that the tubing does not get damaged during installation.

A vibrating power hammer can also be used for installation of drive-points.

Applications

Model 615 Drive-Points are suitable for the following uses:

- groundwater sampling, including VOCs
- water level monitoring
- contaminant plume delineations
- sparge points
- soil gas sampling
- UST monitoring
- low cost and minimal disturbance site assessment

High Quality Groundwater & Surface Water Instrumentation

Drive-Point Piezometer

Model 615 Drive-Point Piezometers

|Quote |Drive-

Sample in Narrow Dia.

Sampling Within Narrow Diameters

Direct push sampling has quickly become a popular way to obtain groundwater samples; however, sampling within drive-points requires a narrow diameter sampler. Solinst offers several options for this specific sampling application.

Single Valve Pump

To sample from within Solinst Model 615 Drive-Point Piezometers, the integral tubing can be converted easily into a Solinst Single Valve Pump. This inexpensive modification creates a dedicated compressed air or nitrogen drive pump out of 5/8" x 1/2" (12 mm x 16 mm) tubing. Suitable for sampling to depths of 150 ft. (45 m).

Miniature Point Source Bailer

The 1/2" (12 mm) dia. stainless steel bailer works very well in 615N Drive-Point Piezometers. The bottom emptying device permits a regulated, steady flow.

High Quality Ground

SP15 & SP16 Groundwater Samplers

Patent No. 5,612,498

The Screen Point 15 groundwater sampling system has been the most widely used direct push system for environmental groundwater investigations for several years. Since then, Geoprobe Systems® has added the Screen Point 16 system (1.6 in. OD screen sheath) which is designed for use under the more powerful GH60 hammer with the heavier 1.5 in. probe rods. These protected screen samplers have only five parts, including the grout plug, plus a few O-rings. Using either of these tools with O-rings on the rod fittings enables you to collect representative groundwater samples from a discrete interval using a bailer, bladder pump, or other device. The length of the screen exposed to the formation can be set from just a few inches to as much as 41-inches to let you select the sampling zone. Additionally, the same screens (Stainless Steel or PVC) can be used in both samplers. The grout plug at the base of the screen makes it possible to conduct bottom-up grouting with bentonite slurries or neat cement using any of the Geoprobe® GS Series grout machines. A printed standard operating procedure (SOP) for the SP15/16 samplers is available free upon request. Technical Bulletin 95-1500.

The Screen Point 15/16 Groundwater Samplers are used to collect groundwater samples from unconsolidated materials at depths ranging from near ground surface to over 100 feet below grade. The depth that can be reached with the SP15/16 samplers is a function of the equipment and methods being used to advance the sampler (manual, static vehicle weight, or percussion probing), the formation being penetrated, and operator experience.

Screen Point 15 & Screen Point 16 Advantages:

- Completely sealed during driving
- Stainless steel or PVC screen
- Actual interface samples
- 41-in. exposed screen length
- Fast recharge from formation
- Samples recovered using Tubing Check Valve, Mini-bailer or 0.5 in. Bladder Pump

- Durable Drive Head and Corrosion Resistant Sampler Sheath
- Sample both dissolved compounds and NAPLs
- Built to withstand percussive probing
- Screen sheath forms mechanical annular seal above the screen while sampling

Screen Point 15 Groundwater Sampler Kit

Disposable PVC Screens Available for the Screen Point Series Groundwater Samplers

Add Geoprobe® brand disposable screens to your groundwater sampling arsenal. The PVC screens are the same dimensions as their stainless steel counterparts, but are made to be left downhole. By using these screens, decontamination time is reduced, especially when used at sites with high contaminant concentrations. The 45-inch long screens can be used in both of our Screen Point 15 and 16 Groundwater Samplers. The PVC screens have a 1.05 in. OD, 0.78 in. ID, and have two rows of 0.10 in. slots spaced at 0.125 in. intervals (approx. 8 slots per inch).

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Macro-Core® Soil Sampler
Main Info
Here's How It Works...
MC Cutting Shoe Options
MC Drive Heads
Feature: No Spacer Ring
Writeable Liners
MC Liner Cutter

Macro-Core® Soil Sampler

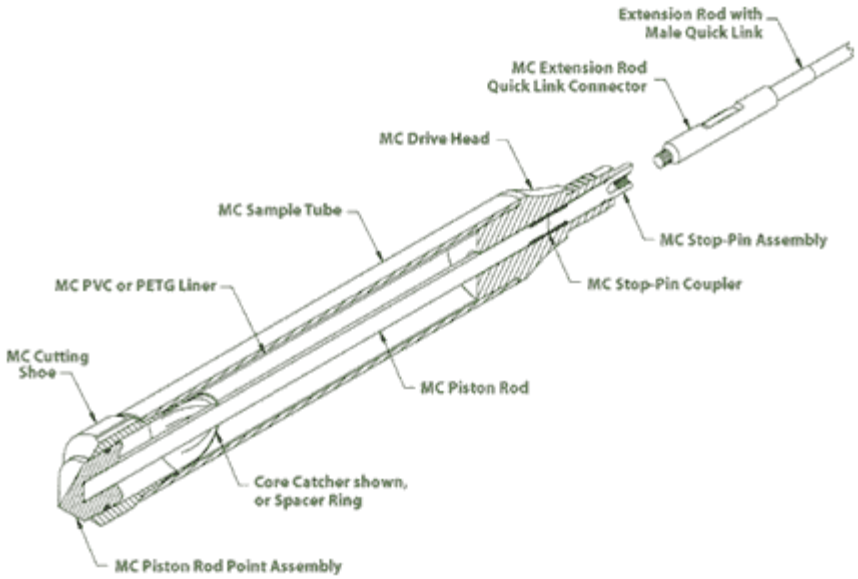
U.S. Patent No. 5,186,263

The most frequently used direct push soil sampler. . . the Macro-Core® Soil Sampling system. This 1.5-inch diameter, piston-operated sampler features a positive release system that eliminates the uncertainty of continuous sampling! When the stop-pin is released, the user retracts the extension rod string which carries the released stop-pin and the piston-rod right into the operator's hand.

Other benefits of this new system are numerous. With a lightweight piston tip assembly, sample compression is minimized during retrieval. An O-ring on the tip ensures that the sampler remains sealed until the desired sampling depth is reached. Other features include increased durability, user friendly, easy to decon, and easy to maintain.

The Macro-Core® system is also versatile. While sampling loose, difficult-to-sample soils, use the MC stop-pin coupler. The piston rod and stop-pin are removed in this process which enhances sample recovery. The stop-pin coupler usually is not necessary when sampling in stronger, more consolidated formations, where sample recovery is not a problem.

- Positive release system eliminates the uncertainty of continuous sampling.
- Sample compression is limited due to the lightweight piston tip.
- Stop-pin coupler is available for sampling loose soils.
- 1.5-in. diameter.
- Available for 4-, 3-, and 2-foot Macro-Core® sample tube lengths.
- Few parts to decon. Few parts to maintain.
- One sampler - two sampling options: Closed-Piston or Open-Tube.



MC Sampler Tube lengths:
60 in. MC Sample Tube (4899)
48 in. Sample Tube (AT8522)
36 in. Sample Tube (AT8320)
24 in. Sample Tube (AT8220)
1m Sample Tube (AT8420)

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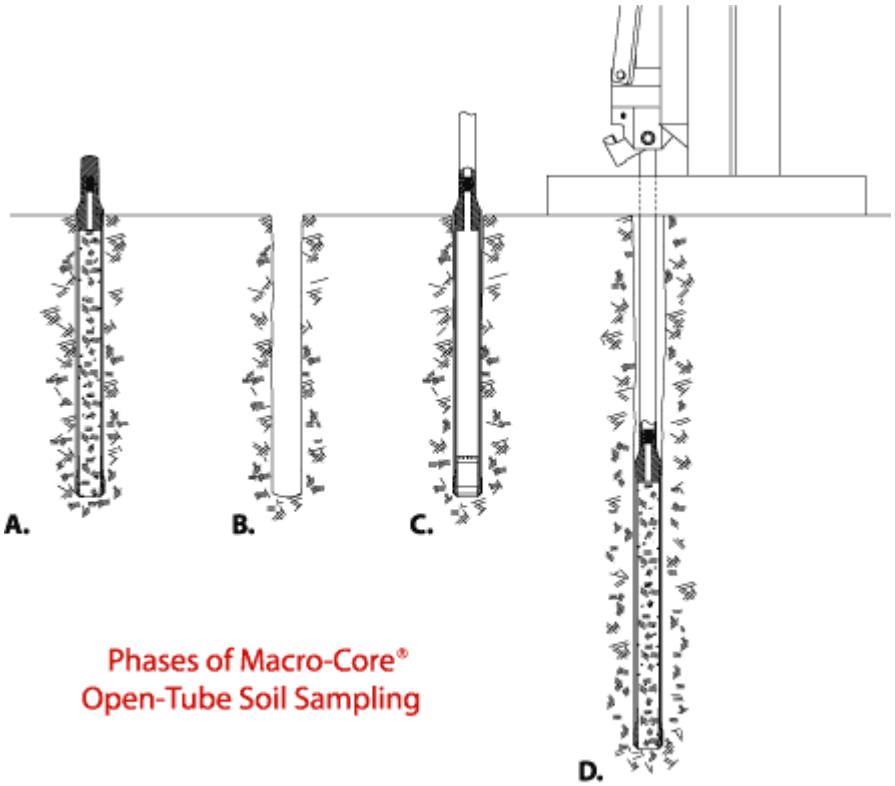
Macro-Core® Soil Sampler
Main Info
Here's How It Works...
MC Cutting Shoe Options
MC Drive Heads
Feature: No Spacer Ring
Writeable Liners
MC Liner Cutter

Macro-Core® Soil Sampler

U.S. Patent No. 5,186,263

Open-Tube Sampling

The simplest use of the Macro-Core® sampler is the open-tube method. Coring starts at the ground surface with an open-ended sampler. In stable soils, the open-tube sampler is inserted back down the same hole to obtain the next core.



Phases of Macro-Core® Open-Tube Soil Sampling

A. Sampler driven to proper depth.

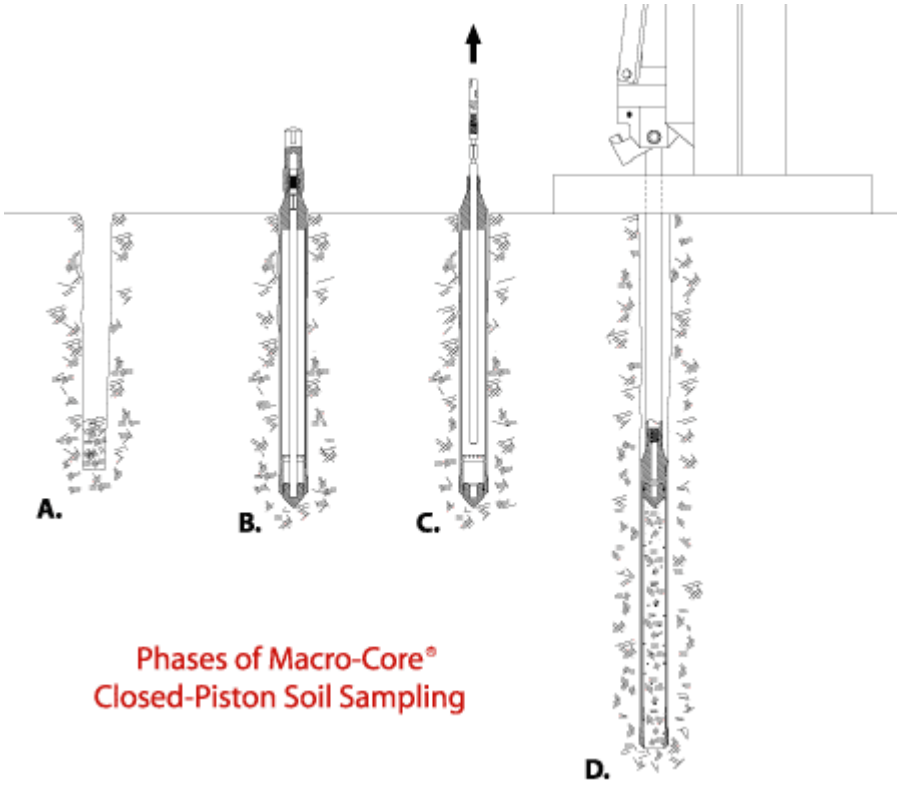
B. Open hole from previous sample.

C. Open-tube sampler driven back down previous hole.

D. Sampler driven to proper depth for sampling second interval.

Closed-Piston/Protected Sampling

In unstable soils that collapse after sampling, the Macro-Core sampler can be equipped with a stop-pin and piston rod system to prevent unwanted soil from entering the sampler as it is being advanced to the next sampling interval.



A. Previously cored or pre-probed hole with sloughed soil.

B. MC Closed-Piston Sampler driven through slough to top of sampling interval.

C. Removing stop-pin and piston rod to release point assembly.

D. MC Closed-Piston Sampler driven to collect representative soil core.

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Appendix B
Field Investigation Methods and Standard Operating Procedures

SOP-A14

Pore Water Sampling
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for pore water sampling at the Topock site. This SOP should be used for pore water sampling stations on the Colorado River.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP).
2) Pore Water and Seepage Study Work Plan. Refer to Topock Program Sampling, Analysis, and Field Procedures Manual and QAPP (Field Procedures Manual), as required.
3) Topock Program Health and Safety Plan (HSP).
4) Blank sampling logs and field notebook.

PREPARATION & SETUP

1) Review event-specific SAP or event-specific field instructions, Work Plan, and HSP.
2) Initiate field logbook for sampling activity.
3) Inspect all equipment and calibrate field water quality (WQ) meters according to SOP-A9, *Calibration of Field Instruments*.
4) Inventory sample bottles, required analyses, and confirm the lab courier schedule.
5) Field-check and set up sampling equipment: drive point sampler, WQ meters, health and safety apparatuses (life vest, rescue rope, life preserver), water depth meter or depth-finder, weighted tape, peristaltic pump, filters, sufficient tygon and silicone tubing, sampling equipment, etc.
6) Conduct tailgate meeting to discuss health and safety issues and event objectives.

SAMPLING PROCEDURES

1) Prepare pore water sampling log (use attached form).
2) The sampling team will travel to each pore water sampling station in a motorized boat. A safety inspection of the boat will be performed by the field crew prior to boarding (check for fire extinguisher, etc.). Samples will be collected from selected stations along transects across the river.
3) An industry standard (Trimble or similar) resource grade handheld DGPS unit (GeoXT or similar) will be used with real-time correction (wide area augmentation system) to locate the sampling stations within a 1 meter radius (68% of the time, commonly referred to 1 sigma accuracy). At each location, two anchors should be positioned upstream at

least 10 feet from each other (refer to SOP A-12 Attachment A). Record the GPS coordinates on the sampling log. In the event a sampling station is too shallow to safely approach by boat, the next closest location with adequate depth will be sampled and a remark noted on the sampling log with the new GPS coordinates.

4) Record the depth of the river at each sampling station using the depth-finder or a weighted tape. If a weighted tape is used, read the tape at the river water surface when the weight touches the river floor. Record river depth on the sample log.

5) Samples will be collected at a depth below the river bottom determined from the pilot study.

6) Samples are to be collected using a drive point sampler and variable-speed peristaltic pump with ¾-inch tygon tubing. Dedicated tubing will be used for each sample. Once the sampling depths have been calculated for each station, pre-cut two pieces of tygon tubing and attach them to the drive point sampler. Lower the sampler and tubing until the tip of the sampler touches the river bottom. Then hand-drive the sampler into the river sediment until desired depth is achieved. Attach the discharge end of the sample tubing to the flow cell of the water quality meter. Start the peristaltic pump and purge 3 sampler volumes. Record the time, pH, conductivity, turbidity, dissolved oxygen, temperature, salinity, TDS, and ORP on the field log. Note and provide qualifying remarks if parameter readings are anomalous or unstable due to an instrument problem. Turn off the peristaltic pump, remove tubing from the flow cell, and restart the pump. Attach a 0.45 micron filter when sampling for Cr(T) by USEPA Method 6010B or for Cr(VI) by USEPA Method 7199. Refer to SOP-A6 in the Field Procedures Manual for filtration procedures. Pump approximately 500 ml through the system and begin filling the applicable sample bottles. Remove the filter prior to filling sample bottles for the other analyses, which do not require filtration. Record all sample information on the field log.

7) Collect remaining samples for analyses according to the event-specific SAP. Use a new piece of tygon tubing and change out the flexible silicone tubing in the peristaltic pump at each location.

8) Follow the Field Procedures Manual for sample handling and management, equipment decontamination, and investigation-derived waste (IDW) management.

9) Decontaminate the sampling apparatus after each sample is collected. The decontamination will be a triple rinse with 5-gallon buckets containing soapy water, potable water, and deionized (DI) water, respectively. First, the apparatus will be placed in the soapy water and the outside scrubbed. Then pump approximately 3 sampler volumes through the apparatus using the peristaltic pump and dedicated tubing used. Re-circulate the water back into the 5-gallon bucket. Repeat the rinse with the potable and deionized water.

10) Collect an equipment rinse blank after the first decontamination of the day. Collect the sample by attaching the decontaminated sampling apparatus to a length of clean peristaltic tubing. Run deionized water through the sampler and collect a sample to be shipped to the analytic laboratory for hexavalent chromium analysis.

Project Name Pore Water and Seepage Study **Sampling Event** _____

Job Number _____ **Date** _____

Field Team _____ Page ____ of ____

Field Conditions _____

Sample ID _____ Sample Time _____ GPS Coordinates (measured): _____

Depth to Sample Below River Bottom: _____ Time: _____ Measure Point: _____

QC Sample No. and Type _____ QC Sample Time _____

Water Quality Meter Serial Number: Sampling Method:

Sample Location	Time		pH	Conductivity uS/cm	Turbidity NTU	Diss. Oxygen mg/L	Temp. °C	Salinity %	TDS g/L	Eh / ORP mv	Comments (See descriptors below)

Observations: (i.e. low water level, sand bank present, etc..) _____

Remarks _____

Color: clear, grey, yellow, brown, black, cloudy, green **Odor**: none, sulphur, organic, other **Solids**: Trace, Small Qu, Med Qu, Large Qu, Particulate, Silt, Sand

Sample ID _____ Sample Time _____ GPS Coordinates (measured): _____

Depth to Sample Below River Bottom: _____ Time: _____ Measure Point: _____

QC Sample No. and Type _____ QC Sample Time _____

Water Quality Meter Serial Number: Sampling Method:

Sample Location	Time		pH	Conductivity uS/cm	Turbidity NTU	Diss. Oxygen mg/L	Temp. °C	Salinity %	TDS g/L	Eh / ORP mv	Comments (See descriptors below)

Observations: (i.e. low water level, sand bank present, etc..) _____

Remarks _____

Color: clear, grey, yellow, brown, black, cloudy, green **Odor**: none, sulphur, organic, other **Solids**: Trace, Small Qu, Med Qu, Large Qu, Particulate, Silt, Sand

Sample ID _____ Sample Time _____ GPS Coordinates (measured): _____

Depth to Sample Below River Bottom: _____ Time: _____ Measure Point: _____

QC Sample No. and Type _____ QC Sample Time _____

Water Quality Meter Serial Number: Sampling Method:

Sample Location	Time		pH	Conductivity uS/cm	Turbidity NTU	Diss. Oxygen mg/L	Temp. °C	Salinity %	TDS g/L	Eh / ORP mv	Comments (See descriptors below)

Observations: (i.e. low water level, sand bank present, etc..) _____

Remarks _____

Color: clear, grey, yellow, brown, black, cloudy, green **Odor**: none, sulphur, organic, other **Solids**: Trace, Small Qu, Med Qu, Large Qu, Particulate, Silt, Sand

SOP-A15

TidbiT® Deployment and Retrieval
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures and equipment to be used for TidbiT® deployment and retrieval at the Topock site. This SOP should be used for TidbiT® deployment and retrieval on the Colorado River.

REQUIRED DOCUMENTS

1) Pore Water and Seepage Study Work Plan.
2) Topock Program Health and Safety Plan (HSP).
3) Field notebook.

PREPARATION & SETUP

1) Review event-specific SAP or event-specific field instructions, Work Plan, and HSP.
2) Initiate field logbook for field activity.
3) Inspect all equipment.
4) Field-check and set up sampling equipment: trash pump, TidbiT® sensors and retrieval cable, health and safety apparatuses (life vest, rescue rope, life preserver), water depth meter or depth-finder, weighted tape, 20 feet of 1.5" PVC pipe, etc.
5) Conduct tailgate meeting to discuss health and safety issues and event objectives.

DEPLOYMENT PROCEDURES

1) The team will travel to each TidbiT® station in a motorized boat. A safety inspection of the boat will be performed by the field crew prior to boarding (check for fire extinguisher, etc.). TidbiT® sensors will be deployed at five locations at depths of 1, 3 and 6 feet below the river bottom.
2) An industry standard (Trimble or similar) resource grade handheld DGPS unit (GeoXT or similar) will be used with real-time correction (wide area augmentation system) to locate the TidBiT® stations within a 1 meter radius (68% of the time, commonly referred to 1 sigma accuracy). At each location, two anchors should be positioned upstream at least 10 feet from each other to ensure the boat remains stationary (refer to SOP A-12 Attachment A). Record the GPS coordinates in the log book.
3) Record the depth of the river at each sampling station using the depth-finder or a weighted tape. If a weighted tape is used, read the tape at the river water surface when the weight touches the river floor. Record river depth on the sample log.
4) At each location TidbiT® devices will be deployed at a depth of 1, 3 and 6 feet below the river bottom. String three TidbiT® sensors together with 2' of cable in between each

sensor. Attach 3′ of cable with a 1′ looped end at the top sensor to a small floatation piece that will be at the surface of the river bottom after deployment.

5) Connect appropriate length of PVC pipe to trash pump hose (depth of river + 6′ deployment depth). Leave enough length above river surface to manipulate pipe.

6) Lower pipe end to river bottom at designated location for TidbiT® deployment. Turn on trash pump. Slowly jet and lower the pipe into river bottom to the desired depth. Surging pipe up and down may be required to achieve desired depth.

7) Confirm depth with a weighted tape down the pipe.

8) When appropriate depth is achieved, lower the TidbiT® sensors and retrieval cable down the pipe.

9) Extract the pipe by pulling back to the surface. Additional water jetting may be required to loosen sediments around the pipe.

RETRIEVAL PROCEDURES

1) Navigate to TidbiT® location using a GPS unit.

2) Use a 15′ hooked-end pole to catch the looped end for the TidbiT® string. Several passes maybe required.

3) Once the loop has been hooked, pull the TidbiT® string out of the river bottom. An onboard pulley maybe required to extract the TidbiTs®. If the TidbiT® string cannot be pulled to the surface, it may be necessary to jet a pipe along the string to the required depth to facilitate removal.

4) Label the TidbiTs® with location and depth upon bringing onboard. Return to the office trailer and download the data from TidbiTs® onto the computer.

Appendix C
Health and Safety Plan

CH2M HILL HEALTH AND SAFETY PLAN

This Health and Safety Plan (HSP) will be kept on the site during field activities and will be reviewed as necessary. The plan will be amended or revised as project activities or conditions change or when supplemental information becomes available. The plan adopts, by reference, the Standards of Practice (SOPs) in the CH2M HILL *Corporate Health and Safety Program, Program and Training Manual*, as appropriate. In addition, this plan adopts proceduresprovided in project-specific Work Plans. The Site Safety Coordinator (SSC) is to be familiar with these SOPs and the contents of this plan. CH2M HILL's personnel and subcontractors must sign Attachment 1.

Project Information and Description

PROJECT NO(s): Initial Project #168525.TP GW Monitoring # 328225.GM.02.00 Interim Corrective Measures & Drilling testing #184004.PS. Background Study 316538.TC.02.00. Tracer Testing 332959.CM.FW.03 Pore Water Seepage Testing # 332663.A1

CLIENT: Pacific Gas & Electric Co.

PROJECT/SITE NAME: Topock Site Remediation, PG&E Topock Gas Compressor Station

SITE ADDRESS: 15 miles southeast of Needles, California (eastern San Bernardino County)

CH2M HILL PROJECT MANAGER(S): Julie Eakins/SFO (Project Manager)
Ellen Hedfield/RDD (groundwater monitoring task)
Mathew Johns/DEN & Paul Bertucci/SFO (Floodplain monitoring)
Jay Piper/LAS (drilling/testing task)
Brett Roberts/DEN (Background Study)
Terry DeBiase/SFO (Pore Water and Seepage Study)

TASK MANAGER(S): Serena Lee/SFO & Matt Ringier/SFO (GMP)
John Dallapiazzo/DEN (Background Study)
David Thomas/SFO (Transducer O&M)

CH2M HILL OFFICE: Oakland (San Francisco), California Office

DATE HEALTH AND SAFETY PLAN PREPARED: rev1 - 11/20/2001, rev2 - 10/28/2003, rev3 – 02/19/2004, rev4- 04/02/2004, rev5-08/20/2004, rev6-04-26-2005, rev 8 09-19-2005.

DATE(S) OF SITE WORK: Project startup in November 2001 (site visit/observe other samplers); ongoing groundwater and surface water sampling; drilling of exploratory boring/well in November 2003; interim corrective measures scheduled for 2004 ; Numerous work tasks, including water sampling, remediation work and such will continue through 2006

SITE ACCESS: Active PG&E gas compressor facility, requires sign-in & safety orientation: most sampling locations and wells are on federal (BLM) land.

SITE SIZE: approximately 1/2-mile square study area

SITE TOPOGRAPHY: high desert, hills & dry wash/alluvial terrain

PREVAILING WEATHER: dry; very hot during summer

SITE DESCRIPTION AND HISTORY: Active natural gas compressor facility which was subject of a RCRA Facility Investigation (RFI) in 1997-99 to investigate extent of chromium-impacts to soil and groundwater resulting from past wastewater disposal. The RFI Report and ongoing groundwater monitoring will be used to define correction measures and remediation alternatives. Interim corrective measures are planned in 2004 to collect

additional site data and initiate hydraulic control of the groundwater plume. Current surface conditions pose no critical or immediate risk to human health or environment.

DESCRIPTION OF SPECIFIC TASKS TO BE PERFORMED:
Field activities scheduled for 2005-6 include the following tasks:

1. Groundwater Monitoring Program: Includes water level monitoring and groundwater and surface water sample collection, shipment for analysis of water samples, sampling equipment and decontamination, purge water handling and management for PG&E disposal. July 2005 initiation of depth-specific river channel sampling from boats.
2. New task added in Sept 2005 is Pore Water Seepage studies using boats for access to the river bottoms.
3. Interim Corrective Measures (site investigation activities): Includes drilling, monitoring well and extraction well installation, geophysics, and hydraulic testing.
4. Interim Corrective Measures (groundwater extraction system): Includes installation and operation and maintenance (O&M) of a groundwater extraction system at the MW-20 bench. Installation activities include siting equipment (e.g. tanks, secondary containment, piping, and temporary power) provided by PG&E subcontractor. O&M activities include system monitoring, water sampling (for mass removal and waste profiling), coordinating truck filling operations, and routine system maintenance. Extracted groundwater is scheduled for offsite treatment and disposal until onsite treatment and disposal facilities are permitted and/or installed.
5. Development and testing of further monitoring wells.
6. Tracer testing for determination of groundwater flow paths, velocities, mixing and dispersion.

Site Map

This page is reserved for a Site Map.

Note locations of Support, Decontamination, and Exclusion Zones; site telephone; first aid station; evacuation routes; and assembly areas.

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1 Tasks to be Performed Under this Plan

1.1 Description of Tasks

(Reference Field Project Start-up Form)

Refer to project documents (i.e., Work Plan) for detailed task information. A health and safety risk analysis (Section 1.2) has been performed for each task and is incorporated in this plan through task-specific hazard controls and requirements for monitoring and protection. Tasks other than those listed below require an approved amendment or revision to this plan before tasks begin. Refer to Section 8.2 for procedures related to "clean" tasks that do not involve hazardous waste operations and emergency response (Hazwoper).

1.1.1 Hazwoper-Regulated Tasks

- **Groundwater monitoring**
- **Surface water sampling**
- **Monitoring well drilling/installation**
- **Investigation-derived waste (drum) sampling and disposal**
- **O&M of groundwater extraction system at MW-20 bench**

1.1.2 Non-Hazwoper-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hazwoper-trained personnel. **Prior approval from the Health and Safety Manager (HSM) is required before these tasks are conducted on regulated hazardous waste sites.**

TASKS	CONTROLS
• Installation of groundwater extraction system at MW-20 bench (e.g., siting tanks, piping, instrumentation and controls, and temporary power..	• Brief on hazards, limits of access, and emergency procedures
• Background sampling study	• Post contaminant areas as appropriate (refer to Section 8.2 for details)
• Pore water Seepage sampling and study, using boats to access the river.	• Sample and monitor as appropriate (refer to Section 5.0)
• Tracer injection well study using dyes	

1.2 Task Hazard Analysis

(Refer to Section 2 for hazard controls)

POTENTIAL HAZARDS	TASKS				
	Mud-Rotary Drilling	Groundwater monitoring, aquifer testing, tracer study	O&M of pumping system	Surface water and sediment sampling from the shore or water	IDW drum sampling and disposal
Flying debris/objects	X	X		X	X
Noise > 85dBA	X	X	X		
Electrical	X		X		
Suspended loads	X				
Buried utilities, drums, tanks	X				
Slip, trip, fall	X	X	X	X	X
Back injury	X	X	X	X	X
Confined space entry					
Trenches / excavations					
Visible lightning	X	X	X	X	X
Vehicle traffic	X	X	X		
Elevated work areas/falls			X	X	
Fires			X	X	X
Entanglement	X				
Drilling	X				
Heavy equipment			X		
Working near water				X	
Working from boat				X	
IDW Drum Sampling					X

2 Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the SSC for clarification.

In addition to the controls specified in this section, Project-Activity Self-Assessment Checklists are contained in Attachment 5. These checklists are to be used to assess the adequacy of CH2M HILL and subcontractor site-specific safety requirements. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. Self-assessment checklists should be completed early in the project, when tasks or conditions change, or when otherwise specified by the HSM. The self-assessment checklists, including documented corrective actions, should be made part of the permanent project records, and be promptly submitted to the HSM.

Project-specific frequency for completing self-assessments

- complete self assessment checklist every two weeks for drilling activities.
- complete self assessment checklist every week for groundwater extraction system activities

2.1 Project-Specific Hazards

2.1.1 Lockout/Tagout

- Do not work on equipment when the unexpected operation could result in injury, unless lockout/tagout procedures are implemented.
- Staff working under a lockout/tagout procedure must complete the CH2M HILL Lockout/Tagout training course. Project-specific training may also be required on site-specific lockout/tagout procedures.
- Standard lockout/tagout procedures include the following six steps:
  - notify all personnel in the affected area of the lockout/tagout,
  - shut down the equipment using normal operating controls,
  - isolate all energy sources,
  - apply individual lock and tag to each energy isolating device,
  - relieve or restrain all potentially hazardous stored or residual energy, and
  - verify that isolation and de-energization of the equipment has been accomplished. Once verified that the equipment is at the zero energy state, work may begin.
- All safe guards must be put back in place, all affected personnel notified that lockout/tagout has been removed, and controls positioned in the safe mode prior to lockout/tagout removal.
- Do not remove another person's lock or tag.

2.1.2 Working Above or Near Water

- Fall protection should be provided to prevent personnel from falling into water. Where fall protection systems are not provided and the danger of drowning exists, U.S. Coast Guard-approved personal flotation devices (PDFs), or life jacket, shall be worn.
- Inspect PFDs prior to use. Do not use defective PFDs.
- A life-saving skiff must be provided for emergency rescue.
- A minimum of one ring buoy with 90 feet of 3/8-inch solid-braid polypropylene (or equal) rope must be provided for emergency rescue.
- Use sampling and other equipment according to the manufacturers' instructions.

2.1.3 Drilling

(Reference CH2M HILL SOP HS-35, *Drilling*)

- Only authorized personnel are permitted to operate drill rigs.
- Stay clear of areas surrounding drill rigs during every startup.
- Stay clear of the rotating augers and other rotating components of drill rigs.
- Stay as clear as possible of all hoisting operations. Loads shall not be hoisted overhead of personnel.
- Do not wear loose-fitting clothing or other items such as rings or watches that could get caught in moving parts. Long hair should have it restrained.
- If equipment becomes electrically energized, personnel shall be instructed not to touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party shall be contacted to have line de-energized prior to approaching the equipment.
- Smoking around drilling operations is prohibited.

2.1.4 Exposure to Public Vehicular Traffic

The following precautions must be taken when working around traffic, and in or near an area where traffic controls have been established by a contractor.

- Exercise caution when exiting traveled way or parking along street – avoid sudden stops, use flashers, etc.
- Park in a manner that will allow for safe exit from vehicle, and where practicable, park vehicle so that it can serve as a barrier.
- All staff working adjacent to traveled way or within work area must wear reflective/high-visibility safety vests.
- Eye protection should be worn to protect from flying debris.
- Remain aware of factors that influence traffic related hazards and required controls – sun glare, rain, wind, flash flooding, limited sight-distance, hills, curves, guardrails, width of shoulder (i.e., breakdown lane), etc.
- Always remain aware of an escape route -- behind an established barrier, parked vehicle, guardrail, etc.
- Always pay attention to moving traffic – never assume drivers are looking out for you
- Work as far from traveled way as possible to avoid creating confusion for drivers.
- When workers must face away from traffic, a “buddy system” should be used, where one worker is looking towards traffic.
- When working on highway projects, obtain a copy of the contractor’s traffic control plan.
- Work area should be protected by a physical barrier – such as a K-rail or Jersey barrier.
- Review traffic control devices to ensure that they are adequate to protect your work area. Traffic control devices should: 1) convey a clear meaning, 2) command respect of road users, and 3) give adequate time for proper traffic response. The adequacy of these devices are dependent on limited sight distance, proximity to ramps or intersections, restrictive width, duration of job, and traffic volume, speed, and proximity.
- Either a barrier or shadow vehicle should be positioned a considerable distance ahead of the work area. The vehicle should be equipped with a flashing arrow sign and truck-mounted crash cushion (TMCC). All vehicles within 40 feet of traffic should have an orange flashing hazard light atop the vehicle.
- Except on highways, flaggers should be used when 1) two-way traffic is reduced to using one common lane, 2) driver visibility is impaired or limited, 3) project vehicles enter or exit traffic in an unexpected manner, or 4) the use of a flagger enhances established traffic warning systems.
- Lookouts should be used when physical barriers are not available or practical. The lookout continually watches approaching traffic for signs of erratic driver behavior and warns workers. Vehicles should be parked at least 40 feet away from the work zone and traffic. Minimize the amount of time that you will have your back to oncoming traffic.

2.1.5 IDW Drum Sampling

Personnel are permitted to handle and/or sample drums containing investigation-derived waste (IDW) only; handling or sampling other drums requires a plan revision or amendment approved by the CH2M HILL HSM. The following control measures will be taken when sampling drums containing IDW:

- Minimize transportation of drums.

- Sample only labeled drums or drums known to contain IDW.
- Use caution when sampling bulging or swollen drums. Relieve pressure slowly.
- If drums contain, or potentially contain, flammable materials, use non-sparking tools to open.
- Picks, chisels, and firearms may not be used to open drums.
- Reseal bung holes or plugs whenever possible.
- Avoid mixing incompatible drum contents.
- Sample drums without leaning over the drum opening.
- Transfer the content of drums using a method that minimizes contact with material.
- PPE and air monitoring requirements specified in Sections 4 and 5 must address IDW drum sampling.
- Spill-containment procedures specified in Section 7 must be appropriate for the material to be handled.

2.1.6 Sunburn Prevention

Most people enjoy spending time outdoors, but too much time in the sun can cause problems later. Excessive sun exposure can cause your skin to age prematurely, become "leathery," wrinkled, and in some cases, may cause skin cancer. People with fair skin, freckles and red or blond hair are most at risk but even those who tan easily need to be careful. Avoid being outside from 10 a.m. to 3 p.m. when the sun's rays are the strongest. When this is not possible, wear protective clothing such as long sleeves and a full rim hard hat to cover your neck, ears and face.. Use a sun screen with a sun protection factor of at least 15, and reapply it often since perspiration can dilute it's protective effects.. Also take precautions on cloudy days because even though the sun intensity seems diminished, 70 to 80% of the suns rays are still coming through the clouds.. Some medications can also make you more sun sensitive so check with your doctor.

2.1.7 ATV Safety

- Use of ATV's is a high hazard risk and only approved staff may operate.
- All staff will be required to review Attachment 7 and receive basic use training.
- ATV's shall be used in accordance of manufacturers specifications.
- Required PPE shall be worn at all times.

2.1.8 Field Vehicle Safety

- Parking at pullouts must be done with care. Leave room for vehicles belonging to contractors to easily pullout in case of emergency. Do not block any vehicles in. If this is necessary, leave keys in ignition.
- Right of Way on site roads. Those traveling uphill always have the right of way if there is no room to pass. Vehicle traveling downhill, must backup to the nearest pullout.
- Field vehicles are to carry emergency equipment as specified in section 9.2.
- Correct PPE should be available for each person riding in a field vehicle.
- WD is required for site access in certain areas. Only those familiar with use of OFF Highway 4WD vehicles should drive during site access.
- Do not park or drive over dry brush, as this may be ignited by a hot exhaust system.
- Do not attempt to drive on pitched steeply angled roadways or trails.
- Do not attempt to cross fast flowing stream beds or flash flood channels without knowing weather conditions or storm warnings.
- Seatbelts are to be worn at all times.
- Only rented 4WD vehicles with extra damage waiver insurance shall be used. Enterprise Rental provides this, check with contracts about other CH2MHILL preferred rental agencies. Special rate codes must be used to rent.

2.1.9 Earthmoving Equipment (Reference CH2M HILL SOP HS-27, *Earthmoving Equipment*)

- Only authorized personnel are permitted to operate earthmoving equipment.
- Maintain safe distance from operating equipment and stay alert of equipment movement. Avoid positioning between fixed objects and operating equipment and equipment pinch points, remain outside of the equipment

swing and turning radius. Pay attention to backup alarms, but not rely on them for protection. Never turn your back on operating equipment.

- Approach operating equipment only after receiving the operator's attention. The operator shall acknowledge your presence and stop movement of the equipment. Caution shall be used when standing next to idle equipment; when equipment is placed in gear it can lurch forward or backward. Never approach operating equipment from the side or rear where the operator's vision is compromised.
- When required to work in proximity to operating equipment, wear high-visibility vests to increase visibility to equipment operators. For work performed after daylight hours, vests shall be made of reflective material or include a reflective stripe or panel.
- Do not ride on earthmoving equipment unless it is specifically designed to accommodate passengers. Only ride in seats that are provided for transportation and that are equipped with seat belts.
- Stay as clear as possible of all hoisting operations. Loads shall not be hoisted overhead of personnel.
- Earthmoving equipment shall not be used to lift or lower personnel.
- If equipment becomes electrically energized, personnel shall be instructed not to touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party shall be contacted to have line de-energized prior to approaching the equipment.

2.1.10 Fall Protection (Reference CH2M HILL SOP HS-31, *Fall Protection*)

- Fall protection systems must be used to eliminate fall hazards when performing construction activities at a height of 6 feet or greater and when performing general industry activities at a height of 4 feet or greater.
- Staff exposed to fall hazards must complete the CH2M HILL Fall Protection training course and receive project-specific fall protection training. Do not use fall protection systems on which you have not been trained.
- The SSC/DSC must complete the Project Fall Protection Evaluation Form and provide project-specific fall protection training to all staff exposed to fall hazards. The Project Fall Protection Evaluation Form is provided in Attachment 4 of this plan.
- The SSC/DSC shall act as competent person and shall inspect and oversee the use of fall protection systems. Follow all requirements established by the competent person for the use and limitation of fall protection systems.
- A registered professional engineer shall oversee the use of horizontal lifelines.
- Only one person shall be simultaneously attached to a vertical lifeline.
- Remain within the guardrail system when provided. Leaning over or stepping across a guardrail system is not permitted.
- Do not stand on objects (boxes, buckets, bricks, blocks, etc.) or ladders to increase working height on top of platforms protected by guardrails.
- Inspect personal fall arrest systems prior to each use. Do not use damaged fall protection systems at any time, or for any reason.
- Set-up personal fall arrest systems so that you can neither free-fall more than 6 feet nor contact any lower level.
- Only attach personal fall arrest systems to anchorage points capable of supporting at least 5,000 pounds.
- Use fall protection equipment for fall protection only and not to hoist materials. Do not use personal fall arrest systems that have been subjected to impact loading.

2.1.11 Chemical Laboratory Activities

- Personnel must complete the computer-based Laboratory Safety training module.
- Personnel must complete the general laboratory medical monitoring protocol and be approved for such activities.
- Personnel must receive chemical-specific hazard communication training on the chemicals to which they are exposed.
- Personnel who are exposed to methylene chloride must complete the computer-based Methylene Chloride training module.
- Personnel must read and follow the requirements of the Chemical Hygiene Plan.

2.1.12 Lightning and Thunderstorms

- Avoid working during thunderstorms.
- If caught in one, seek shelter in low lying areas, nearby buildings or your car. Do not touch anything metal.
- Avoid lone trees as shelter.
- Avoid open, elevated, bare areas.
- Do not cross bodies of water.
- If caught in open area, place feet close together and crouch down as small as possible, without lying on the ground.
- Ground strikes are known to be initiated by "leaders", or charges, from the earth making a connection to the charge in the clouds. This may make your hair stand up, and since you do not want to be part of a leader that makes the connection to form a cloud-to-ground strike, immediately crouch as described above.
- Avoid working in flood channels due to flash flood hazards. Rain in the mountains can create a flashflood hazard, even if no rain is falling in your area.

2.1.13 Working On Water

- Safe means of boarding or leaving the boat or platform must be provided to prevent slipping and falling.
- Boat/barge must be equipped with adequate railing.
- Boat/barge must be operated according to U.S. Coast Guard regulations (speed, lightning, right-of-way, etc.).
- Staff should be instructed on safe use and operation of boat prior to use.
- Work requiring the use of a boat will not take place at night or during inclement weather.
- Shut off engine before refueling. Do not smoke while refueling.

Before getting underway:

- Vessels should not be operated alone.
- Personnel Floatation Devices (PFD) are required for all personnel, and are available to check out when filing float plan.
- Cellular telephone equipment may be checked out when filing float plan.
- Jackets and other protection against the weather should be a consideration when planning your operation.
- Basic Personal Protective Equipment (PPE) such as hats, safety glasses, etc., are required in addition to PFD's.

Communication:

- A serviceable cellular telephone must be onboard with the operator. Cellular telephones may be obtained when filing float plan.
- A list of emergency telephone contact numbers will be provided when filing float plan.
- Marine radio, inquire if one is available and test for operation

- If your destination includes boarding any of the dredging or floating equipment, you must first contact the operator to schedule the visit to ensure safe operations.

At the dock:

- USCG approved Personal Floatation Device (PFD) must be worn at all times by all personnel in and around small craft or when the potential for drowning exists.
- Check inventory, which should at a minimum include; PFDs for all personnel, cellular telephone, marine radio, charged fire extinguisher, first aid kit, emergency signaling device, fuel, paddle, anchoring system, and running lights (if night operations occur).
- Never jump into a small boat, always board by stepping into the center of the bottom.
- Be careful no to exceed the maximum weight capacity of the vessel.
- Make careful inspection of the vessel and the immediate surroundings.

- Check visibility, conditions such as heavy fog may preclude operations.
- Make note of the direction and strength of the wind and current.
- Ensure that all lines are secure before getting underway to prevent fouling the propeller.
- Smoking is not permitted onboard.

Returning:

- Make certain that the vessel is secure at the dock, all dock lines secure, radio and other electrical equipment is turned off, etc.
- Replace or report equipment the needs service or repair when closing out the float plan.
- Return any equipment, which may have been issued, to you or your passengers for the operation.

Be ALERT! The principal cause of a vessel colliding with another vessel or with a fixed object is failure of the operator to maintain an efficient forward lookout.

2.1.14 Hand Augering

Muscle strains can occur with hand augering. To minimize the occurrence of injury, the following should be observed:

- Keep augers sharp - a dull auger requires more work to advance through the soil.
- Before beginning work, stretch or warm up the body as you would prior to exercising.
- Try to avoid excessive twisting or wrenching motions when using the auger.

2.1.15 Tracer Injection Well Study

A tracer test using fluorescent dyes will be used and added to existing injection wells. Tracer dyes are shipped in powder form to the jobsite in carboys, inside protective coolers.

Guidelines outlines in Section 2.2.2, 2.2.3, and 2.2.4 of this safety plan, must followed for use of this Tracer dye.

2.2 General Hazards

2.2.1 General Practices and Housekeeping

(Reference CH2M HILL SOP HS-20, *General Practices*)

- Site work should be performed during daylight hours whenever possible. Work conducted during hours of darkness require enough illumination intensity to read a newspaper without difficulty.
- Good housekeeping must be maintained at all times in all project work areas.
- Common paths of travel should be established and kept free from the accumulation of materials.
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions.
- Provide slip-resistant surfaces, ropes, and/or other devices to be used.
- Specific areas should be designated for the proper storage of materials.
- Tools, equipment, materials, and supplies shall be stored in an orderly manner.
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area.
- Containers should be provided for collecting trash and other debris and shall be removed at regular intervals.
- All spills shall be quickly cleaned up. Oil and grease shall be cleaned from walking and working surfaces.

2.2.2 Hazard Communication

(Reference CH2M HILL SOP HS-05, *Hazard Communication)*

The SSC is to perform the following:

- Complete an inventory of chemicals brought on site by CH2M HILL using Attachment 2.
- Confirm that an inventory of chemicals brought on site by CH2M HILL subcontractors is available.
- Request or confirm locations of Material Safety Data Sheets (MSDSs) from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed.

- Before or as the chemicals arrive on site, obtain an MSDS for each hazardous chemical.
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly.
- Give employees required chemical-specific HAZCOM training using Attachment 3.
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

2.2.3 Shipping and Transportation of Chemical Products

(Reference CH2M HILL's *Procedures for Shipping and Transporting Dangerous Goods)*

Chemicals brought to the site might be defined as hazardous materials by the U.S. Department of Transportation (DOT). All staff who ship the materials or transport them by road must receive CH2M HILL training in shipping dangerous goods. All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. Contact the HSM or the Equipment Coordinator for additional information.

2.2.4 Lifting

(Reference CH2M HILL SOP HS-112, *Lifting*)

- Proper lifting techniques must be used when lifting any object.
  - Plan storage and staging to minimize lifting or carrying distances.
  - Split heavy loads into smaller loads.
  - Use mechanical lifting aids whenever possible.
  - Have someone assist with the lift -- especially for heavy or awkward loads.
  - Make sure the path of travel is clear prior to the lift.
  - CH2M HILL's lifting limit per person is 40lbs. All lifts over this weight must be done with assistance.

2.2.5 Fire Prevention

(Reference CH2M HILL SOP HS-22, *Fire Prevention*)

- Fire extinguishers shall be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet. When 5 gallons or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet. Extinguishers must:
  - be maintained in a fully charged and operable condition,
  - be visually inspected each month, and
  - undergo a maintenance check each year.
- The area in front of extinguishers must be kept clear.
- Post "Exit" signs over exiting doors, and post "Fire Extinguisher" signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet from any building.
- Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.
- Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.

2.2.6 Electrical

(Reference CH2M HILL SOP HS-23, *Electrical*)

- Only qualified personnel are permitted to work on unprotected energized electrical systems.
- Only authorized personnel are permitted to enter high-voltage areas.
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented.
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service.
- All temporary wiring, including extension cords and electrical power tools, must have ground fault circuit interrupters (GFCIs) installed.
- Extension cords must be:
  - equipped with third-wire grounding.

  - covered, elevated, or protected from damage when passing through work areas.
  - protected from pinching if routed through doorways.
  - not fastened with staples, hung from nails, or suspended with wire.
- Electrical power tools and equipment must be effectively grounded or double-insulated UL approved.
- Operate and maintain electric power tools and equipment according to manufacturers' instructions.
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet from overhead power lines for voltages of 50 kV or less, and 10 feet plus ½ inch for every 1 kV over 50 kV.
- Temporary lights shall not be suspended by their electric cord unless designed for suspension. Lights shall be protected from accidental contact or breakage.
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

2.2.7 Heat Stress

(Reference CH2M HILL SOP HS-09, *Heat and Cold Stress*)

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°F to 60°F should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons per day. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate yourself by slowly increasing workloads (e.g., do not begin with extremely demanding activities).
- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shelter/shade to protect personnel against radiant heat (sun, flames, hot metal).
- Maintain good hygiene standards by frequently changing clothing and showering.
- Observe one another for signs of heat stress. Persons who experience signs of heat syncope, heat rash, or heat cramps should consult the SSC/DSC to avoid progression of heat-related illness.

SYMPTOMS AND TREATMENT OF HEAT STRESS

	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool– but not cold– water. Call ambulance, and get medical attention immediately!

Monitoring Heat Stress

These procedures should be considered when the ambient air temperature exceeds 70°F, the relative humidity is high (>50 percent), or when workers exhibit symptoms of heat stress.
The heart rate (HR) should be measured by the radial pulse for 30 seconds, as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 100 beats/minute, or 20 beats/minute above resting pulse. If the HR is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate still exceeds 100 beats/minute at the beginning of the next rest period, the work cycle should be further shortened by 33 percent. The procedure is continued until the rate is maintained below 100 beats/minute, or 20 beats/minute above resting pulse.

A new Heat Stress Monitoring log has been implemented. See attachments or Rick Cavil for a copy.

2.2.8 Cold Stress

(Reference CH2M HILL SOP HS-09, *Heat and Cold Stress*)

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in cool weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- Wind-Chill Index is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- NSC Guidelines for Work and Warm-Up Schedules can be used with the wind-chill index to estimate work and warm-up schedules for fieldwork. The guidelines are not absolute; workers should be monitored for symptoms of cold-related illnesses. If symptoms are not observed, the work duration can be increased.
- Persons who experience initial signs of immersion foot, frostbite, hypothermia should consult the SSC/DSC to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

SYMPTOMS AND TREATMENT OF COLD STRESS			
	Immersion (Trench) Foot	**Frostbite**	**Hypothermia**
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm–but **not** hot–water. Have victim drink warm fluids, but **not** coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but **not** coffee or alcohol. Get medical attention.

2.2.9 Compressed Gas Cylinders

- Valve caps must be in place when cylinders are transported, moved, or stored.
- Cylinder valves must be closed when cylinders are not being used and when cylinders are being moved.
- Cylinders must be secured in an upright position at all times.
- Cylinders must be shielded from welding and cutting operations and positioned to avoid being struck or knocked over; contacting electrical circuits; or exposed to extreme heat sources.
- Cylinders must be secured on a cradle, basket, or pallet when hoisted; they may not be hoisted by choker slings.

2.2.10 Confined Space Entry

(Reference CH2M HILL SOP HS-17, *Confined Space Entry*)

No confined space entry will be permitted. Confined space entry requires additional health and safety procedures, training, and a permit. If conditions change such that confined-space entry is necessary, contact the HSM to develop the required entry permit.
When planned activities will not include confined-space entry, permit-required confined spaces accessible to CH2M HILL personnel are to be identified before the task begins. The SSC is to confirm that permit spaces are properly posted or that employees are informed of their locations and hazards.

2.3 Biological Hazards and Controls

2.3.1 Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If a person is bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Seek medical attention immediately. **DO NOT** apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings.

2.3.2 Bees and Other Stinging Insects

Bee and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform the SSC and/or buddy. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; seek medical attention if a reaction develops.

2.3.3 Bloodborne Pathogens

(Reference CH2M HILL SOP HS-36, *Bloodborne Pathogens*)

Exposure to bloodborne pathogens may occur when rendering first aid or CPR, or when coming into contact with landfill waste or waste streams containing potentially infectious material. Exposure controls and personal protective equipment (PPE) are required as specified in CH2M HILL SOP HS-36, *Bloodborne Pathogens*. Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.

2.3.4 Scorpion Weed

Scorpion weed has been found to be located on the project site and needs to be avoided by project personnel. Scorpion week has purple flowers has the potential to cause a skin rash when contacted. The following text provides information to project personnel about this plant species.

GENERAL MORPHOLOGY: This plant is an herbaceous plant species that has a cyme raceme (curled flower stem with multiple flowers) and alternate leaves.

FLOWER COLOR: Purple

LOCATION WHERE PLANTS MAY OCCUR: Predominantly along the side of a wash or along the Colorado River bank.

REQUIRED COORDINATION: As is may be difficult to identify the plants present on the project site, they will need to be identified on the project site to all field personnel prior to site work.

IF SKIN IS CONTACTED WITH PLANT:

When skin is directly contacted by *Phacelia sp*., sap or hairs from the plant will attached to the skin. Once affected, you will begin to feel a tingling sensation and your skin may develop red bumps or turn brown. Do not touch this

area of your skin because you may spread the hairs/sap of the plant to new areas on your skin. This would cause other areas to be infected. You have two types of methods to assist in removing the hairs. In all cases, please consult the appropriate medical attention.

1. **Where water is available**: Place area of skin under large volume of flowing water. You can look to see if hairs are removed from the water flow. When confident that the hairs/sap have been removed you can wash area with soap. I would suggest that you place soap directly on area without touching it first, and keep under flowing water until removed. You can repeat as often as necessary. When confident that hairs have been removed from the area, you can rub the area with soap with a paper towel or rag.

2. **Where water is not available**: If you are in an are where water is not available, you can place tape over the area contacted an pull off quickly. This will assist in removing the hairs. Repeat as often as necessary. An additional method would be to cover area with hand cream or other viscous liquid and shave. This will remove the plant hairs as well as your natural hair from your skin. A razor is usually included in a snake bite kit. Please dispose of razor after use. You can rinse the area with any type of liquid (soda, juice) if water is not available if sap is present on your skin. Follow #1 above when water is available.

WHEN CLOTHING/GEAR IS CONTACTED WITH PLANT:

Remove clothing without touching area that was contacted with plant. Store in a plastic bag until you can wash them. When washing, do not include other clothing items in the load. If a large area is affected in the clothing, you may want to wash it more than once to ensure that all plant materials have been removed.

Wash all gear with soap and water if contacted plant. Electronic equipment will have to be wiped with a dry towel, as water will damage the equipment. Be careful to ensure that all field equipment is clean, as people using the equipment on a later date could become infected.

2.3.5 Dog Safety

- In areas known to be frequented by feral dogs, equip each field team with dog repellant (e.g., Shock Dog Repellent or other capsaicin-based spray).
  - Read manufactures instructions.
  - Position yourself up-wind if possible before using.
  - Only use if attacked-- not just threatened.
- Avoid all dogs – both leashed and stray.
- Don't disturb a dog while it is sleeping, eating or caring for puppies.
- If a dog approaches to sniff you - stay still.
- An aggressive dog has a tight mouth, flattened ears and a direct stare.
- If you're threatened by a dog, remain calm – don't scream and avoid eye contact.
- If you say anything, speak calmly and firmly.
- Don't turn and run – try to stay still until the dog leaves, or back away slowly until the dog is out of sight or you have reached safety (e.g., vehicle).
- If attacked, retreat to vehicle or attempt to place something between you and the dog.
- If you fall or are knocked to the ground, curl into a ball with your hands over your head and neck, and protect your face.
- If bitten, immediately scrub the bite site vigorously with soap and water.
- Report the incident to the local authorities.

- Seek medical attention as soon as possible.

2.5 Contaminants of Concern

(Refer to Project Files for more detailed contaminant information)

Contaminant	Location and Maximum[a] Concentration (ppm)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Chromium (as Cr(II) & Cr(III))	GW: 13.2 (MW-20/70) SB: 74.9 (4', RR Debris site) SS: 2,100 (disposal area) SW: not detected	0.5 mg/m^3	25	Irritated eyes, sensitization dermatitis, histologic fibrosis of lungs	NA
Chromium (hexavalent)	GW: 12.9 (MW-20/70) SB: 15.4 (4, RR Debris site) SS: 53.0 (disposal area) SW: not detected	0.01 mg/m^3	15 Ca	Irritated respiratory system, nasal septum perforation, liver and kidney damage, leucytosis, leupen, monocytosis, eosinophilla, eye injury, conjunctivitis, skin ulcer, sensitization dermatitis	NA

Footnotes:

[a] Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), SS (Surface Soil), SL (Sludge), SW (Surface Water).

[b] Appropriate value of PEL, REL, or TLV listed.

[c] IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.

[d] PIP = photoionization potential; NA = Not applicable; UK = Unknown.

2.6 Potential Routes of Exposure

Dermal: Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 4.	**Inhalation:** Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in Sections 4 and 5, respectively.	**Other:** Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking).

3 Project Organization and Personnel

3.1 CH2M HILL Employee Medical Surveillance and Training

(Reference CH2M HILL SOPs HS-01, *Medical Surveillance*, and HS-02, *Health and Safety Training)*

The employees listed below are enrolled in the CH2M HILL Comprehensive Health and Safety Program and meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated "SSC" have completed a 12-hour site safety coordinator course, and have documented requisite field experience. An SSC with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. At least one FA-CPR designated employee must be present during all tasks performed in exclusion or decontamination zones. The employees listed below are currently active in a medical surveillance program that meets state and federal regulatory requirements for hazardous waste operations. Certain tasks (e.g., confined-space entry) and contaminants (e.g., lead) may require additional training and medical monitoring.

Pregnant employees are to be informed of and are to follow the procedures in CH2M HILL's SOP HS-04, *Reproduction Protection*, including obtaining a physician's statement of the employee's ability to perform hazardous activities before being assigned fieldwork.

Employee Name	Office	Responsibility	SSC/FA-CPR
David Thomas	BAO	Task/Field Manager (Drilling);	Level D,
Matt Ringier	BAO	Team Lead, SSC	Level D, ISC,
Gary Bissonnette	BAO	Field member	Level D,
Serena Lee	BAO	Team Lead, SSC	Level D, FA/CPR, SSC
Martin Barackman	RDD	Field team	Level D,
Zach Miller	SDO	Field team	Level C, SSC, FA/CPR
Matt Johns	DEN	PM (Floodplain)	Level C, SC-HW, FA/CPR
Jennifer Bradtmueller	DEN	GMP Team	Level C, SC-HW, FA/CPR
Bob Trebble	ANC	GMP team	Level D, FA/CPR
John Dallapiazza	DEN	Team lead, SSC	Level C, SC-HW, FA/CPR
Kathryn Brown	RDD	GMP Team	Level C, SC-HW, FA/CPR
Brad Shearer	RDD	Field team	Level C, SC-HW, FA/CPR
Jay Piper	PHX	Field Task Mgr.	Level C, FA, SC-HW
Paul Bertucci	BAO	Project Manager (Floodplain)	Expired
Dan Cichy	DEN	GMP Team, Bkgd Study	Level D, FA/CPR
Ken Dorman	SAC	GMP Team	Level C, SC-HW, FA
Shawn Duffy	RDD	GMP Team	Level D
Kate Ebel	BAO	GMP Team	Level D, SC-HW, FA/CPR
Mike Ladeau	SCO	GMP Team	Level C, FA/CPR, SC
John Lueck	RDD	GMP Team	Level C, SC-HW, FA
Audie Martin	RDD	GMP Team	Level C, ISC, FA/CPR
Victor Martinez	DFW	GMP Team	Level C, SC-C, FA/CPR

Erica Matthews	LAS	GMP Team	Level D, SC-HW
Ryan McClellan	DEN	GMP Team	Level C
Ben Moayyad	SAC	GMP Team	Level D, SC-HW, FA/CPR
Jim Sarabia	PHX	GMP Team	Level C, SC-HW, FA/CPR
Allan Erickson	PHX	Transducer Team	Level D, SC-C, FA/CPR
Isaac Wood	BAO	Transducer Team	Level C

3.2 Field Team Chain of Command and Communication Procedures

3.2.1 Client

Contact Name: Yvonne Meeks, PG&E Project Manager
Phone: (805)-546-5243
Facility Contact Name: Margie Fergerson, Topock Facility Site Environ. Manager
Phone: (760) 326-5524

3.2.2 CH2M HILL

Project Manager: Julie Eakins/BAO
Task Manager/SSC (Drilling): David Thomas/BAO
Task Manager (soil sampling): Rick Sturm/BAO
Task Manager (groundwater program): Matt Ringier/ BAO and Serena Lee/BAO
Task Manager (interim corrective measures: Mathew Johns/DEN
Health and Safety Manager: Rick Cavil/BAO
Field Team Leader/SSC (GMP): Matt Ringier and Serena Lee/BAO (groundwater program) David Thomas/BAO (interim corrective measures and system operation),
Site Safety Coordinator: Jay Piper/ PHX, David Thomas/BAO, Matt Ringier/BAO, John Dallapiazza/DEN, Allan Erickson/PHX
The SSC is responsible for contacting the Field Team Leader and Project Manager. In general, the Project Manager will contact the client. The Health and Safety Manager should be contacted as appropriate.

3.2.3 CH2M HILL Subcontractors

(Reference CH2M HILL SOP HS-55, *Subcontractor, Contractor, and Owner*)

Strongarm Environmental Field Services, Norwalk, CA. 562-404-6656(Scott or Casey) Will provide two field sampling technicians and field vehicles/equipment to perform quarterly groundwater sampling in 2002 under the direction of CH2M HILL.

WDC Exploration and Wells, Montclair, CA, will conduct drilling and well construction/development tasks.

Randy Wallis Well Service, Barstow, CA will provide on-call services including well and pump maintenance and repair of the existing groundwater monitoring and extraction wells at the Topock site.

Prosonic Corp., 2475 Cerritos Ave., Signal Hill CA 90755. 562-424-9992 or 800-996-4949 (Corp. office) Provide specialized drill rig and crew.

GSI Water, 520 Mission St. South Pasadena, CA 91030. 626/441-0039 Seepage Study

Captain Doyle River Excursions, Topock Marina**.** Boat charter service and captains for boat tasks.

The subcontractors listed above are covered by this HSP and must be provided a copy of this plan. However, this plan does not address hazards associated with the tasks and equipment that the subcontractor has expertise in (e.g., drilling, excavation work, electrical). Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit these procedures to CH2M HILL for review before the start of field work. Subcontractors must comply with the established health and safety plan(s). The CH2M HILL SSC should verify that subcontractor employee training, medical clearance, and fit test records are current and must monitor and enforce compliance with the

established plan(s). CH2M HILL's oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

CH2M HILL should continuously endeavor to observe subcontractors' safety performance. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. In addition to this level of observation, the SSC is responsible for confirming CH2M HILL subcontractor performance against both the subcontractor's safety plan and applicable self-assessment checklists. Self-assessment checklists contained in Attachment 5 are to be used by the SSC to review subcontractor performance.

Health and safety related communications with CH2M HILL subcontractors should be conducted as follows:

- Brief subcontractors on the provisions of this plan, and require them to sign the Employee Signoff Form included in Attachment 1.
- Request subcontractor(s) to brief the project team on the hazards and precautions related to their work.
- When apparent non-compliance/unsafe conditions or practices are observed, notify the subcontractor safety representative and require corrective action – the subcontractor is responsible for determining and implementing necessary controls and corrective actions.
- When repeat non-compliance/unsafe conditions are observed, notify the subcontractor safety representative and stop affected work until adequate corrective measures are implemented.
- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, and stop affected work until adequate corrective measures are implemented. Notify the Project Manager and HSM as appropriate.
- Document all oral health and safety related communications in project field logbook, daily reports, or other records.

4 Personal Protective Equipment (PPE)

(Reference CH2M HILL SOP HS-07, *Personal Protective Equipment*, HS-08, *Respiratory Protection*)

PPE Specifications [a]

Tasks	Level	Body	Head	Respirator [b]
General site entry Surveying Observation of material loading for offsite disposal Oversight of remediation and construction	D	Work clothes; steel-toe, leather work boots; work glove.	Hardhat [c] Safety glasses Ear protection [d]	None required
Surface water sampling Aquifer testing Sediment sampling Drilling new wells, soil sampling.	Modified D	Work clothes or cotton coveralls **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Safety glasses Ear protection [d]	None required
Groundwater sampling Investigation-derived waste (drum) sampling and disposal	Modified D	**Coveralls:** Long Work pants **Boots:** Steel-toe, leather work boots **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hat [c] Splash shield [c] Safety glasses Ear protection [d]	None required.
River work from a boat	Modified D	**Work clothes:** long pants, t-shirt with sleeves, leather work boots, USCG approved flotation device. Upgrade to steel toed may be required if carrying heavy objects. **Gloves:** Nitrile gloves may be necessary for sampling.	Hat Safety Glasses	None required
Groundwater extraction system site set-up and general inspections	D	Work clothes; steel-toe, leather work boots; work glove.	Hardhat [c] Safety glasses Ear protection [d]	None required
Groundwater extraction system O&M	Modified D	**Coveralls:** Uncoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Safety glasses Ear protection [d]	None required.

Reasons for Upgrading or Downgrading Level of Protection

Upgrade[f]	Downgrade
• Request from individual performing tasks. • Change in work tasks that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels (Section 5) exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decreases the hazard. • Change in work task that will reduce contact with hazardous materials.

[a] Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.

[b] No facial hair that would interfere with respirator fit is permitted.

[c] Hardhat and splash-shield areas are to be determined by the SSC.

[d] Ear protection should be worn when conversations cannot be held at distances of 3 feet or less without shouting.

[e] Cartridge change-out schedule is at least every 8 hours (or one work day), except if relative humidity is > 85%, or if organic vapor measurements are > midpoint of Level C range (refer to Section 5)--then at least every 4 hours. If encountered conditions are different than those anticipated in this HSP, contact the HSM.

[f] Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the HSM, and an SSC qualified at that level is present.

5 Air Monitoring/Sampling

(Reference CH2M HILL SOP HS-06, *Air Monitoring)*

5.1 Air Monitoring Specifications

Air monitoring is not required since there is a very low potential for personal exposure during planned site activities. The primary pathway for exposure to chromium is via inhalation of chromium-containing dust, so as long as dust is controlled, there should be no exposure problems. If work changes or if dust is generated during work activities, then the HSM must be notified so that air monitoring and PPE can be further evaluated.

6 Decontamination

(Reference CH2M HILL SOP HS-13, *Decontamination*)

The SSC must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SSC. The SSC must ensure that procedures are established for disposing of materials generated on the site.

6.1 Decontamination Specifications

Personnel

- Boot wash/rinse
- Glove wash/rinse
- Outer-glove removal
- Body-suit removal
- Inner-glove removal
- Respirator removal
- Hand wash/rinse
- Face wash/rinse
- Shower ASAP
- Dispose of PPE in municipal trash, or contain for disposal
- Dispose of personnel rinse water to facility or sanitary sewer, or contain for offsite disposal

Sample Equipment

- Wash/rinse equipment
- Solvent-rinse equipment
- Contain solvent waste for offsite disposal

Heavy Equipment

- Power wash
- Steam clean
- Dispose of equipment rinse water to facility or sanitary sewer, or contain for offsite disposal

6.2 Diagram of Personnel-Decontamination Line

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SSC should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones.

Figure 6-1 illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SSC to accommodate task-specific requirements.

7 Spill-Containment Procedures

Sorbent material will be maintained in the support zone. Incidental spills will be contained with sorbent and disposed of properly. Additional spill-containment procedures are provided in project-specific work plans.

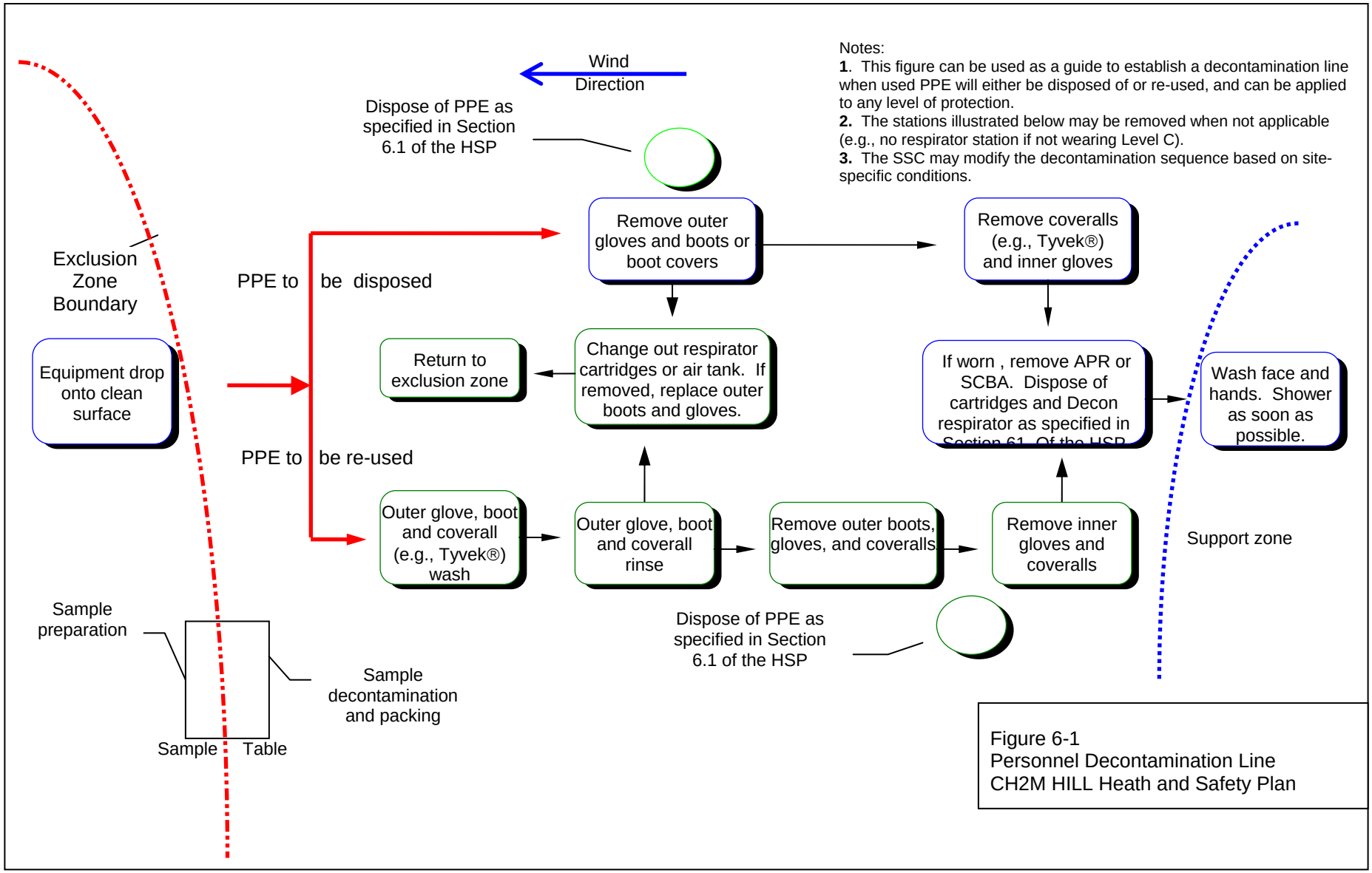

Figure 6-1
Personnel Decontamination Line
CH2M HILL Heath and Safety Plan

8 Site-Control Plan

8.1 Site-Control Procedures

(Reference CH2M HILL SOP HS-11, *Site Control)*

- The SSC will conduct a site safety briefing (see below) before starting field activities or as tasks and site conditions change.
- Topics for briefing on site safety: general discussion of Health and Safety Plan, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, emergencies.
- The SSC records attendance at safety briefings in a logbook and documents the topics discussed.
- Post the OSHA job-site poster in a central and conspicuous location in accordance with CH2M HILL SOP HS-71, *OSHA Postings*.
- Establish support, decontamination, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals
  - Air horn
  - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the "buddy system."
- Initial air monitoring is conducted by the SSC in appropriate level of protection.
- The SCC is to conduct periodic inspections of work practices to determine the effectiveness of this plan – refer to Sections 2 and 3. Deficiencies are to be noted, reported to the HSM, and corrected.

8.2 Hazwoper Compliance Plan

(Reference CH2M HILL SOP HS-19, *Site-Specific Written Safety Plans)*

Certain parts of the site work are covered by state or federal Hazwoper standards and therefore require training and medical monitoring. Anticipated Hazwoper tasks (Section 1.1.1) might occur consecutively or concurrently with respect to non-Hazwoper tasks. This section outlines procedures to be followed when approved activities specified in Section 1.1.2 do not require 24- or 40-hour training. Non-Hazwoper-trained personnel also must be trained in accordance with all other state and federal OSHA requirements.

- In many cases, air sampling, in addition to real-time monitoring, must confirm that there is no exposure to gases or vapors before non-Hazwoper-trained personnel are allowed on the site, or while non-Hazwoper-trained staff are working in proximity to Hazwoper activities. Other data (e.g., soil) also must document that there is no potential for exposure. The HSM must approve the interpretation of these data. Refer to subsections 2.5 and 5.3 for contaminant data and air sampling requirements, respectively.
- When non-Hazwoper-trained personnel are at risk of exposure, the SSC must post the exclusion zone and inform non-Hazwoper-trained personnel of the:
  - nature of the existing contamination and its locations
  - limitations of their access
  - emergency action plan for the site
- Periodic air monitoring with direct-reading instruments conducted during regulated tasks also should be used to ensure that non-Hazwoper-trained personnel (e.g., in an adjacent area) are not exposed to airborne contaminants.
- When exposure is possible, non-Hazwoper-trained personnel must be removed from the site until it can be demonstrated that there is no longer a potential for exposure to health and safety hazards.
- Remediation treatment system start-ups: Once a treatment system begins to pump and treat contaminated media, the site is, for the purposes of applying the Hazwoper standard, considered a treatment, storage, and disposal facility (TSDF). Therefore, once the system begins operation, only Hazwoper-trained personnel (minimum of 24 hour of training) will be permitted to enter the site. All non-Hazwoper-trained personnel must not enter the TSDF area of the site.

9 Emergency Response Plan

(Reference CH2M HILL, SOP HS-12, *Emergency Response*)

This emergency response plan covers the planned sampling, drilling, and investigation activities for the site. A project-specific Emergency Response Plan has been prepared for operation of the groundwater extraction system.

9.1 Pre-Emergency Planning

The SSC performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate.

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin, including driving route to hospital.
- Brief new workers on the emergency response plan.

The SSC will evaluate emergency response actions and initiate appropriate follow-up actions.

9.2 Emergency Equipment and Supplies

The SSC should mark the locations of emergency equipment on the site map and post the map.

Emergency Equipment and Supplies	Location
20 LB (or two 10-lb) fire extinguisher (A, B, and C classes)	Support Zone/Heavy Equipment
First aid kit	Support Zone/Field Vehicle
Eye Wash	Support & Decon Zone/Field Vehicle
Potable water	Support & Decon Zone/Field Vehicle
Bloodborne-pathogen kit	Support Zone/Field Vehicle
Additional equipment (specify):	Cell phone or radio

9.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Shut down CH2M HILL operations and evacuate the immediate work area.
- Notify appropriate response personnel.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.

Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled.

9.4 Emergency Medical Treatment

The procedures listed below may also be applied to non-emergency incidents. Injuries and illnesses (including overexposure to contaminants) must be reported to Human Resources. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the CH2M HILL medical consultant. During non-emergencies, follow these procedures as appropriate.

- Notify appropriate emergency response authorities listed in Section 9.8 (e.g., 911).
- The SCC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR where feasible.
- Get medical attention immediately.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, state that the situation is a CH2M HILL matter, and give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Report incident as outlined in Section 9.7.

9.5 Evacuation

- Evacuation routes and assembly areas (and alternative routes and assembly areas) are specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the SSC before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The SSC and a "buddy" will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The SSC will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).
- The SSC will write up the incident as soon as possible after it occurs and submit a report to the Corporate Director of Health and Safety.

9.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

9.7 Incident Notification and Reporting

- Upon any project incident (fire, spill, injury, near miss, death, etc.), immediately notify the PM and HSM. Call emergency beeper number if HSM is unavailable.
- For CH2M HILL work-related injuries or illnesses, contact and help Human Resources administrator complete an Incident Report Form (IRF). IRF must be completed within 24 hours of incident.
- For CH2M HILL subcontractor incidents, complete the Subcontractor Accident/Illness Report Form and submit to the HSM.
- Notify and submit reports to client as required in contract.

10 Approval

This site-specific Health and Safety Plan has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if those conditions change.

10.1 Original Plan

Written By: Paul Bertucci **Date: 11/20/2001**

Approved By: Trish Danby/SAC **Date: November 20, 2001**

10.2 Revisions

Revisions Made By:	**Rick Cavil/SJC**	**Date:**	**Feb. 20, 2004**
Revisions Made By:	**Rick Cavil/SJC**	**Date:**	**04/02/04**
Revisions Made By:	**Rick Cavil/SFO**	**Date:**	**08/20/04**
Revisions Made By:	**Rick Cavil/SFO**	**Date:**	**04/20/05**
Revisions Made By:	**Rick Cavil/BAO**	**Date:**	**07/06/05**
Revisions Made By:	**Rick Cavil/BAO**	**Date:**	**09/19/05**

Revisions to Plan: Hazards updates, section 2.1.15, PPE sections, new task orders, new subs, MSDS,

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Revisions Approved By: Rick Cavil/SJC	**Date: 02/24/2004**
Revisions Approved By: Rick Cavil/SJC	**Date: 04/02/2004**
Revisions Approved By: Rick Cavil/SFO	**Date: 08/20/2004**
Revisions Approved By: Rick Cavil/SFO	**Date: 04/26/2005**
Revisions Approved By: Rick Cavil/BAO	**Date: 07/07/2005**
Revisions Approved By: Rick Cavil/BAO	**Date: 09/19/2005**

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11 Attachments

Attachment 1: **Employee Signoff Form – Field Safety Instructions**
Attachment 2: **Project-Specific Chemical Product Hazard Communication Form**
Attachment 3: **Chemical-Specific Training Form**
Attachment 4: **Emergency Contacts**
Attachment 5: **Project Activity Self-Assessment Checklists**
Attachment 6: **Applicable Material Safety Data Sheets**
Attachment 7: **ATV Safety**
Attachment 8: **Heat Stress Monitoring Log**

EMPLOYEE SIGNOFF FORM

Health and Safety Plan

- The CH2M HILL project employees and subcontractors listed below have been provided with a copy of this HSP, have read and understood it, and agree to abide by its provisions.

Project Name: Topock Groundwater Monitoring and Drilling **Project Number:** varies by task

EMPLOYEE NAME (Please print)	EMPLOYEE SIGNATURE	COMPANY	DATE

Project-Specific Chemical Product Hazard Communication Form

This form must be completed prior to performing activities that expose personnel to hazardous chemicals products. Upon completion of this form, the SSC shall verify that training is provided on the hazards associated with these chemicals and the control measures to be used to prevent exposure to CH2M HILL and subcontractor personnel. Labeling and MSDS systems will also be explained.

Project Name: Topock Groundwater Monitoring and Drilling **Project Number:** 184004.PS.02

MSDSs will be maintained at the following location(s):

Hazardous Chemical Products Inventory

Chemical	Quantity	Location	MSDS Available	Container labels	
				Identity	Hazard
Methane	1 liter, compressed	Support Zone			
Isobutylene	1 liter, compressed	Support Zone			
Pentane	1 liter, compressed	Support Zone			
Hydrochloric acid	< 500 ml	Support Zone / sample bottles			
Nitric acid	< 500 ml	Support Zone / sample bottles			
Sulfuric Acid	< 500 ml	Support Zone / sample bottles			
Sodium hydroxide	< 500 ml	Support Zone / sample bottles			
Methanol	< 1 Gallon	Support/Decon Zones			
Hexane	< 1 Gallon	Support/Decon Zones			
pH buffers	< 500 ml	Support Zone			
MSA Sanitizer	< 1 liter	Support/Decon Zones			
Alconox/Liquinox	< 1liter	Support/Decon Zones			
Tracer dyes	30 lbs.				

Refer to SOP HS-05 *Hazard Communication* for more detailed information.

CH2MHILL

CHEMICAL-SPECIFIC TRAINING FORM

Location:	Project # : 184004.PS.02
HCC:	Trainer:

TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

☐ Physical and health hazards

☐ Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)

☐ Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

Emergency Contacts – Attachment 4

24-hour CH2M HILL Emergency Beeper – 888/444-1226

Medical Emergency – 911
Colorado River Medical Center
1401 Bailey Ave.
Needles, CA 92363
(760) 326-4531
Ambulance (760) 326-5299

CH2M HILL Medical Consultant
Health Resources
Dr. Jerry H. Berke, M.D., M.P.H.
600 West Cummings Park, Suite 3400
Woburn, MA 01801-6350
1-781-938-4653 1-800-350-4511
(After hours calls will be returned within 20 minutes)

Fire/Spill Emergency – 911
Fire Dept. Emergency (760) 326-2211
Needles Fire Department (760) 326-2833

Corporate Director Health and Safety
Name: Jerry Lyle/BOI
Phone: 208-345-5310 x6244
24-hour emergency beeper: 888-444-1226

Security & Police – 911
Highway Patrol (760) 326-9200
Needles Sheriff (760) 326-9200
Park Moabi Regional Park Ranger (760) 326-3831

Regional Health and Safety Program Manager (RHSPM)
Name: Rick Cavil/BAO
Phone: 510-587-7502 Cell: 408-896-0140

Designated Safety Coordinators (DSC)
Name: John Dallapiazza/DEN 303-771-0900 x65342
Matt Ringier/BAO 510-587-7510
Name: Dave Thomas/BAO 510-587-7529
Name: Jay Piper/LAS cell: 702-525-1137
Name: Allan Erickson/PHX cell:602-312-5895

Regional Human Resources Department
Name: Lisa Covey/SAC
Phone: 916/920-0212 ext. 253

Project Manager
Name: Julie Eakins /BAO
Phone: (510) 587-7647

Corporate Human Resources Department
Name: Pete Hannan/COR
Phone: 303/771-0900

Federal Express Dangerous Goods Shipping
Phone: 800/238-5355
CH2M HILL Emergency Number for Shipping Dangerous Goods
Phone: 800/255-3924

Worker's Compensation:
Contact Regional HR dept. to have form completed or contact Julie Zimmerman after hours: 303/664-3304

Automobile Accidents:
Rental: Carol Dietz/COR 303/713-2757
CH2M HILL owned vehicle:
Zurich Insurance Co. 800/987-3373

Contact the Project Manager. Generally, the Project Manager will contact relevant government agencies.

Facility Alarms: per PG&E facility safety program

Evacuation Assembly Area(s): per PG&E facility manager

Facility/Site Evacuation Route(s): per PG&E facility safety program

Hospital Name/Address:
Colorado River Medical Center
1401 Bailey Avenue, Needles , CA

Hospital Phone #: (760) 326-4531

Directions to Hospital

Include written directions here, and attach or post a highlighted map if needed.
Exit facility & drive northwest approximately 10 miles on Highway 40 west to Needles.
Take the "J" Street exit & turn left onto "J Street.
Go several blocks & turn left onto Bailey Ave.
The Hospital is on the left after the park.

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 5

Project Activity Self-Assessment Checklists

CH2MHILL

H&S Self-Assessment Checklist - DRILLING

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to hazards associated with drilling operations (complete Sections 1 and 3), and/or 2) CH2M HILL oversight of a drilling subcontractor is required (complete entire checklist).

SSC/DSC may consult with drilling subcontractors when completing this checklist, but shall not direct the means and methods of drilling operations nor direct the details of corrective actions. Drilling subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Completed checklists shall be sent to the health and safety manager for review.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate CH2M HILL employee exposures to drilling hazards
☐ Evaluate a CH2M HILL subcontractor's compliance with drilling H&S requirements
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the drilling subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-35.

SECTION 1	Yes	No	N/A	N/O
PERSONNEL SAFE WORK PRACTICES (3.1)				
1. Only authorized personnel operating drill rig	☐	☐	☐	☐
2. Personnel cleared during rig startup	☐	☐	☐	☐
3. Personnel clear of rotating parts	☐	☐	☐	☐
4. Personnel not positioned under hoisted loads	☐	☐	☐	☐
5. Loose clothing and jewelry removed	☐	☐	☐	☐
6. Personnel instructed not to approach equipment that has become electrically energized	☐	☐	☐	☐
7. Smoking is prohibited around drilling operation	☐	☐	☐	☐
8. Personnel wearing appropriate PPE, per HSP/FSI	☐	☐	☐	☐

SECTION 2	Yes	No	N/A	N/O
GENERAL (3.2.1)				
9. Daily safety briefing/meeting conducted with crew	☐	☐	☐	☐
10. Daily inspection of drill rig and equipment conducted before use	☐	☐	☐	☐
DRILL RIG PLACEMENT (3.2.2)				
11. Location of underground utilities identified	☐	☐	☐	☐
12. Safe clearance distance maintained from overhead powerlines	☐	☐	☐	☐
13. Drilling pad established, when necessary	☐	☐	☐	☐
14. Drill rig leveled and stabilized	☐	☐	☐	☐
DRILL RIG TRAVEL (3.2.3)				
15. Rig shut down and mast lowered and secured prior to rig movement	☐	☐	☐	☐
16. Tools and equipment secured prior to rig movement	☐	☐	☐	☐
17. Only personnel seated in cab are riding on rig during movement	☐	☐	☐	☐
18. Safe clearance distance maintained while traveling under overhead powerlines	☐	☐	☐	☐
19. Backup alarm or spotter used when backing rig	☐	☐	☐	☐
DRILL RIG OPERATION (3.2.4)				
20. Kill switch clearly identified and operational	☐	☐	☐	☐
21. All machine guards are in place	☐	☐	☐	☐
22. Rig ropes not wrapped around body parts	☐	☐	☐	☐
23. Pressurized lines and hoses secured from whipping hazards	☐	☐	☐	☐
24. Drill operation stopped during inclement weather	☐	☐	☐	☐
25. Air monitoring conducted per HSP/FSI for hazardous atmospheres	☐	☐	☐	☐
26. Rig placed in neutral when operator not at controls	☐	☐	☐	☐
DRILL RIG MAINTENANCE (3.2.5)				
27. Defective components repaired immediately	☐	☐	☐	☐
28. Lockout/tagout procedures used prior to maintenance	☐	☐	☐	☐
29. Cathead in clean, sound condition	☐	☐	☐	☐
30. Drill rig ropes in clean, sound condition	☐	☐	☐	☐
31. Fall protection used for fall exposures of 6 feet or greater	☐	☐	☐	☐
32. Rig in neutral and augers stopped rotating before cleaning	☐	☐	☐	☐
33. Good housekeeping maintained on and around rig	☐	☐	☐	☐
DRILLING AT HAZARDOUS WASTE SITES (3.2.6)				
34. Waste disposed of according to HSP	☐	☐	☐	☐
35. Appropriate decontamination procedures being followed, per HSP	☐	☐	☐	☐

<u>SECTION 3</u>

Complete this section for all items checked “No” in Sections 1 or 2. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 6

Applicable Material Safety Data Sheets

ATV SAFETY

ATVs

All terrain vehicles (ATVs) will generally be operated in accordance with the Contractor's requirements.

- ATVs are special use vehicles with a light engine or electric motor, other than construction equipment, not intended and/or allowed for highway use. ATVs ***do not*** have seat belts or ***do not*** have substantial roll protection (i.e., ROPS, FOPS, steel roll-cage, etc.)

Procedures for ATVs:

ATVs shall not be operated on site unless their use has been justified and approved by the Health and Safety Manager (HSM) and the onsite Designated Safety Coordinator (DSC).

ATVs with fewer than four wheels are not allowed on site.

Operators shall be trained by a competent person or certified by the manufacture prior to receiving revocable authorization to operating ATVs on site. ATVs shall be operated in accordance with the operating manual.

Training will consist of these instructions, audio-visual aids, hands-on training by a competent person, and a demonstration of basic skills. All individuals are required meet all training aspects before ATV use.

ATVs shall remain on flat surfaces at all times and shall not be operated on slopes steeper than a 20% grade.

Daily inspections of vehicles for safety and maintenance will be required. See the onsite DSC for further guidance or use checklists provided.

Operators and passengers on ATVs shall wear:

- wear safety glasses, goggles, or face-shield at all times when moving
- leather boots or shoes
- a ***PROPERLY FITTED*** DOT/ANSI/SNELL approved helmet

ATV Safety

- Speed ***is not*** to exceed 20 mph.
- Make sure the engine is turned OFF before dismounting the vehicle. (tip: put vehicle into neutral before turning engine off).
- Avoid driving over any extremely obstacles (i.e. wood/logs, fences, boulders, etc).
- Remember to shift weight, to inside when turning, forward when going uphill, and back when going down hill. Reduce speed when necessary.
- Watch for pedestrians and other vehicles.
- Only drive during daylight hours.
- Do not carry passengers.
- Do not exceed recommend payload.
- When using trailers, watch your turning radius.
- Slow down before coming to a stop.
- Shut engine down prior to refueling.
- Each driver will have a valid drivers license.
- ATV's must have adequate wheel guarding.

- Absolutely no horseplay or stunting will be tolerated while operating ATV's.
- Stay seated at all times while ATV is in motion.
- Avoid changes gears when throttle is depressed completely. It's best to quickly let up on the throttle before changing gears, and then going back after the gear has switched.
- Report any damage or injuries immediately, and report any hazardous condition that could cause these, including horseplay.
- Keep both hands on the bars when in motion.

CH2M HILL requires that riders read this information as part of the training before using ATVs on this project, and sign-off on the Health and Safety Plan/IIPP (Attachment 1) to show they understand and will comply. All questions should be posed to the Health and Safety Manager and onsite DSC.

Gators

Gators are another vehicle which is used on this site for field access along the river sands and such. All staff are required to review manufacturers operating guidelines and wear seatbelts at all times.

- There is no riding allowed in the back.
- All riders will have a seat with a seatbelt.
- Safety glasses are to be worn when operating.
- Gators are not ATV's and should not be used on steep terrains.

Appendix A9:
In-situ Floodplain Pilot Study Work Plan

PACIFIC GAS AND ELECTRIC COMPANY
TOPOCK COMPRESSOR STATION

DRAFT

IN-SITU HEXAVALENT CHROMIUM REDUCTION PILOT TEST WORK PLAN
Floodplain Reductive Zone Enhancement

August 2005

Prepared for:

Pacific Gas and Electric Company

Prepared by:
MWH
1340 Treat Boulevard, Suite 300
Walnut Creek, CA 94597

Prepared By:

Steven Reiners
Project Engineer

Reviewed Bv:

Kevin Sullivan, P.E.
Project Manager

MWH

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6 Preliminary Project Schedule

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1 Representative Site List - In-situ Hexavalent Chromium Treatment

2 Evaluation of Potential In-Situ Pilot Test Locations

3 Preliminary Schedule of Analyses – Floodplain Test Area

ATTACHMENT

1 July 21, 2005 PG&E Request for BLM Approval, Field Activity Summary for In-Situ Chromium Reduction Pilot Test on BLM-Managed Land

LIST OF ACRONYMS

BLM	United States Bureau of Land Management
CACA	Corrective Action Consent Agreement
CMS	Corrective Measures Study
Cr_{dis}	dissolved chromium
CrVI	hexavalent chromium
Cr_{tot}	total chromium
CrIII	trivalent chromium
DTSC	California Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
EVO	emulsified vegetable oil
ft/ft	foot per foot
IDW	investigation-derived waste
IM	Interim Measures
MEAL	methanol, ethanol, acetate, and lactate
mg/L	milligrams per liter
msl	mean sea level
µg/L	micrograms per liter
ORP	oxidation/reduction potential
PG&E	Pacific Gas and Electric Company
psi	pounds per square inch
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RWQCB	Regional Water Quality Control Board – Colorado River Basin
SAFPM	Sampling, Analysis and Field Procedures Manual
TDS	total dissolved solids
TOC	total organic carbon
WDR	Waste Discharge Requirements
ZVI	zero-valent iron

1.0 INTRODUCTION

Pacific Gas and Electric Company (PG&E) is addressing the presence of hexavalent chromium (CrVI) in groundwater at the Topock Compressor Station (Compressor Station), under the oversight of the California Environmental Protection Agency's Department of Toxic Substances Control (DTSC). To support the Resource Conservation and Recovery Act (RCRA) Corrective Measures Study (CMS) for the Topock site, PG&E is evaluating technologies for remediation of CrVI in groundwater.

This work plan presents the approach and description of field activities proposed for a pilot in-situ CrVI reduction test at the Topock site. The purpose of the pilot test is to evaluate in-situ technologies that would reduce CrVI in groundwater at the Topock site to trivalent chromium (CrIII). The results of the pilot testing will be used to:

- Evaluate the feasibility and performance of selected in-situ reductants under actual site conditions
- Provide additional information on site conditions necessary to develop an enhanced reductive zone along the river floodplain.
- Assist with the selection of preferred in-situ reductant(s) for long-term site management

The remainder of Section 1.0 of this work plan provides background information and a description of the Topock site. Section 2.0 presents an overview of in-situ CrVI reduction technologies, describes the methodologies and reducing agents that may be used to implement in-situ treatment and presents preliminary results of site specific bench-scale testing. Section 3.0 of this work plan describes the activities to be performed prior to implementation of the pilot test. The proposed approach and schedule for conducting the pilot test are discussed in Sections 4.0 and 6.0, respectively, of this work plan. Section 5.0 presents procedures for waste management and equipment decontamination to be followed during drilling, development and sampling of the proposed pilot test wells.

1.1 PROJECT BACKGROUND

PG&E's Topock Compressor Station is located in San Bernardino County, approximately 15 miles southeast of Needles, California (Figure 1). In February 1996, PG&E and DTSC entered into a Corrective Action Consent Agreement (CACA) pursuant to Section 25187 of the California Health and Safety Code. Under the terms of the CACA, PG&E was directed to conduct a RCRA Facility Investigation (RFI), and to implement corrective measures to address CrVI released in the Bat Cave Wash Area near the PG&E Topock Compressor Station. The source was chromium salt historically used as a corrosion inhibitor in the station's cooling towers. DTSC is the lead administering agency for the project.

PG&E is proceeding with the corrective measures process to select and implement a long-term remedy for the site. PG&E submitted a CMS work plan in December 2002, pursuant to the RCRA corrective action process, and in accordance with the CACA. The DTSC approved the CMS work plan in June 2003.

Concurrently with the CMS, and in compliance with DTSC's directive, PG&E commenced implementation of interim measures (IM) in March 2004. The objective of the IM is to provide hydraulic control of the CrVI plume in the floodplain by maintaining a net landward groundwater gradient. The current elements of the IM include groundwater extraction from the pumping center at well TW-2D, groundwater treatment, and management of extracted groundwater. The IM is a part of the overall corrective measures process for the site. It is one step toward establishing a long-term remedial approach for the site. The IM may or may not be part of the recommended long-term corrective measures for the site.

Evaluation of additional potential remedies identified in the CMS Work Plan is ongoing. This in-situ pilot study is proposed to collect information to evaluate the efficacy of various in-situ CrVI reduction technologies in the CMS.

1.2 SITE DESCRIPTION

1.2.1 Geology and Hydrogeology

The Topock site is characterized by arid conditions, with precipitation averaging less than 5 inches per year and high temperatures. Vegetation at the Topock site is very sparse, except in the southern part of the Colorado River floodplain where stands of tamarisk and occasional mesquite trees occur. Topography near the site is abrupt, rising from around 450 feet above mean sea level (msl) at the Colorado River to over 1,200 feet msl within a mile to the south and southwest.

The local near-surface geology consists of recent and older river deposits in the floodplain area, progressing westward to older alluvial fan deposits derived from the local mountains. The sequence of unconsolidated alluvial fan and fluvial deposits comprise the principal groundwater aquifer at the site, collectively referred to as the Alluvial Aquifer. In the floodplain area, the alluvial fan deposits interfinger with and are replaced by the fluvial deposits. The unconsolidated alluvial and fluvial deposits are underlain by bedrock formations consisting of Miocene consolidated/cemented conglomerate and sandstone (Miocene Conglomerate unit), which in turn are underlain by pre-Tertiary metamorphic and igneous crystalline bedrock. Because the Miocene Conglomerate and bedrock have very low permeability, groundwater movement occurs primarily in the overlying unconsolidated deposits.

Numerous groundwater monitoring wells at the site are screened in the shallow portion of the alluvial aquifer. Well clusters, such as those at MW-20, MW-24, MW-34, MW-36 and MW-39 also include wells screened at deeper levels of the alluvial aquifer. The measured saturated thickness of the alluvial aquifer ranges from as little as 30 feet (at MW-32) to as great as 180 feet (at MW-33) along the Colorado River floodplain. In the vicinity of the proposed floodplain pilot test, the saturated thickness of the alluvial aquifer ranges from about 77 feet (well PE-1) to approximately 96 feet (well MW-39). The total saturated thickness of the alluvial aquifer is greatest in the western upland portion of the study area, where it can exceed 200 feet.

Natural groundwater gradients in the alluvial aquifer are relatively flat, on the order of 10^{-4} to 10^{-3} feet per foot. Consequently, the average groundwater velocity at the site can be very low. Gradient directions vary over seasons and years, but in the upland portion of the study area they generally run to the northeast. An upward vertical gradient has been observed in alluvial aquifer well clusters and between bedrock and the unconsolidated deposits. Groundwater gradients in the floodplain are directed predominantly westward towards the pumping center at TW-2D. Gradients between individual well pairs in the floodplain can show a northern, southern or downward component, depending on their location relative to TW-2D. Data collected from floodplain wells in March 2005 indicate landward gradients ranging from 0.0024 foot per foot (ft/ft) to 0.0035 ft/ft, and a downward vertical gradient of approximately 0.005 ft/ft at well MW-36 reflecting the influence of pumping from well TW-2D (CH2M Hill, 2005c). Current estimates of groundwater seepage velocity in the vicinity of the pilot test area under the influence of TW-2D pumping range from about 0.1 to 1 foot per day.

Interactions between groundwater and the Colorado River are complex. The daily fluctuations in river stage cause the surface water-groundwater interaction at this site to be very dynamic. Pressure transducers have been installed in floodplain wells near the Colorado River to more closely monitor the changes in water levels and to better define the surface water-groundwater interaction. Draft transducer data collected by CH2M Hill from well MW-39 from April 30, 2004 to April 14, 2005, show daily groundwater elevation fluctuations on the order of one foot. The difference between the minimum and maximum elevations during that period was approximately six feet, and the maximum elevation change during any one-month period was about five feet (increasing from March 14 to April 14, 2005). During the monitoring period prior to March 2005, the groundwater elevation at MW-39 typically changed no more than one foot per month.

1.2.2 Groundwater Quality

Groundwater in the site area exhibits variable total dissolved solids (TDS) concentrations. In general, TDS concentrations increase with depth. Samples collected from most of the shallow monitoring wells exhibit TDS concentrations in the range of 1,000 to 3,000 milligrams per liter (mg/L). However, groundwater sampled in bedrock wells and the deeper alluvium wells

contains higher TDS concentrations (8,000 to 12,000 mg/L). Water samples from the Colorado River exhibit TDS concentrations ranging from 400 to 800 mg/L.

Major ions are dominated by sodium and chloride, with sulfate also significant in some wells. Oxidation-reduction potential (ORP) measurements in wells in the upland portion of the alluvial aquifer generally reflect oxidizing conditions in which CrVI is stable. Dissolved oxygen concentrations range from 3.0 to 7.2 mg/L. Nitrate concentrations up to 77 mg/L have been measured.

Reducing conditions are observed in shallow floodplain monitoring wells, as well as in deeper wells immediately adjacent to the Colorado River. Under these conditions, CrVI is converted to the relatively immobile CrIII. This naturally occurring reduction zone along the river appears to act as a barrier to CrVI migration.

Extensive site characterization has been performed to quantify the distribution of CrVI in groundwater at the Topock site. Monitoring wells have been installed near and along Bat Cave Wash, to the east of the wash, and in the Colorado River floodplain. Analytical results indicate that most of the chromium found in affected groundwater is in the hexavalent form. Figure 2 illustrates the CrVI distribution using analytical data from the March 2005 sampling event. The areal extent of the CrVI plume is approximated by the dashed contour representing 0.05 mg/L (the California drinking water maximum contaminant level for total chromium). Figure 3 shows CrVI concentrations in groundwater in an east-west cross-sectional view, between well MW-20 and the river. Vertical profiles for the majority of the site indicate that where CrVI is present in significant concentrations, it is present throughout the saturated alluvium. In the floodplain, CrVI concentrations are consistently lower or non-detectable at shallow depths, where reducing conditions have been measured.

The impact of chromium on groundwater is primarily controlled by the oxidation state of the metal, which greatly affects solubility. The two most common oxidation states of chromium are CrIII and CrVI. CrIII exists as a relatively non-reactive cation that is virtually insoluble in water above a pH of 6.2. Conversely, CrVI exists as a highly water-soluble oxy-anion.

2.0 OVERVIEW OF TECHNOLOGY

The following subsections describe various aspects of in-situ CrVI reduction technologies that will be evaluated in the proposed pilot test.

2.1 IN-SITU TECHNOLOGY DESCRIPTION

The proposed pilot test will evaluate the in-situ reduction of CrVI to CrIII, and the subsequent geochemical fixation of the CrIII onto the aquifer matrix. The concept of in-situ reduction was pioneered in the 1970s by MWH personnel, and was first tested in California at a chromium-impacted site in the early 1980s. Since that time, chromium reduction has been applied at sites throughout the world in varied geohydrological regimes, using a variety of approaches (Rouse et al., 2001) (Rouse, 2001). Table 1 is a representative list of sites in California and elsewhere at which the in-situ reduction of CrVI has been successful.

CrVI can be reduced to the trivalent form by many electron donors such as organic carbon, ferrous iron, and reduced sulfur. Soil containing organic carbon can reduce CrVI by the reaction:

$$2Cr_2O_7^{-2} + 3C + 16H^+ \rightarrow 4Cr^{+3} + 3CO_2 + 8H_2O$$

The CrIII forms chromium hydroxide, which binds to the aquifer matrix.

CrVI can be reduced to the trivalent form by ferrous iron, either in solution or in various ferrous-bearing silicates such as olivene, amphibolite, mica, and chlorite. A proposed reaction for the reduction of CrVI by ferrous biotite is given by Palmer and Puls (1994) as:

$$[Fe(II), K^+]biotite + Fe^{+3} \rightarrow [Fe(III)]biotite + K^+ + Fe^{+2}$$

The resultant ferrous ions in solution react with CrVI according to:

$$HCrO_4^- + 3Fe^{+2} + 7H^+ \rightarrow Cr^{+3} + 3Fe^{+3} + 4H_20$$

The CrIII and ferrous iron form oxyhydroxides, which sorb to the aquifer matrix. As such, CrIII is in a geochemically stable form, similar to the mode of occurrence of most natural chromium in soil and rock. The second reaction of ferrous iron with CrVI would also be applicable in the case of direct addition of ferrous iron to the aquifer or with the reduction of background ferric iron to the ferrous state by a chemical reductant like calcium polysulfide. Note that there are several reductants that can be considered for in-situ reduction, as described further in Section 2.3.

The reduction of CrVI to CrIII can also be facilitated by indigenous bacteria. Soluble organic carbon substrates such as lactate, ethanol, acetic acid (vinegar), molasses, or emulsified vegetable oil can be introduced into the groundwater, providing a food source to stimulate the growth of naturally-occurring bacteria. The increased rate of microbial respiration depletes the supply of dissolved oxygen and creates reducing conditions.

An important consideration with the use of in-situ reductants is the potential for temporary solubilization/mobilization of other reducible metals that naturally reside in the aquifer matrix, such as iron, manganese and arsenic. Data collected during the application of in-situ reductants at other sites shows that this is a temporary phenomenon associated with the creation of reducing conditions. Once conditions return to background, these metal ions re-precipitate in the aquifer matrix. A monitoring program is proposed in this workplan to confirm the temporary nature of this phenomenon. The reduction of chromium is generally a one-way reaction; after the aquifer returns to ambient conditions, CrIII typically does not re-oxidize to CrVI.

Experience at other chromium-affected sites has shown that there are two key elements to a successful in-situ remedial program:

- Selection of the appropriate reducing agent, considering site geochemistry and hydrology

- Design of the proper reductant delivery system, to ensure contact between the contaminant and the reductant

These elements are discussed in the following sections.

2.2 REAGENT SELECTION

A number of chemical and biological reagents have been used for in-situ treatment of CrVI in groundwater. These reagents work by altering geochemical conditions in the aquifer, creating a reducing environment in which CrVI reduction occurs spontaneously. The reducing environment is maintained for a period of time (generally weeks to months, depending on the reductant) through the addition of a reductant solution. Selection of the appropriate reductant, and the quantity and concentration of the solution, requires an understanding of the geochemical, biological, and hydrologic conditions at the site.

2.2.1 Chemical Reduction

In-situ chemical reduction involves the injection of either reduced sulfur-based reagents (such as bisulfite, metabisulfate, sodium hydrosulfite (also know as dithionite), or calcium polysulfide; or iron-based reagents (such as ferrous sulfate, ferrous chloride, or emulsified zero-valent iron [ZVI]) into the aquifer. When contacted by any of these reductants, CrVI is reduced to insoluble CrIII and is sorbed to soil as chromium hydroxide/oxide, resulting in a commensurate removal of soluble chromium from groundwater. Chemical reductants can be introduced into the aquifer using injection wells or infiltration basins. The reductant can be spread through the aquifer using the natural hydraulic gradient, or using a recirculation system consisting of injection and extraction wells. The equipment and installation techniques for introducing and spreading the reductant are well established, and are considered conventional technologies.

2.2.2 Biological Reduction

Reduction of CrVI to CrIII also occurs under biologically-induced reducing conditions (measured as a negative oxidation-reduction potential). The reduction of CrVI is not a biological reaction, but occurs spontaneously after the microbes have created reducing conditions. Soluble organic carbon substrates such as lactate, ethanol, acetic acid (vinegar), molasses, or emulsified

vegetable oil can be introduced into the groundwater, providing a food source to stimulate the growth of naturally-occurring bacteria. Increasing the supply of soluble organic carbon increases the rate of microbial respiration, which depletes the supply of dissolved oxygen and creates reducing conditions. The simple carbon substrates are supplied to the subsurface via a reagent mixing and delivery system.

Bench-scale microcosm testing is typically used to select the most effective carbon substrates for biological reduction. Microcosms are jars or similar containers filled with CrVI-containing soil and groundwater from the site, to which various amendments are added in a laboratory setting. Microcosm testing is used to evaluate carbon substrate efficiency and to generate transformation rate data (time required to reduce CrVI to CrIII with each electron donor). For chemical reduction, relatively simple jar tests are typically performed. A summary of the approach and results of bench scale testing that was conducted for the Topock site is discussed in Section 2.2.3**.**

Now that microcosm testing has been found to produce favorable results, pilot testing is proposed to evaluate reagent performance at the field level, and to determine full scale design parameters such as reductant concentrations and quantities, and the optimal reagent delivery and mixing system (as discussed in Section 2.4).

2.2.3 Bench Test Results

This section summarizes results of microcosm testing conducted using aquifer matrix and groundwater samples collected from well MW39-D at the Topock site. The microcosm tests were performed as described in the report entitled *In-situ Remediation Bench-scale Testing* submitted to DTSC on January 14, 2005 (CH2M Hill, 2005a).

The primary objective of the bench-scale testing was to evaluate the capabilities of a number of chemical and biological reagents selected to reduce CrVI to CrIII, given the particular geochemical and microbiological conditions at the Topock site. The tests included:

- Chemical reduction using dithionite, ZVI, and calcium polysulfide.

- Biologically induced reduction using molasses; methanol, ethanol, acetic acid, and lactate (MEAL); and emulsified vegetable oil (EVO).

All of the tested chemical and biological reagents were successful at reducing CrVI to CrIII in a brief time period. Based on MWH's previous experience, the chemical reagents were expected to produce the most rapid reductions in CrVI concentrations, as these reagents do not rely on microbial respiration to develop reducing conditions. Dithionite and calcium polysulfide promoted decreases in CrVI concentrations from over 11,000 micrograms per liter (µg/L) to less than 0.2 µg/L within six hours. Reaction rates in ZVI-amended microcosms were much slower, probably because corrosion of ZVI must occur (producing ferric iron) before the CrVI can be reduced. CrVI concentrations with ZVI decreased from over 11,000 µg/L to about 2,400 µg/L after three days, to about 700 µg/L after seven days, and to less than 0.2 µg/L within 19 days.

The microcosms amended with the biological reagents MEAL, EVO and molasses also exhibited decreases in CrVI concentrations from over 11,000 µg/L to less than the analytical detection limit of 0.2 µg/L over the study period. Of the biological reagents, molasses promoted the most rapid decreases in CrVI concentrations, from over 11,000 µg/L to less than 0.2 µg/L within eight days. The MEAL- and EVO-amended microcosms both exhibited decreases in CrVI concentrations nearly identical to the ZVI-amended microcosms, with initial CrVI concentrations of over 11,000 µg/L declining to about 2,500 µg/L after four days, to about 700 µg/L after eight days, and to less than 0.2 µg/L within 19 days. EVO has a larger number of carbon molecules in the compound, and microorganisms require more time to break down these more complex compounds.

The differences in the rate of reduction of CrVI concentrations observed among the biological reagents are likely due to differences in the initial reagent concentrations and the time required to establish reducing conditions. The molasses-amended microcosms had higher concentrations of reducing agents than the MEAL- and EVO-amended microcosms. Furthermore, it generally takes longer to generate the conditions needed to reduce CrVI to CrIII using complex carbon reagents like EVO, as compared to using simple carbon reagents like the food-grade MEAL or molasses. It is important to note that biological reagents that produce rapid CrVI reduction rates

have shorter half-lives than more complex carbon reagents and may be metabolized so quickly that the compounds will not travel far from the injection wells. Reagents that react more slowly are typically more persistent in the environment. These compounds may result in better distribution in the aquifer, resulting in a larger treatment zone and less infrastructure required to contact the CrVI plume.

Analysis of dissolved chromium (Cr_{dis}) and total chromium (Cr_{tot}) concentration data collected during the study suggests that the reduced chromium (CrIII) precipitated to aquifer soils in all of the study microcosms. In the MEAL- and EVO-amended microcosms, Cr_{dis} and Cr_{tot} concentrations declined in parallel with CrVI concentrations, indicating that chromium precipitated to aquifer soils as it was reduced. Molasses-amended microcosms showed Cr_{dis} and Cr_{tot} concentrations declining more slowly than CrVI concentrations, suggesting that some of the chromium required a longer time to precipitate to aquifer soils. Similar behavior was observed with the calcium polysulfide reagent, and this behavior was even more pronounced with the dithionite reagent. The ZVI-amended microcosms behaved similarly to the MEAL- and EVO-amended microcosms, with chromium precipitating to aquifer soils as it was reduced.

In all of the microcosms, the CrVI was reduced and precipitated to aquifer soils within the study period of 69 days. Reoxidation of CrIII to CrVI was not observed in any of the microcosms during the study.

Concentrations of CrVI in the control (untreated) microcosms decreased throughout the study period, especially in the intrinsic (unsterilized) control where initial CrVI concentrations of over 11,000 µg/L decreased to about 4,200 µg/L after eight days, and to less than the analytical detection limit of 4 µg/L within 69 days. Concentrations of CrVI in the sterilized control (which theoretically had no microbial activity) decreased less rapidly than in the intrinsic control microcosms, with the initial CrVI concentration of over 11,000 µg/L declining to about 9,200 µg/L after eight days, and to about 1,300 µg/L after 69 days. Changes in CrVI concentration in these control microcosms (both sterile and intrinsic) are not related to the introduction of biological or chemical reagents. However, natural organic carbon is present in the aquifer at the Topock site, and provides a food supply for microbial respiration. The intrinsic

control results suggest that the respiration of native (intrinsic) microbes in these microcosms created moderately reducing anaerobic conditions that reduced CrVI to CrIII. It is possible that sterilization was not completely effective in the sterile control microcosms, or that abiotic processes contributed to the reduction in CrVI concentrations in these controls.

Further discussion regarding proposed additional bench scale testing to be performed is provided in Section 3.6.

2.3 REAGENT DELIVERY SYSTEMS

In addition to the selection of an appropriate reductant, successful implementation of in-situ remediation of CrVI requires adequate delivery and mixing of reagents in the subsurface. Reductant solution can be delivered to the subsurface through:

- Infiltration Basins - An infiltration basin may be particularly well suited to treating residual chromium in the soil and pore water of the vadose zone, if present. The gravel in Bat Cave Wash has the ability to receive CrIII and secondary precipitate without plugging (as can happen with wells). However, a basin allows for oxygen delivery to the subsurface, and oxygen will consume the reductant. Surface basins rely on natural hydraulic head as the distribution driver, so there may be a lag of weeks to months before the solution migrates to the saturated zone.
- Injection Wells - Introduction of the reductant solution through permanent or temporary wells works best in permeable sediments, but the wells and/or aquifer matrix may become fouled by the formation of secondary precipitates from the reductant solution, or by bacterial growth. The reductant solution can be gravity fed or pressure injected into the well.
- Direct-Push Injection Rods - Introduction of the reductant solution through direct-push steel rod is well suited for sites where the water table is shallow and the vadose zone does not contain obstructions, such as cobbles (this is not the case at the Topock site). When the reductant solution is delivered under high pressure, sub-horizontal fractures may be formed, allowing the reductant solution to migrate laterally from the introduction point, and then diffuse into the aquifer.

Delivery system operating methods used to remediate CrVI in groundwater at other sites, and worth considering at the Topock site, include:

- Introducing reagent through well(s) or basin(s) positioned hydraulically upgradient of the affected area, followed by passive migration across the affected aquifer.

- Introducing reagent through a lesser number of wells positioned hydraulically up-gradient or cross-gradient of the affected area, followed by active circulation through the affected area, capture via extraction wells, and reinjection into the area requiring treatment.

Both of these delivery approaches have benefits and limitations. With a passive flow system, reductant solutions are allowed to flow with the natural groundwater gradient through the affected area. Passive flow systems often require a dense network of wells or injection points to achieve adequate distribution of reagent in the subsurface.

With an active recirculating system, groundwater dosed with a reductant solution is injected, and then is drawn through the target treatment zone to extraction wells located on the opposite side of the plume. The recirculation system provides for containment and re-injection of any excess reagent, and can greatly decrease the time required for the reagent to contact the contaminant plume. However, active pumping uses more energy than passive flow. The equipment and installation techniques for passive and recirculating systems are well established, and are considered conventional technologies.

3.0 PRE-IMPLEMENTATION CONSIDERATIONS

The following sections describe activities that will be conducted prior to implementation of the pilot test.

3.1 FLOODPLAIN PILOT TEST LOCATION EVALUATION

Four areas within the floodplain were evaluated to compare their suitability as locations for the floodplain in-situ pilot test. Potential Test Area 1 (PTA-1) is located northeast of well TW-2. PTA-2 is located due east of well TW-2. PTA-3 is located along the floodplain monitoring transect (the line of wells extending from MW-20 to MW-34). PTA-4 is located south of the transect. Each of these potential test areas is oriented along the general floodplain groundwater flow direction toward extraction well TW-2 with the exception of PTA-3 which is oriented along the transect (Figure 4A). The four PTAs were evaluated based upon the following seven criteria:

- Proximity and orientation to well TW-2
- Susceptibility to influence from extraction well PE-1
- Knowledge and suitability of stratigraphy and groundwater chemistry
- Implications for future plume monitoring
- Topography
- Potential biological impacts
- Proximity to potential cultural resources

These seven criteria were ranked for each PTA using the following scale:

- Excellent
- Good
- Fair
- Poor
- Unacceptable

A ranking of unacceptable for any one of the seven criteria indicates that the PTA location is not suitable for the pilot test resulting in that PTA being removed from further evaluation. The criteria developed and used for evaluating sites for the in situ pilot study will not be identical to the criteria ultimately used for siting facilities for full-scale application of an in situ treatment system (if in-situ treatment is selected as part of the final remedy).

The criteria rankings are summarized in Table 2. Please refer to Figure 4A for the locations of the PTAs and wells referred to in the following evaluations.

3.1.1 Proximity and Orientation to Well TW-2

Groundwater extraction from well TW-2 is expected to be the dominant influence on groundwater flow direction and gradient in the floodplain area during the in-situ pilot test, with groundwater flow direction generally toward TW-2 and a steeper gradient (i.e. higher groundwater velocity) closer to TW-2. One of the objectives of the pilot test is to evaluate the transport of injected reductant solution under pumping-influenced conditions. To monitor this transport, monitoring wells should ideally be located directly downgradient of the selected injection point. Therefore, PTAs located closer to extraction well TW-2 and oriented along the flow direction toward TW-2 were given higher rankings. Additionally, PTAs located closer to the pumping centers at TW-2 and PE-1 will have a higher certainty of capture by TW-2 and PE-1, in order to ensure that there is no release of injected reagents towards the Colorado River.

PTA-1 is one of the two PTAs closest to well TW-2, and is oriented toward TW-2. It is more distant from PE-1 than PTA-2 and therefore is slightly less likely to be within the combined capture zone of TW-2 and future PE-1. PTA-1 was given a ranking of good for this criterion.

The proximity of PTA-2 to well TW-2 is similar to that of PTA-1, and likewise is oriented in the general direction of groundwater flow toward TW-2. It is located well within the combined capture zone of TW-2 and future PE-1. PTA-2 was given a ranking of excellent for this criterion.

PTA-3 is located somewhat farther from well TW-2, and is oriented along the existing well transect rather than directly toward TW-2. The orientation along the transect makes maximum benefit of the existing wells and data, but would result in some monitoring wells within PTA-3 being somewhat cross-gradient to the expected flowlines. PTA-3 was given a ranking of fair for this criterion.

PTA-4 is the farthest from TW-2, but is oriented directly toward TW-2. PTA-4 was given a ranking of poor for this criterion.

3.1.2 Susceptibility to Influence from Extraction Well PE-1

It is anticipated that groundwater extraction from well PE-1 may occur during the floodplain in-situ pilot test. Pumping from PE-1 is expected to alter the groundwater flow direction and gradient in the area between PE-1 and TW-2. A simple, uni-directional groundwater gradient is most desirable for the pilot test. Therefore, PTAs located farther from potential influence of pumping from well PE-1 were ranked higher for this criterion.

PTA-1 is located the farthest from PE-1, and was given a ranking of excellent for this criterion.

PTA-2 is located closer to TW-2 than to PE-1, and it is expected that pumping from TW-2 would be the dominant influence on groundwater flow direction and gradient at this location. PTA-2 was given a ranking of good for this criterion.

PTA-3 is located much closer to PE-1 than to TW-2, and groundwater flow direction and gradient in this area could be strongly influenced by pumping from PE-1. PTA-3 was given a ranking of poor for this criterion.

PTA-4 is located closer to PE-1 than to TW-2, and groundwater flow direction and gradient in this area could be strongly influenced by pumping from PE-1. PTA-4 was given a ranking of poor for this criterion.

3.1.3 Knowledge and Suitability of Stratigraphy and Groundwater Chemistry

Detailed knowledge of the stratigraphy and groundwater chemistry within the pilot test area are essential in planning and executing a successful in-situ pilot test. Therefore, PTAs located closer to locations with more extensive historical data were ranked higher for this criterion. Sites with historical data that indicated unacceptable conditions for a pilot test were ranked unacceptable.

Although the overall stratigraphy and groundwater chemistry of the floodplain is generally well understood, there are no existing groundwater monitoring wells within PTA-1 or in the immediate vicinity. Understanding of the stratigraphy and groundwater chemistry at this location would be based on interpolation of data from other wells located over 130 feet away. PTA-1 was given a ranking of poor for this criterion.

Although there are no existing wells within its boundary, PTA-2 runs parallel to and approximately 100 feet north of the existing floodplain well transect. The transect represents the greatest density of stratigraphic and groundwater chemistry data within the floodplain, and its proximity and similar orientation to PTA-2 simplify the extrapolation of data to PTA-2. PTA-2 was given a ranking of good for this criterion.

PTA-3 encompasses the central portion of the floodplain well transect which represents the greatest density of data within the floodplain. PTA-3 was given a ranking of excellent for this criterion.

PTA-4 is located to the south of the floodplain well transect, and encompasses the MW-42 well cluster. Historical groundwater data from the MW-42 well cluster indicate chromium concentrations in groundwater that are much lower than those needed to evaluate the performance of the in-situ pilot test. Therefore, PTA-4 was given a ranking of unacceptable for this criterion.

3.1.4 Implications for Future Plume Monitoring

Performance of the in-situ pilot test is expected to result in the removal of chromium from the groundwater at certain monitoring wells within the pilot test area of influence. It is anticipated that wells previously used to monitor plume concentrations and boundaries would not be effective for those purposes for minimum of one year after completion of the pilot test, and possibly as long as several years. PTAs encompassing wells that could be rendered unusable for plume monitoring purposes were ranked lower for this criterion.

Existing wells are not expected to be influenced by performance of the in-situ pilot test at PTA-1. PTA-1 was given a ranking of excellent for this criterion.

Existing wells are not expected to be influenced by performance of the in-situ pilot test at PTA-2. PTA-2 was given a ranking of excellent for this criterion.

Numerous floodplain transect wells could be rendered unusable for plume monitoring by performance of the pilot test at PTA-3. The transect wells provide groundwater chemistry data critical to evaluating the performance of interim measures in the floodplain area. Therefore, PTA-3 was given a ranking of unacceptable for this criterion.

PTA-4 encompasses the MW-42 well cluster. This well cluster could be rendered unusable for plume monitoring purposes if the in-situ pilot test is performed here. PTA-4 was given a ranking of fair for this criterion.

3.1.5 Topography

Well drilling locations are limited to areas with a slope less than 0.09 foot per foot based on the limitations of the drill rig to provide a level drilling platform and a vertical hole (the drill rig is 35 feet long and has hydraulic leveling jacks with a maximum lift of 3 feet, resulting in a maximum slope of 3 feet per 35 feet, or approximately 0.09 foot per foot). The topography of the floodplain at the four PTA locations is nearly identical, and is equally suitable for the in-situ pilot test (Figure 2). Therefore, PTA-1, PTA-2, PTA-3 and PTA-4 were all given a ranking of good for this criterion.

3.1.6 Potential Biological Impacts

There are no known potential impacts to specific species that vary between the four PTAs. Areas towards the southern portion of the floodplain generally have more dense vegetation that may provide breeding habitat for the southwestern willow flycatcher during portions of the year. Activities and impacts within this biologically sensitive area should be minimized. Therefore, the rankings for this criterion were based upon the amount of vegetation removal that would be required, with PTAs requiring less vegetation removal ranking higher.

PTA-1 and PTA-2 are located in an area with relatively sparse saltcedar. The site is located outside the BLM-designated biologically sensitive area. PTA-1 and PTA-2 were given a ranking of good for this criterion.

PTA-3 is located in an area of scattered, but slightly denser saltcedar. The site is located near the edge of the BLM-designated biologically sensitive area. PTA-3 was given a ranking of fair for this criterion.

PTA-4 is located in an area with the densest saltcedar. The site is located within the BLM-designated biologically sensitive area. PTA-4 was given a ranking of poor for this criterion.

3.1.7 Proximity to Potential Cultural Resources

The project area lies within a larger area of significant cultural and tribal sacred site resources and all activities must be conducted in a manner which recognizes and respects these resources. In addition, the Colorado River itself is of spiritual and cultural importance to local tribes. The

four PTAs (Figure 3) all lie approximately equal distance from identified cultural resources. Therefore, PTA-1, PTA-2, PTA-3 and PTA-4 were all given a ranking of fair for this criterion.

3.1.8 Summary and Recommendations

PTA-3 and PTA-4 were removed from further evaluation because each had a ranking of unacceptable for at least one evaluation criterion. The rankings of PTA-1 and PTA-2 were largely similar with the exception of the knowledge and suitability of stratigraphy and groundwater chemistry. There is greater confidence in the anticipated stratigraphy and groundwater chemistry at PTA-2 because of its proximity and identical orientation to the floodplain well transect. There is far less data in the vicinity of PTA-1, and therefore greater uncertainty in the stratigraphy and groundwater chemistry at that location. Although it is located closer to the transect, PTA-2 is far enough from the transect that none of the transect wells should be affected by the in-situ pilot test. Based on the evaluation performed, PTA-2 is recommended as the location for the floodplain in-situ pilot test.

3.2 PROPOSED PILOT TEST APPROACH

The proposed pilot test will attempt to enhance the existing reducing environment in the floodplain adjacent to the Colorado River (Figure 5). The test area will be located entirely within the zone of influence of the planned pumping at TW-2. Two food-grade reagents, lactate and emulsified soybean oil, will be introduced into the groundwater to stimulate the growth of aerobic bacteria, thereby depleting the supply of dissolved oxygen and enhancing the reducing environment. These conditions should reduce CrVI to CrIII between the injection well and pumping well TW-2. The induced gradient generated by pumping groundwater from TW-2 will allow the test to monitor the potential radius of impact of the reagents, their persistence, and their effectiveness at reducing CrVI under active circulation conditions.

Based on the results of bench-scale testing, along with literature reports for other sites, emulsified vegetable oil is believed to be one of the most persistent biological reagents, while lactate should be more mobile and faster reacting. It is proposed that these reagents be tested together at the floodplain. This mixture has been used successfully at other sites, and has been

found to be effective while exhibiting no negative synergistic effects. Section 4.1 discusses the proposed reagent dosage to be used during the pilot test. These dosages have been estimated based on available site data. These estimates will be further refined as part of reductant demand testing as described in Section 3.6.

The proposed test area is approximately 200 feet east of the current TW-2 extraction wells, towards the Colorado River. A two-level injection well cluster (PTI-1S/D) will be installed to allow for controlled injection into both the shallow fluvial deposits and deeper alluvial fan deposits of the aquifer in this area. Concentrations of CrVI and geochemical conditions vary vertically in this area. Data collected at the site (e.g. well MW-39 cluster) indicate that reducing conditions are present in the shallowest groundwater within the fluvial deposits along the floodplain, and low to non-detectable levels of CrVI are present. The reducing conditions diminish with depth and also with distance from the river. There is a general correlation between the transition to more oxidizing conditions and the depth at which the alluvial fan deposits are found. It is likely that because of this, the shallowest portions of the saturated zone in the floodplain will require less reagent than the deeper layers, and in fact may not require reagent addition at all. To evaluate the effects of treatment within the various lithologic and geochemical conditions, several multi-level monitoring well nests will be installed. Multi-level monitoring well nests PT-1 and PT-2 will be installed approximately 20 feet and 50 feet west of the injection well cluster, to monitor the development of the enhanced reductive zone as it moves toward TW-2. In addition, to address the potential influence of new extraction well PE-1, multi-level well nests PT-3 and PT-4 will be installed at radial distances of 15 and 20 feet southwest and southeast of PTI-1S/D. The locations of these well clusters are designed to provide good spatial coverage for the expected spread of the treatment zone from PTI-1S/D. Furthermore, at the request of DTSC, multi-level well nests PT-5 and PT-6 will be located 50 feet west and 25 feet north of PTI-1S/D, which is expected to be largely outside the treatment radius, and thus will provide information as to whether the injected solution has migrated outside of the intended treatment zone.

At each multi-level monitoring well nest, three vertical zones will be targeted for monitoring, using three individual well casings installed within one boring and separated by bentonite seals. Details regarding drilling methodology and well design are presented in Section 3.3.

3.3 ACCESS AGREEMENTS

Permission for access and placement of components of the pilot test will be obtained from the Bureau of Land Management (BLM) through approval of a workplan at the local BLM field office level. The proposed pilot test well locations and access route are presented in Figure 5.

3.4 PERMITTING

It is anticipated that the injection of reductant and tracer solutions as proposed for the pilot test will require the issuance of Waste Discharge Requirements (WDR) by the Colorado River Basin Regional Water Quality Control Board (RWQCB). The WDR will specify how the test will be conducted and the monitoring and reporting that will be required by the RWQCB. This work plan, in addition to a completed Report of Waste Discharge Form 200, will provide the information needed for the RWQCB staff to prepare the WDR. The WDR will be considered for adoption by the RWQCB at a regular board meeting. Generally, depending on staff availability, at least three months is required from submittal of the work plan until the WDR is approved.

Well construction permits will be obtained from the San Bernardino County Department of Public Health, Environmental Health Services Safe Drinking Water Permit Section for the additional wells that will be installed.

PG&E has entered into an agreement with the federal agencies under which remedial work at the site will be conducted in compliance with Section 121 of CERCLA, 42 U.S.C. § 9621. Pursuant to Section 121, no local, state, or federal permits are required for any portion of any remedial action conducted on federal property, provided that the remedial action meets specified conditions. PG&E will work with the DTSC and federal agencies to determine and obtain those permits that are actually required prior to implementation of the pilot study.

3.5 WELL INSTALLATION

Injection well cluster PTI-1S/D, and the six monitoring well nests (PT-1 to PT-6) will be installed on the floodplain in the area west of the monitoring well MW-20 Bench. All wells will be installed during one mobilization, if possible. The wells will be drilled using a rotosonic drilling rig equipped with a 10-inch outside diameter drill casing. The borehole for the PTI-1D will be drilled to total depth (i.e. the top of the bedrock) first; continuous coring and geologic logging will be performed at this location and for each of the nested monitoring well drilling locations. PG&E will then confer with DTSC regarding gravel pack and screen size for the deep well; the selection of shallower screened intervals (if applicable) and gravel pack for that location will also be made at that time. The total depth of drilling at each location (except PTI-1S) will be approximately 120 feet or until the Miocene Conglomerate bedrock is encountered, so that the deepest well screens can be placed at the bottom of the saturated alluvium. At PTI-1S the total depth of the boring will be approximately 70 feet so that the well screen is roughly centered within the saturated fluvial material.

Soil samples will be collected from the recovered continuous core at approximately 10-foot intervals within the saturated zone. These soil samples will be submitted to a California-certified analytical laboratory for CrVI and total organic carbon (TOC) analysis. In addition, soil will be reserved for use in reductant demand testing as further discussed in Section 3.4.

Injection well cluster PTI-1S/D will be constructed within two separate borings. PTI-1S will be constructed with a 4-inch diameter schedule 80 PVC casing and 0.02-inch slotted screen. The screen interval will be 40 feet in length extending from an approximate elevation of 440 feet to 400 feet msl, corresponding with the lowest portion of the shallow saturated fluvial deposits as shown in Figure 3. PTI-1D will be constructed with a 4-inch diameter schedule 80 PVC casing and 0.02-inch slotted screen. The screen will be 40 feet in length extending from an approximate elevation of 400 feet to 360 feet msl corresponding with the full saturated thickness of the alluvial fan deposits at this location as shown in Figure 3. The screened intervals of these two wells (PTI-1S and PTI-1D) will together allow for injection over a total of 80 feet of saturated thickness.

To evaluate the effects of treatment within the various lithologic and geochemical conditions, several multi-level monitoring well nests will be installed. At each monitoring well nest, a single 10-inch diameter boring will be drilled. Three 2-inch diameter schedule 40 PVC casings with 10 feet of 0.02-inch slotted screen will be installed in each boring. The screens will be placed at the following approximate elevations: 435-425 feet msl, 410-400 feet and 375-365 feet msl. These screened intervals were selected based on the lithologic conditions encountered at existing wells MW-39 and MW-20 in the pilot test area. The individual wells in each well nest will be installed from the deepest to shallowest. Number 212 filter sand will be placed from 2 feet below to 2 feet above each screen. Bentonite chips will be installed using a tremie pipe between the screened depths.

Following well construction, each well will be developed using a surge block, bailer, and submersible pump. During development, temperature, pH, specific conductance, and turbidity will be measured using field instruments.

All drilling, well installation, well development, and associated field activities will be performed in accordance with the applicable procedures contained within the *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program, Revision 1* (SAFPM), or the version of that document that is current at the time the field activities are performed (. All newly installed wells will be monitored and sampled at least twice for the analytes described in Section 4.2 prior to the injection of reagents, to establish baseline conditions. Purging and sampling will be performed with the pump intake placed in the middle of the screened interval, and will follow the methods in the SAFPM (CH2M Hill, 2005b).

3.6 SOIL AND GROUNDWATER REDUCTANT DEMAND

Representative soil collected from the saturated fluvial and alluvial fan deposits during drilling of PTI-1S/D and groundwater samples collected from each well will be used in a microcosm study to refine the dosages of emulsified soybean oil that support conversion of the CrVI to CrIII. For each test (one for fluvial soil/groundwater and one for alluvial soil/groundwater), the groundwater will be analyzed for CrVI, redox potential, sulfate, pH, and TOC. Batch

microcosms will be prepared with the soil and groundwater and dosed with 0, 10, 25, 50, 100, 150, 200, 300 and 450 mg/L of the emulsified oil on a total organic carbon basis. The concentrations of CrVI, sulfate, and TOC as well as pH and redox potential will be determined after 0, 1, 2, and 4 weeks.

The results of these tests will be evaluated to determine if the dosage of reagent discussed in Section 4.1 should be adjusted in secondary injections subsequent to the initial pilot test injection. This data will also be useful for more accurate estimates for a potential future full-scale system.

Since this data will only be used for design optimization and not for 'proof of concept,' strict maintenance of anaerobic conditions during sample gathering, preparation and testing is not necessary. Any oxygen introduced into the samples during these steps will only serve to increase the apparent reductant demand, resulting in an additional degree of conservatism in future dosing calculations, and the magnitude of such changes is likely to be low with reasonably careful sample handling. Additionally, this data will be cross-verified with actual field observations during the pilot test when selecting full-scale design parameters.

3.7 TRACER TEST

Concurrent with the pilot test injection, a short-duration tracer test will also be initiated to better understand the flow conditions in the pilot test area. The conservative, non-toxic tracer potassium bromide will be injected in wells PTI-1S/D. Monitoring in the nearby well network will demonstrate the injected solution migration and confirm the gradient influenced by extraction wells TW-2 and PE-1. The test data will also be used to refine estimates of aquifer porosity, dispersivity, and groundwater velocity, which will be useful for pilot test interpretation and potential full-scale design.

4.0 IMPLEMENTATION PLAN

Following well installation and sampling, the pilot test will commence with the introduction of the emulsified vegetable oil and lactate solution. This section discusses the reagent dosage and methodology for reagent introduction.

4.1 REAGENT DOSAGE

Calculation of a target reagent dose consists of two parts:

1 Determining the amount of reagent needed to satisfy the static reductant demand of a certain volume of soil and groundwater in an aquifer (which can be referred to as static demand). This amount can be estimated stoichiometrically.

2 Determining the amount of reagent needed to treat new groundwater flowing into that volume of aquifer after dosing, for a given period of time (which can be referred to as dynamic demand). Calculation of this amount requires additional assumptions, such as the persistence of the reductant in the subsurface and the groundwater flux through the area.

For purposes of this test, there is a wide range of acceptable doses. Smaller than optimal doses may result in incomplete treatment of a given area, but can be adjusted via stronger secondary doses after the first injection. Larger than optimal doses will result in complete treatment and a residual reagent that may continue to treat new groundwater flowing into the treatment zone for an extended period of time.

Data from the bench-scale study (CH2M Hill, 2005a) showed effective treatment for all biological reduction systems at a dosage of 450 mg/L of reagents. This value can therefore be considered an upper bound of required dosage to meet the static reductant demand; smaller doses may be possible. This possibility will be studied in more detail via the reductant demand testing described in Section 3.4.

To select a starting dose for this pilot test, calculations were performed in consultation with Terra Systems, Inc. Terra Systems, Inc. is a firm specializing in organic substrate use for biologically-induced reduction. The calculations reflect that the substrate is indirectly used by bacteria for the reduction of various electron acceptors and CrVI. The calculations estimate the

quantity of soybean oil, lactate (assuming 4 percent of the soybean oil by weight), food grade emulsifiers, and yeast extract which is recommended as a nutrient source. The reagent dose requirements were calculated for the floodplain pilot test based on a maximum estimated area of treatment effectiveness of 10,000 feet^2 and a maximum saturated thickness of 100 feet. An estimated groundwater seepage velocity of approximately 0.1-foot per day was assumed.

Input used for the model was based on existing site data, including the following parameters and values: 4 mg/L of dissolved oxygen, 2 mg/L nitrate and 10 mg/L CrVI. In addition, it was assumed that approximately 250 mg/L of available sulfate would be consumed, based on a review of the data from the bench scale pilot test. The following table shows the estimated quantity of soybean oil, lactate, emulsifier, yeast extract, and water needed for the pilot test.

Estimated Soybean Oil, Lactate, Emulsifier, Yeast Extract, and Chase Water Requirements for Floodplain Pilot

Component	Pounds	Gallons
Soybean Oil	7,641	996
Sodium Lactate	306	28
Emulsifier	831	100
Yeast Extract	14	
Water	1,470	536
Total Reagent Volume	13,262	1,660
Chase Water	35,747	4,290

Based on the above calculations, a total of volume of approximately 6,000 gallons (1,700 gallons of prepared emulsified vegetable oil and sodium lactate solution followed by a 4,300-gallon chase of clean treated groundwater) will be introduced into each of wells PTI-1S/D.

4.2 REAGENT INTRODUCTION

The reagent and chase water will be allowed to gravity feed if possible, but depending on the rate of flow a pump will be available to assist in injection. The injection pressures will be kept below 50 pounds per square inch (psi). No permanent aboveground equipment will be employed during the pilot test. The proposed approach will minimize the duration and nature of site

disruptions, by using temporary hoses to convey batches of reagents from transportable containers to the injection wells. Extracted and treated groundwater from the currently operating extraction system will be used as the dilutant and chase water for the reagent. The groundwater will be blended with the reagents in above ground transportable containers and the resulting mixture will be sent to the injection well via hose. The transportable containers and hoses will be removed from the area following the injection, leaving only the monitoring wells on site. Flow rate and pressure, volumes and blended reagent concentrations will be carefully monitored and recorded during reagent introduction. As discussed in Section 3.4, the reagent dose and volume of the solution to be introduced may be modified after reviewing reductant demand test data, and may also be adjusted to target various well depths based on the results of soil and groundwater sampling during well installation. Any changes to the approach proposed in this work plan will be first communicated to and approved by the DTSC.

4.3 PILOT TEST MONITORING

Monitoring of reagent flow (rate and volume) into the injection well and water levels in nearby monitoring wells will be conducted throughout the duration of injection.

Groundwater monitoring will be conducted to evaluate the effectiveness of the reagent introduction. It is anticipated that the chemical nature of groundwater near the injection well will change soon after the introduction of the reagent. However, it may take some time for the effect to reach the monitoring wells and for the reductive zone to be created by biological activity.

It is planned to conduct groundwater monitoring and sampling immediately following injection, and then daily for the first week, weekly for the first month, and then monthly thereafter (as described in detail below). It is anticipated that the conservative bromide tracer will be detected first, followed later by detections of the reductant or the influence of the reductant. Field instruments and test kits will be used to monitor for the arrival of the bromide tracer and reductant effect in the pilot test monitoring well network. Samples will be collected for laboratory analysis of the various analytes listed below and in Table 3 after detections are noted in the field.

Groundwater sampling will be performed according to the methods described in the SAFPM (CH2M Hill, 2005b). Weekly groundwater monitoring and sampling will continue until the influence of the reductant is noted at the furthest pilot test monitoring well, or until such time as it appears that the reductant is no longer migrating. Monthly monitoring and sampling will be conducted for at least six months thereafter. Monitoring will include field analysis of pH, temperature, dissolved oxygen, ORP, specific conductance, and CrVI (by means of a HACH field test kit). Groundwater samples will be submitted to an analytical laboratory and analyzed for the following:

- CrVI by United States Environmental Protection Agency (EPA) Method 7199
- Total chromium, iron (ferric and ferrous), manganese, and arsenic, by EPA Method 6010B
- Calcium, magnesium, potassium, and sodium by EPA Method 6010B
- Carbonate/bicarbonate alkalinity by Standard Methods 2320
- Nitrate, nitrite, chloride, phosphorus (as phosphate), and sulfate by EPA Method 300.0.
- Total Organic Carbon by EPA Method 415.1
- Sulfide by EPA Method 376.1
- Volatile fatty acids by EPA Method 300.M
- Ammonia by EPA Method 350.2
- Methane by EPA RSK SOP 175

Samples will be taken more frequently at the beginning of the test, and less often as the test progresses, as summarized below:

Sampling Phase 1: Day 1 (day following completion of injection) through Day 5. Shallow, middle, and deep casings of PT-1, PT-3, and PT-4 will be monitored daily using field instruments/test kits for CrVI, bromide, pH, temperature, dissolved oxygen, ORP, and specific conductance. Samples will be collected for laboratory analysis of bromide if bromide is detected using a field kit/meter.

Sampling Phase 2: End of Week 1 (Day 7) through end of Week 3 (Day 21). Shallow, middle, and deep casings of PT-1 through PT-6 will be monitored weekly using field

instruments/test kits for CrVI, bromide, pH, temperature, dissolved oxygen, ORP, and specific conductance. Samples will be collected for laboratory analysis of bromide, volatile fatty acids, and total organic carbon if bromide is detected using a field kit/meter. Samples will be collected for laboratory analysis of all analytes specified in Table 3 if field measurements of CrVI concentration differ by more than 20 percent from the baseline sample results or if ORP differs by more than 50 millivolts from the baseline sample results.

Sampling Phase 3: End of Week 4 (Day 28) through end of Month 6 (Week 24, Day 168). Shallow, middle, and deep casings of PT-1 through PT-6, and extraction wells TW-2D and PE-1 will be monitored monthly (every 4 weeks) using field instruments/test kits for CrVI, bromide, pH, temperature, dissolved oxygen, ORP, and specific conductance. Samples will be collected for laboratory analysis of all analytes specified in Table 3 from the shallow, middle, and deep casings of PT-1 through PT-4 monthly (every 4 weeks), from the shallow, middle, and deep casings of PT-5 and PT-6 bi-monthly (every 8 weeks), and from extraction wells TW-2D and PE-1 bi-monthly (every 8 weeks).

A preliminary schedule of analyses for the Floodplain Area In-Situ Field Test is presented in Table 3. The frequency of the monitoring and parameters may be modified as the pilot test progresses, depending on the results obtained in the field. Any modification of the WDR-required monitoring and sampling must be first authorized by the appropriate regulatory agencies.

4.4 REPORTING

It is anticipated that frequent communications between the PG&E project team and DTSC will occur during the course of the pilot test. Additionally, quarterly update reports will be prepared and submitted beginning immediately after the introduction of reagents, and continuing for the duration of the test period. These reports will contain all data obtained during the test. A final written summary report of findings, including a complete data set, will be submitted within approximately three months of completion of the pilot test. This report will include a discussion

of treatment efficiencies, recommendations, and considerations for development of a possible full-scale in-situ remedial plan.

5.0 WASTE MANAGEMENT AND EQUIPMENT DECONTAMINATION

Several waste materials will be generated during the drilling, development, and sampling of the proposed pilot test wells. These investigation-derived waste (IDW) materials will include groundwater, drill cuttings, decontamination rinsate, and incidental trash.

5.1 IDW MANAGEMENT

Drill cuttings generated during drilling of the pilot test wells will be contained in lined roll-off bins temporarily staged at the drilling sites. After sampling and characterization of the drill cuttings are completed, the cuttings bins will be removed from the drilling sites for disposal by PG&E. The drill cuttings will be screened for chromium. If the drill cuttings are characterized as a hazardous waste, they will be transported off site for disposal at a permitted hazardous waste facility. It is anticipated that the cuttings bins will be temporarily staged at the drilling sites for no longer than 45 days.

Water generated during drilling, well development, and sampling activities will be collected in drums or portable storage tanks temporarily located at each drilling site, transferred by forklift or truck to storage tanks in a staging area for characterization and treatment or disposal at a permitted facility. Elevated chromium concentrations are anticipated in the groundwater removed from the pilot test wells. Therefore, secondary containment will be provided for the storage tanks in the staging area.

Incidental trash will be collected from the work area at the conclusion of each workday and placed in a trash collection bin.

All IDW management will be performed in accordance with the procedures specified in the SAFPM (CH2M Hill, 2005b).

5.2 EQUIPMENT DECONTAMINATION

Down-hole drilling and development equipment, and the back end of the drill rig, will be steam cleaned prior to starting work at each new drilling site. Steam cleaning will be performed on a decontamination pad such that all rinsate can be contained and collected. Rinsate from the decontamination of drilling equipment will be transferred to the cuttings bin or water storage tank that contains material from the borehole last drilled.

All equipment decontamination will be performed in accordance with the methods specified in the SAFPM (CH2M Hill, 2005b). Water used for sampling equipment decontamination will be transferred at the end of each workday into the water storage tank that contains water from the wells sampled that day.

6.0 SCHEDULE

The following preliminary schedule has been developed to clarify the sequencing and approximate duration of tasks. It does not show time required prior to the test for permitting and workplan approval. This information is shown graphically in Figure 6.

- Installation and development of injection/monitoring wells (one month)
- Pre-injection baseline sampling (two events/two weeks)
- Tracer testing (one month, concurrent with reagent injection)
- Introduction of reagents (batch) (Phase 1 Field Test, one week)
- Monitoring and sampling events:
  - Weekly for the first month after injection
  - Monthly for months one to six after injection (six months)
- Interim data review after each sampling round; determination if multiple injections are needed based on tracer tests, current and expected TW-2 pumping plans
- Reintroduction of reagents as appropriate
- Preparation and submittal of an interim report at six months.
- Follow-on monitoring and sampling program beyond six months as appropriate

Current biological resource-driven constraints on the floodplain (due most notably to the potential presence of the Willow Flycatcher) are not anticipated to interfere with the pilot test well installation schedule or the pilot test activities.

The project schedule includes a preliminary data report, which will occur after approximately six months of testing to maintain the overall CMS schedule. It is anticipated that data useful for the CMS process will be obtained at this six-month point, and that continued testing beyond six months will yield additional information that may be useful in a full scale design.

Currently anticipated key dates for this program are:

- Submittal of final addendum to this Work Plan – September 2005

- Field mobilization/start of project – October 2005
- Six month interim report submittal – May 2006

7.0 REFERENCES

CH2M Hill, 2005a, *In-Situ* Remediation Bench-scale Testing, PG&E Topock Compressor Station, Needles, California, Prepared for Pacific Gas and Electric Company, January.

CH2M Hill, 2005b, Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program, PG&E Topock Compressor Station, Needles, California, Prepared for Pacific Gas and Electric Company, March 31.

CH2M Hill, 2005c, Performance Monitoring Report No. 16, PG&E Topock Compressor Station, Interim Measures No. 2, March 1 through 31, 2005, Prepared for Pacific Gas and Electric Company, April 15.

Palmer, Carl D, and Robert Puls, 1994, Natural Attenuation of CrVI in Ground Water and Soils, EPA/540/S-94/505, U.S. Environmental Protection Agency Ground Water Issue, October.

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MW-35
MW-29
MW-33
MW-13
MW-19
MW-28
MW-31
MW-37
MW-14
TW-2D
PE-1
MW-39
MW-36
MW-34
MW-30
MW-20
MW-25
MW-42
MW-27
MW-32
MW-26
MW-40
MW-43
MW-11
PGE-6
MW-24
MW-22
MW-21
PGE-7
MW-12
MW-38
MW-23
TW-1
MW-10
MW-9
PGE-8
MW-15

Colorado River

Park Moabi Road

IM-3 Groundwater Treatment Plant

Bench 20 IM-2 Groundwater Treatment Plant

Railroad

I-40 Highway

PG&E Topock Compressor Station

Wash

Batcave

Legend

- Current Well Locations
- Potential Extraction Well

0 FEET 300
SCALE

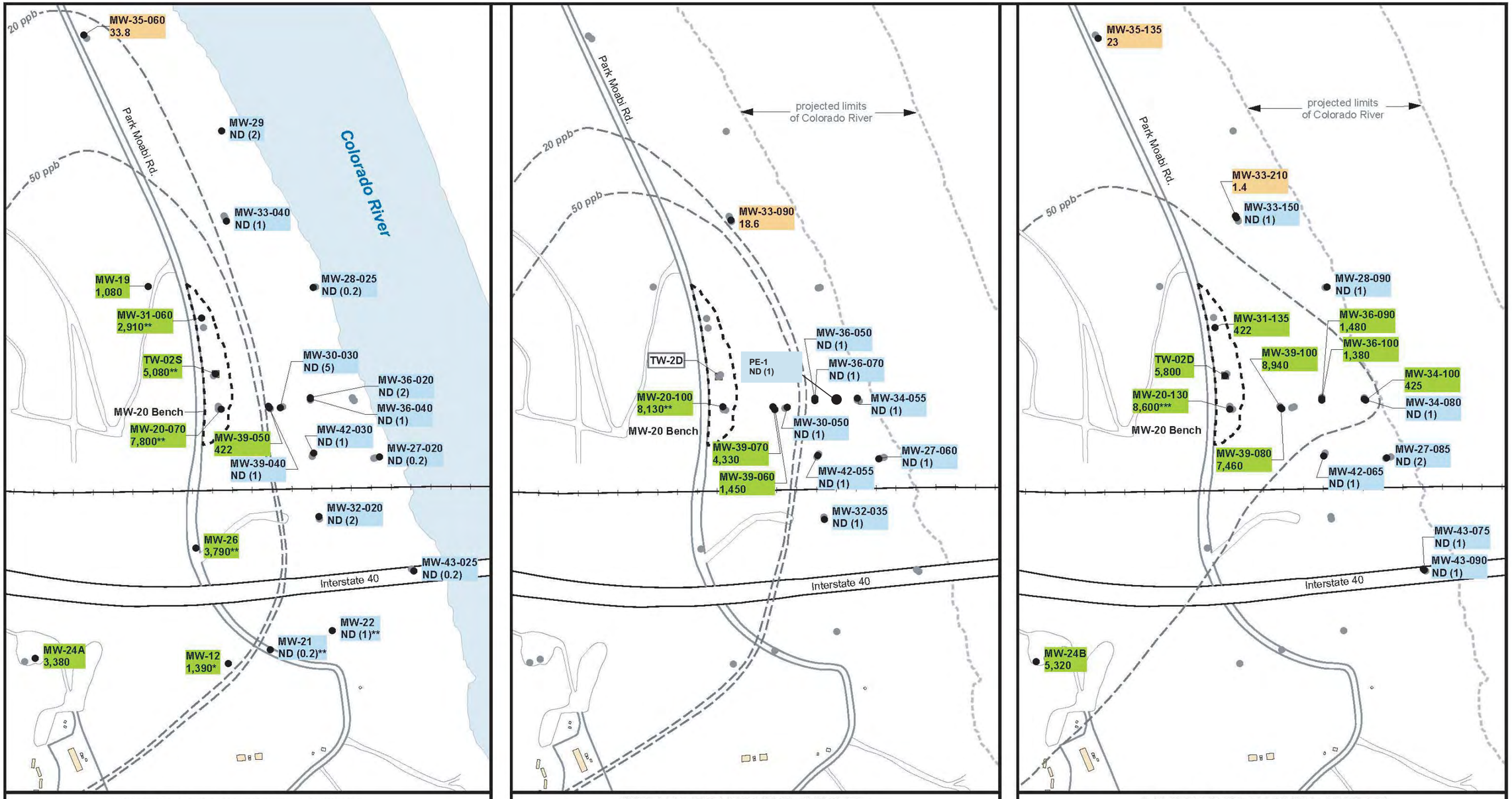
N

MWH

PG & E
TOPOCK FACILITY
NEEDLES, CALIFORNIA

SITE PLAN

FIGURE 1



ND (1) Not detected at listed reporting limit (ppb)

41 Less than 50 ppb

3,810 Greater than 50 ppb

Notes:
Results listed are from March 2005 sampling events.
Results marked * are from September 2004 sampling events.
Results marked ** are from December 2004 sampling events.
Results marked *** are from January 2005 sampling events.

Hexavalent Chromium Concentrations in Groundwater
March 2005 Sampling Events

Concentrations in micrograms per liter (µg/L)
equivalent to parts per billon (ppb)
ND = not detected at listed reporting limit.

N

0 400 800 Feet

1 inch equals 400 feet

FIGURE 2
HEXAVALENT CHROMIUM CONCENTRATIONS IN ALLUVIAL AQUIFER, MARCH 2005
Provided by CH2Mhill

MWH

West

East

TW-2S
TW-2D
proj: 140'

MW-20
Well Cluster

PT-2

PT-1

PT-3

PTI-1S/D

MW-39
Well Cluster

PT-5

MW-30-30
MW-30-50

MW-36
Well Cluster

PE-1
proj: 20'

MW-34-55
MW-34-80
MW-34-100

Colorado
River

Note: PE-1 shown in projection
for reference only.
PE-1 contacts bedrock.

water table (average 454' MSL)

UPPER ZONE

MIDDLE ZONE

LOWER ZONE

ALLUVIAL AQUIFER

Elevation (feet above MSL)

520
500
480
460
440
420
400
380
360
340
320

0
100
200
300
400
500
600
700

Distance (feet)

8280	181	1940	7.75	0.01 ③
8440	110	2490	7.64	0.01 ③
8730	126	5520	7.88 ②	0.01 ③

180'

132'

422	11	① 4300	② 7.23	No Data
4310	71	① 6100	② 7.44	No Data

ND (1)	-177	3500 ①	7.82 ②	No Data
1450	65	4300 ①	7.21 ②	No Data
7460	82	6800 ①	7.32 ②	No Data
8940	28	9300 ①	7.4 ②	No Data

118.3'

ND(1)	-84	38800	8.27	0.05 ④
ND(1)	-230	6470	7.22 ②	0.09 ③

67'

1480	49	① 9800	② 7.63	No Data

ND (2)	-88	① 6600	② 7.63	No Data
ND (1)	-194	8300 ①	7.67 ②	No Data
ND (1)	-168	① 5300	② 7.60	No Data
ND (1)	-115	760 ①	7.35 ②	No Data
1380	-20	9500 ①	7.63 ②	No Data

108'

ND (1)	-194	8420	7.4	No Data

97'

425	-60	10800	7.60 ②	No Data
ND (1)	-191	6230	7.35 ②	No Data
ND (1)	-121	8980	7.34 ②	No Data

115'

50

500

5,000

50

Approximate geologic contact
between alluvial fan (west)
and fluvial deposits (east)

Miocene Conglomerate (Bedrock)

well ID MW-25
water level
well screen
total depth of boring 105'

1.4	-103	8420	7.4	0.05

ND

Notes: bgs = below ground surface
MSL = mean sea level

Groundwater Sampling Results, March 2005

Hexavalent chromium (micrograms per liter or ppb)
Oxidation-reduction potential (millivolts)
Total dissolved solids in mg/L
pH
Ferrous iron in mg/L
Not detected above the posted reporting limit
Interpreted isoconcentration contour of hexavalent chromium

① Data from June 2004
② Data from April 2005
③ Data from November 2001
④ Data from September 2000

Blue color indicates new wells to be installed,
they have been projected southward into this cross section.

Taken from CH2MHill

MWH

P G & E
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

VERTICAL CROSS SECTION
HEXAVALENT CHROMIUM CONTOURS

FIGURE 3

JOB No. -- FILE No. INDSVR\INDUSTRIAL\CAD MLUEBKE\PGE\TOPOCK\CROSS SECTION 5 05

JOB No. -- FILE No. INDSVR\INDUSTRIAL\CAD MLUEBKE\PGE\TOPOCK\PILOT 7 28 05

MW-35
MW-29
Colorado River
Park Moabi Road
MW-33
MW-13
MW-19
MW-28
IM-3 Groundwater Treatment Plant
MW-37
MW-31
PTA-1
MW-14
Bench 20 IM-2 Groundwater Treatment Plant
TW-2D
PTA-2
PE-1
MW-39
PTA-3
MW-36
MW-34
MW-30
IM-3 East Access Road
MW-20
PTA-4
MW-25
MW-42
MW-27
Railroad
MW-32
MW-26
MW-40
I-40 Highway
MW-43
MW-11
PGE-6
MW-22
MW-24
MW-21
MW-12
PGE-7
MW-23
MW-38
TW-1
MW-10
MW-9
PG&E Topock Compressor Station
PGE-8
Wash
Batcave

Legend

- Current Well Locations
- Potential Extraction Well
- Interpreted Limit of Groundwater with a Concentration of Hexavalent Chromium that Exceeds 50 ppb
- Potential Pilot Test Areas (PTAs)

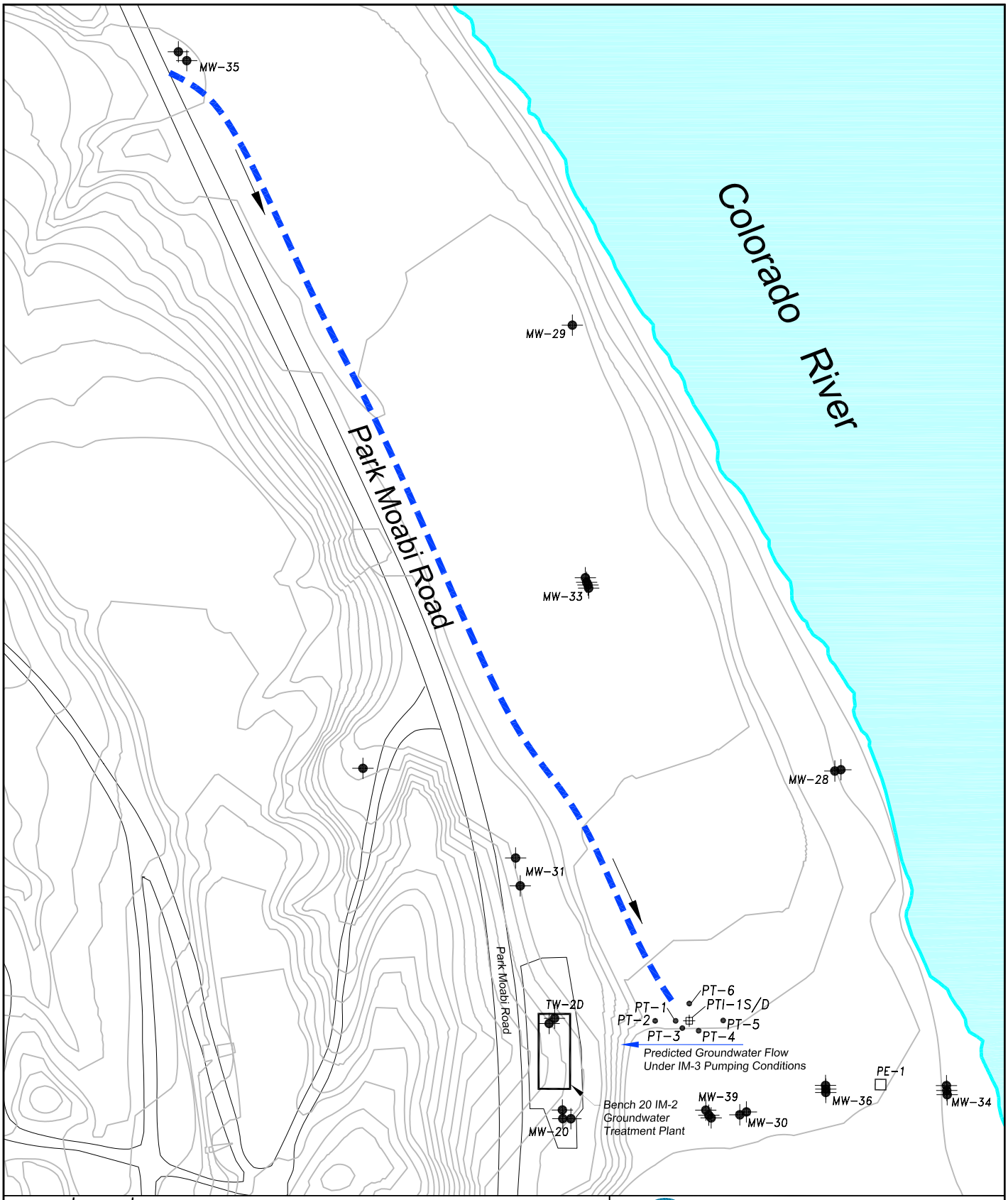
0 FEET 300
SCALE

MWH

PG & E
TOPOCK FACILITY
NEEDLES, CALIFORNIA

LOCATION AND EXTENT OF POTENTIAL PILOT TEST AREAS SHOWING LOCATION CRITERIA

FIGURE 4A



Legend

- Existing Monitoring Well
- Proposed Injection Well
- Proposed Monitoring Point
- Potential Extraction Well
- Proposed Rig Access Route

0 FEET 200
SCALE

N

MWH

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PROPOSED PILOT TEST WELLS AND ACCESS ROUTE

FIGURE 5

FILE: PGE\TOPOCK\ACCESS_ROUTE_5_05

JOB No.

Figure 6
PG&E Topock Compressor Station
Preliminary Project Schedule

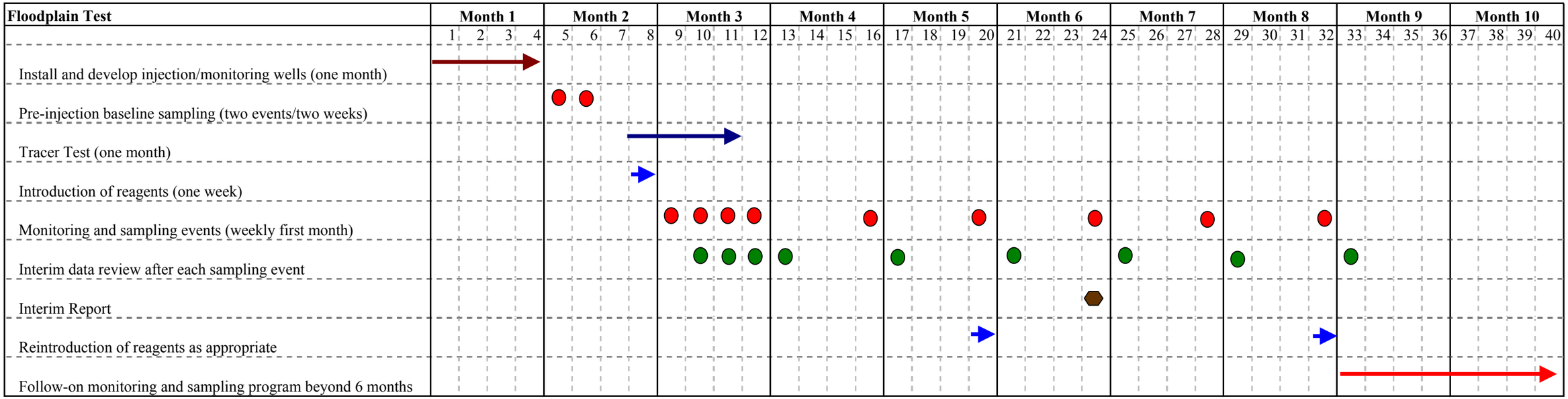

Table 1
Representative Site List
In-Situ Chromium Treatment

Project Location	Key Elements	Regulatory Oversight	Description
Coast Wood Ukiah, CA	▪ Full scale above ground and in situ treatment using calcium polysulfide ▪ Extraction, infiltration and injection ▪ Significant plume decrease, additional remediation will be required after plant closure	DTSC North Coast RWQCB U.S. EPA, Region IX	Groundwater extraction and aboveground electrochemical treatment for remediation of calcium polysulfide and molasses for clean-up of impacted soils. Hexavalent chromium concentrations decreased an order of magnitude over the first two years after reductant was introduced. The injections also caused temporary mobilization of iron, manganese and arsenic, and elevated sulfate concentrations in groundwater.
Valley Wood Superfund site, Turlock, CA	▪ In-Situ remediation in a mile-long plume with injection of calcium polysulfide ▪ Aboveground treatment of groundwater using ferrous-ion reduction ▪ Ongoing groundwater monitoring MNA closure requested	U.S. EPA, Region IX DTSC Central Valley RWQCB	Geochemical fixation was performed to control hexavalent chromium at this Federal Superfund site. The *in-situ* fixation treatment included groundwater extraction, aboveground treatment using the existing ferrous-ion reduction system, dosing the treated water with calcium polysulfide , and re-injection. Closure monitoring is currently being discussed with U.S. EPA. Because of low ambient carbon concentrations and not introducing additional carbon source, there was a temporary increase in sulfate concentrations in the groundwater for approximately one year.
Ecodyne Superfund Site Windsor, CA	▪ Full Scale Treatment of groundwater and vadose soil using calcium polysulfide ▪ Limited monitoring and agency discussion underway	North Coast RWQCB DTSC	Full-scale treatment of hexavalent chromium-impacted groundwater via *in-situ* geochemical fixation using calcium polysulfide was completed in 2004. This process expedited the cleanup by approximately 10 years, when compared with ongoing pump and treat operations which have now been discontinued. Source area soil treatment has now been accomplished.
Marley Cooling Tower Stockton, CA	▪ Pilot Studies using calcium polysulfide amended with ethanol Direct-push injection through temporary bores ▪ Ongoing monitoring	Central Valley RWQCB DTSC	First phase of a pilot test for *in-situ* chemical reduction of groundwater impacted by hexavalent chromium was completed using calcium polysulfide and ethanol. Hexavalent chromium levels were reduced from 10^{+}ppm to non-detect in less than 100 days. A second phase of pilot study to remediate the upgradient portion of the hexavalent chromium plume has also been completed with calcium polysulfide and ethanol and is now being monitored. Temporary mobilization of iron, manganese, and arsenic has been noted in proximity to injection points, but this is not long-lasting in the subsurface. *In-situ* treatment is estimated to reduce the time to closure by 25 years.

Table 1
Representative Site List
In-Situ Chromium Treatment

Project Location	Key Elements	Regulatory Oversight	Description
Former Aerospace Facility Long Beach, CA	▪ Pilot Study using CaSx and corn syrup ▪ Full scale implementation using injection via direct push rods. ▪ Ongoing infiltration and injection of reductant. ▪ Ongoing monitoring	Los Angeles RWQCB	The pilot test resulted in complete reduction of the hexavalent chromium in groundwater throughout the test area, and the effect of the reductant placement persisted for more than 200 days despite the flushing of the tracer by groundwater flow. The program reduced concentrations from greater than 50 mg/L to non-detectable levels. Full-scale implementation involved the injection of approximately 1,000,000 gallons of calcium polysulfide reductant solution amended with corn syrup, into the groundwater through direct-push rods. Reductant solution continues to be infiltrated through a basin to reduce hexavalent chromium concentrations in soil. Tight soil conditions hindered full contact with all impacted areas. Limited remedial efforts are underway in these areas
Carter Holt Harvey, Forwood Products, Mt Gambier, So Australia	▪ CaSx and molasses delivery via injection wells, infiltration trenches and basin. ▪ Extraction, treatment, and reinjection. ▪ Wells used to form reactive barrier across toe of plume. ▪ Clean closure achieved.	South Australian Environmental Protection Agency	This site was over a cavernous limestone aquifer, used as the water supply for a city of 25,000 people, and a major tourist attraction, “Blue Lake”. Initial remediation involved pumping from within the plume under the active water supply plant, treating with calcium polysulfide reductant amended with molasses and injecting around the plume margin. Later, the plant was decommissioned and an infiltration basin installed at the former plant site. Remediation was accomplished in approximately 2 years after basin construction. The site is now certified as remediated by the SA EPA. Because of high calcium carbonate content of the groundwater, injection wells tended to plug, requiring greater reliance on infiltration trenches and basins.
Universal Forest Products Granger, IN	▪ In situ treatment using calcium polysulfide and sodium metabisulfite in drinking water aquifer ▪ Achieved closure under a Voluntary Cleanup Program	Indiana Voluntary Remediation Program	An *in_situ* program to remediate four separate hexavalent chromium plumes was performed in a highly permeable sand aquifer. Two different reductants (calcium polysulfide and sodium metabisulfite) and delivery systems (injection wells and infiltration basin) were used, depending on plume conditions. One plume was cleaned to non-detect levels within 6 weeks of initiation of *in-situ* activities. All four plumes have now received Notices of Completion under the Indiana Voluntary Remediation Program. No mobilization of other metals was noted.
Shieldalloy Metallurgical Corporation Newfield, NJ	▪ Pilot Test using calcium polysulfide ▪ Successful reduction under challenging geochemical conditions		A pilot study was conducted to evaluate the feasibility of using *in-situ* hexavalent chromium reduction to supplement an existing pump-and-treat system. Calcium polysulfide was injected into an existing monitoring well. Even under challenging geochemical conditions – groundwater at a pH of 12 and total dissolved solids several times that of seawater – hexavalent chromium concentrations were reduced from 39 mg/L to below detection limits. The geochemical conditions at this site have resulted in the formation of a dense brine layer at the base of the aquifer, and investigations are ongoing to determine its extent and potential effects on full-scale *in-situ* remediation efforts.

Table 1
Representative Site List
In-Situ Chromium Treatment

Project Location	Key Elements	Regulatory Oversight	Description
Kaydon Ring and Seal Baltimore, MD	▪ Field-scale demonstration using calcium polysulfide ▪ Successful treatment of unsaturated and unsaturated soil using infiltration basin currently underway by other consultant group		Chromium contamination exists in the unsaturated fill, and saturated soil and bedrock under this chromium plating plant as a result of leaks dating back to World War II. A field-scale demonstration was completed under one of the plating lines by breaking up the floor, installing an infiltration bed, and percolating calcium polysulfide reductant solution through the fill into the groundwater. The feasibility of this approach was proven.
Power Engineering Denver, CO	▪ Saturated zone reactive barrier adjacent a river, using calcium polysulfide ▪ Vadose soil treatment		Chromium plating operations at this plant resulted in a hexavalent chromium plume that extended from the facility to the South Platte River. As an interim control measure, borehole placement of calcium polysulfide reductant solution was used to form a reactive barrier across the toe of the plume. *In-situ* reduction of hexavalent chromium in the vadose zone was also initiated by injecting reductant solution through a series of horizontal boreholes beneath the floor slab of the facility. No other metals were noted during monitoring, and the site is not considered as remediated.
Foremost Environmental Solutions Glenwood Springs, CO	▪ Full-scale remediation implementation using calcium polysulfide adjacent to a river ▪ Treatment of vadose and saturated soil using infiltration basin ▪ Site closure obtained	Colorado Health Department	This former plating facility is located on the shore of the Colorado River in an area popular for recreational fishing and rafting. An infiltration basin was constructed in which calcium polysulfide reductant and a carbon source? (to aid in bacterial growth) were infiltrated, resulting in reduction of the hexavalent chromium to the trivalent state and the precipitation of the chromium as a hydroxide. This site is considered complete by the Colorado Health Department. No other metals were mobilized, and sulfate concentrations decreased during remediation.
REMCO Industries Willits, CA	▪ Two pilot test completed using calcium polysulfide and molasses and injection via direct push rods ▪ Full scale remediation ongoing	North Coast Regional Water Quality Control Board	This former chromium plating site is underlain by low-permeability silts and clays that have prevented remediation via conventional pump-and-treat methods. Pilot tests were performed to demonstrate that the direct-push hydrofracturing approach is appropriate at this site, and that the molasses reductant solution used will not only reduce the hexavalent chromium to the trivalent form, but will also achieve reductive dechlorination of TCE. Full-scale remediation design and implementation is ongoing by other consulting group.
Ordnance Facility Hollister, CA	▪ Pilot test completed using HRC®		This pilot test was performed to evaluate the effectiveness of Regenesis Hydrogen Release Compound (HRC®, composed of polylactate ester) for the *in-situ* reduction of hexavalent chromium and perchlorate, as well as the reductive dechlorination of Freon-113 in an aquifer composed of medium to fine silty sand. Hexavalent chromium, perchlorate, and Freon-113 concentrations in the study area were reduced by 99 percent, 88 percent, and 92 percent, respectively.

Table 1
Representative Site List
In-Situ Chromium Treatment

Project Location	Key Elements	Regulatory Oversight	Description
Berkey Street Site Grand Rapids, MI	▪ Large-scale pilot test using HRC®. ▪ Full scale remediation under way.	Michigan Department of Environmental Quality	A large-scale pilot study was performed to evaluate the effectiveness of Regenesis Hydrogen Release Compound (HRC®) for *in-situ* remediation of groundwater exhibiting hexavalent chromium concentration of 49 mg/L in the test area. One hundred pounds of HRC were injected at each of 60 locations using direct-push methods. The reduction in hexavalent chromium concentration within the test area was greater than 90 percent.. Full-scale remediation design is under way.
Plating and Engraving Facility Berkeley, CA	▪ Pilot test using MRC® ▪ Injection via direct push rods ▪ Barrier configuration		A pilot test was performed to evaluate the effectiveness of *in-situ* hexavalent chromium reduction using Regenesis Metals Remediation Compound (MRC®). Fifteen direct-push injection points were used to create a barrier across a preferential groundwater flow path. Hexavalent chromium concentrations within the affected study area were reduced to below detection limits.
Industrial Plating Facility Odessa, TX	▪ Full-scale remediation of groundwater using MRC® ▪ Multiple barrier configuration ▪ Vadose soil treatment under investigation	U.S. EPA [CERCLA (Superfund)] Texas Commission on Environmental Quality	Both pilot-scale and full-scale applications of Regenesis Metals Remediation Compound (MRC®) were completed for the *in-situ* reduction of hexavalent chromium in groundwater beneath the site. A total of 18,720 pounds of MRC® were applied within a treatment area of 350,000 square feet. The success of the pilot- and full-scale MRC applications allowed the existing pump-and-treat system to be shut down. Application of this technology to the untreated portions of the source area is being investigated.

TABLE 2

EVALUATION OF POTENTIAL IN-SITU PILOT TEST LOCATIONS
FLOODPLAIN AREA

Evaluation Criteria	PTA-1	PTA-2	PTA-3	PTA-4
Proximity and Orientation to Well TW-2	G	E	F	P
Susceptibility to Influence from Extraction Well PE-1	E	G	P	P
Knowledge and Suitability of Stratigraphy and Groundwater Chemistry	P	G	E	U
Implications for Future Plume Monitoring	E	E	U	F
Topography	G	G	G	G
Potential Biological Impacts	G	G	F	P
Proximity to Potential Cultural Resources	E	E	E	E

E = excellent
G = good
F = fair
P = poor
U = unacceptable
PTA-1 = Potential Pilot Test Area 1
PTA-2 = Potential Pilot Test Area 2
PTA-3 = Potential Pilot Test Area 3
PTA-4 = Potential Pilot Test Area 4

Table 3

Preliminary Schedule of Analyses

Floodplain Test Area

Analyte	Analytical Method	Number of Samples					Total Analyses
		Baseline		Test Monitoring[4]		QA/QC Samples[5]	
		Monitoring Wells[1]	Extraction Wells[2]	Monitoring Wells[3]	Extraction Wells[2]		
Laboratory							
CrVI	EPA 7199	40	4	90	6	8	148
Cr(total)	EPA 6010B	40	4	90	6	8	148
Arsenic	EPA 6010B	40	4	90	6	8	148
Calcium	EPA 6010B	40	4	90	6	8	148
Iron (ferric)	EPA 6010B	40	4	90	6	8	148
Iron (ferrous)	EPA 6010B	40	4	90	6	8	148
Magnesium	EPA 6010B	40	4	90	6	8	148
Manganese	EPA 6010B	40	4	90	6	8	148
Potassium	EPA 6010B	40	4	90	6	8	148
Sodium	EPA 6010B	40	4	90	6	8	148
Bromide	EPA 300.0	40	4	90	6	8	148
Chloride	EPA 300.0	40	4	90	6	8	148
Nitrate	EPA 300.0	40	4	90	6	8	148
Nitrite	EPA 300.0	40	4	90	6	8	148
Phosphorus (as phosphate)	EPA 300.0	40	4	90	6	8	148
Sulfate	EPA 300.0	40	4	90	6	8	148
Sulfide	EPA 376.1	40	4	90	6	8	148
Volatile fatty acids[6]	EPA300.M	40	4	90	6	8	148
Ammonia	EPA 350.2	40	4	90	6	8	148
Carbonate/bicarbonate alkalinity	SM 2320	40	4	90	6	8	148
Methane	RSK 175	40	4	90	6	8	148
Total organic carbon	EPA 415.1	40	4	90	6	8	148
Field Instrument							
CrVI	HACH Kit	40	4	217	12	n/a	273
Bromide	kit/meter	40	4	217	12	n/a	273
pH	meter	40	4	217	12	n/a	273
Temperature	meter	40	4	217	12	n/a	273
Dissolved oxygen	meter	40	4	217	12	n/a	273
Oxidation-reduction potential (ORP)	meter	40	4	217	12	n/a	273
Specific conductance	meter	40	4	217	12	n/a	273

NOTES:

1. Wells PT-1 to PT-6, and PTI-1S/D; assumes three casings for each PT well
2. Wells TW-2D and PE-1
3. Wells PT-1 to PT-6; assumes three casings for each PT well
4. Assumes six sampling events with laboratory analysis
5. Assumes one Equipment Blank per sampling event
6. Includes lactic acid (lactate), acetate, pyruvate, propionate, and butyrate

Pacific Gas and Electric Company®

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July 21, 2005

Cathy Wolff-White
Bureau of Land Management
Program Director
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406

Subject: Request for BLM Approval, Field Activity Summary for In-Situ Chromium Reduction Pilot Tests on BLM-Managed Land
Pacific Gas and Electric Company, Topock Project

Dear Ms. Wolff-White:

Pacific Gas and Electric Company (PG&E) requests the Bureau of Land Management's (BLM) approval to conduct *in situ* chromium reduction pilot testing on BLM-managed land as part of the remediation technologies evaluation at PG&E's Topock Compressor Station. On March 3, 2004, BLM issued a signed Action Memorandum approving the time-critical interim measures activities at the site to facilitate and streamline PG&E's efforts to continue to protect the Colorado River. It is our understanding that the proposed pilot test activities are classified as site-specified activities under the Action Memorandum and require only the approval by the BLM Lake Havasu Field Office prior to implementation.

Transmitted with this letter is a Technical Memorandum describing the proposed pilot study activities. Subject to approval by BLM and other permitting agencies, the pilot tests are scheduled to begin in October 2005. Thank you for your attention in this matter. Please do not hesitate to call if you have any questions. I can be reached at (805) 546-5243.

Sincerely,

Julie Eatherton for Yvonne Meeks

Cc: Sally Murray, BLM
Mark Howell, BLM
Norman Shopay, DTSC

Field Activity Summary for In-Situ Chromium Reduction Pilot Tests on BLM-Managed Land Pacific Gas and Electric Company, Topock Project

Prepared for the Bureau of Land Management

July 21, 2005

INTRODUCTION

This memorandum has been prepared for the U.S. Bureau of Land Management (BLM) in support of Pacific Gas and Electric Company (PG&E's) request to conduct in situ chromium reduction pilot testing on BLM-managed land as part of the remediation technologies evaluation at PG&E's Topock Compressor Station. The Topock site is located in eastern San Bernardino County, approximately 15 miles to the southeast of Needles, California.

The purpose of this memorandum is to provide a detailed description of proposed activities on BLM-managed land. These activities are understood to be previously authorized by the March 2004 Action Memorandum issued by BLM, which notes that additional wells may be authorized subject to BLM review and approval prior to implementation.

PG&E is addressing chromium in groundwater at the Topock Compressor Station under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). Assisting DTSC and PG&E with the planning and review of site investigation and remediation activities are the members of the Topock Consultative Workgroup (CWG) consisting of representatives of DTSC, BLM, the Colorado River Basin Regional Water Quality Control Board, Metropolitan Water District (MWD), and other regional, state, and federal agencies.

Pending approval by other permitting agencies, PG&E requests permission from BLM to conduct the pilot tests in selected areas of BLM land. The pilot tests are proposed at two discrete locations – one in a "floodplain" area and another in an "upland" area. These proposed locations are shown on Figures 1 and 2, respectively. At each of the two locations, the proposed pilot tests will consist of the following activities:

- Installation of one injection well cluster and four to six monitoring well nests
- Well development and pre-injection sampling
- Performance of a short-duration tracer test using a non-toxic tracer (potassium bromide)
- Reagent injection required for Cr(VI) in situ treatment
- Groundwater monitoring and sampling

These activities are described in more detail below. The pilot tests will be conducted on PG&E's behalf by Montgomery Watson Harza (MWH). Throughout all intrusive field investigation activities, every effort will be made to minimize disturbance to BLM lands.

FIELD INVESTIGATION ACTIVITIES

Locations and Pre-Mobilization Activities

The proposed pilot test well locations and access routes are shown on Figure 1 (floodplain area) and Figure 2 (upland area). In the floodplain area, one injection well cluster (PTI-1S/D) and six monitoring well nests (PT-1 through PT-6) are proposed. In the upland area, one injection well cluster (PTI-2 S/M/D) and four monitoring well nests (PT-7 through PT-10) are proposed.

Prior to equipment mobilization, the proposed drilling sites and access routes will be staked and surveyed for biological and cultural resources. The proposed access routes have been used previously for other well installations. Pre-construction surveys of cultural and natural resources will be conducted in consultation with BLM. All proposed drilling sites and associated equipment access routes will be surveyed. Results of the cultural and biological resource surveys will be confirmed and documented with DTSC and BLM prior to drilling equipment mobilization.

PG&E will conduct all field investigation activities in a manner that protects and avoids impacts to cultural and natural resources. Equipment mobilization is scheduled to occur subsequent to the breeding season for nesting bird species. However, if deemed necessary based on the results of pre-construction surveys, biological and/or cultural resource monitors will be present during well installation and operational activities.

Well drilling permits from San Bernardino County will be obtained and the drilling locations will be cleared of underground utilities prior to equipment mobilization.

Drilling and Well Installation

The wells in the floodplain will be drilled using an all-terrain rotosonic drilling rig; the wells in the upland area will be drilled using a truck-mounted rotosonic drilling rig. The rigs will be equipped with a 8 5/8-inch outside diameter drill casing and a 8 7/8-inch diameter drill bit. In the floodplain area, injection well cluster PTI-1 S/D will be constructed within two separate borings, and each of the six monitoring well nests will be constructed with three wells nested within a single boring. In the upland area, injection well cluster PTI-2 S/M/D will be constructed within three separate borings, and each of the four monitoring well nests will be constructed with three wells nested within a single boring. All wells will be installed during one mobilization, if possible. Well installation activities will occur over an approximately one-month period of time. Table 1 summarizes the proposed drilling depths and well construction plan for the injection well clusters and monitoring well nests at the floodplain and upland locations.

Figure 3 includes a photograph of a typical a drilling rig planned for this work. Two rigs will be mobilized at the same time. Figure 4 shows typical above-ground and flush-mounted well monument surface completions. The floodplain wells will be completed

above-ground, and the upland wells will be completed with traffic-rated flush-mounted well monuments to limit the visibility of the well heads.

Table 1 Construction Plan for Phase 2 Wells on BLM Land

Drilling Area	Well Identifications	Maximum Estimated Drilling Depth	Estimated Depth(s) of Screen Interval (s)	Well Diameter and Type	Surface Well Completion
Floodplain	PTI-1S	70 feet	30-70 feet	4" PVC	Above-ground monument
	PTI-1D	120 feet	75-115 feet	4" PVC	Above-ground monument
	PT-1	120 feet	40-50 feet, 65-75 feet, 100-110 feet	2" PVC	Above-ground monument
	PT-2	120 feet	40-50 feet, 65-75 feet, 100-110 feet	2" PVC	Above-ground monument
	PT-3	120 feet	40-50 feet, 65-75 feet, 100-110 feet	2" PVC	Above-ground monument
	PT-4	120 feet	40-50 feet, 65-75 feet, 100-110 feet	2" PVC	Above-ground monument
	PT-5	120 feet	40-50 feet, 65-75 feet, 100-110 feet	2" PVC	Above-ground monument
	PT-6	120 feet	40-50 feet, 65-75 feet, 100-110 feet	2" PVC	Above-ground monument
Upland	PTI-2S	130 feet	90-130 feet	4" PVC	Above-ground monument
	PTI-2M	170 feet	130-170 feet	4" PVC	Above-ground monument
	PTI-2D	220 feet	170-210 feet	4" PVC	Above-ground monument
	PT-7	220 feet	100-120 feet, 140-160 feet, 180-200 feet	2" PVC	Above-ground monument
	PT-8	220 feet	100-120 feet, 140-160 feet, 180-200 feet	2" PVC	Above-ground monument
	PT-9	220 feet	100-120 feet, 140-160 feet, 180-200 feet	2" PVC	Above-ground monument
	PT-10	220 feet	105-125 feet, 145-165 feet, 185-205 feet	2" PVC	Above-ground monument

An all-terrain forklift will be used for equipment and material transfer to the drill sites. Short-term material storage in the drill site area will be necessary to accommodate the drilling operations. Materials to be temporarily stored at the well sites include drilling equipment and well construction materials (casing, sand, bentonite, cement grout, etc).

Continuous core will be collected during drilling of each boring for geologic logging. The cuttings generated from drilling in the floodplain and upland areas will be transferred by forklift to lined steel roll-off soil bins temporarily staged at MW-20 bench. A 20-cubic yard soil bin will be required for approximately every 240 feet drilled, so approximately 10 soil bins will be required for this well installation effort. The minimal water produced from rotosonic drilling will be temporarily stored in 55-gallon steel drums placed on pallets or portable storage tanks at each drill site. Disposal procedures for the investigation-derived waste (IDW) is discussed below under Waste Management.

Well Development and Pre-Injection Sampling

After installation, the injection and monitoring wells will be developed by a combination of surging, bailing, and pumping to remove sediment from the well casing. A Smeal® development rig or the all-terrain drilling rig outfitted with development equipment will be used for the development activity. The wastewater produced from these activities will be temporarily stored in 55-gallon steel drums placed on pallets or portable storage tanks at each test site.

Following well development, the new injection and monitoring wells will be purged and sampled at least twice to establish baseline conditions. The sampling activities will follow the procedures, plans, and methods used for the Topock groundwater monitoring program. Samples from the new monitoring wells will be submitted to a laboratory to be analyzed for hexavalent chromium and total chromium, total organic carbon, volatile fatty acids, ammonia, methane, and other selected general chemistry parameters.

Tracer Tests

Short-duration tracer tests will be performed over an approximately one-month period concurrent with the reagent injection and groundwater monitoring and sampling activities described below. Potassium bromide, a non-toxic tracer, will be injected into the injection wells PTI-1 S/D and PTI-2 S/M/D as a one-time batch at the same time as the reagent injection. Samples collected during the groundwater monitoring and sampling activities described below will be used to determine when the tracer arrives at the monitoring well nest locations. The tracer tests will help confirm the groundwater gradient and to refine estimates of aquifer parameters in the pilot test areas.

Reagent Injection

Different reagents will be used at the two pilot test locations. In the floodplain test area, approximately 1,700 gallons of prepared emulsified vegetable oil and sodium lactate solution followed by 4,300 gallons of clean treated groundwater will be injected into each of wells PTI-1 S/D. In the upland area, approximately 82,000 gallons of solution consisting of 29 percent strength calcium polysulfide diluted to 3 percent by volume with clean treated groundwater, and 1 percent by volume of emulsified vegetable oil, will be injected into each of wells PTI-2 S/M/D.

The reagent solution (along with the tracer) will be injected in batches from 21,000-gallon portable containers trucked into the site (approximately 2 to 3 trucks per day over a one-week period). The solutions will be allowed to gravity feed if possible, but depending on the rate of flow, a pump may be used to assist in injection. The injection pressures will be kept below 50 pounds per square inch. No permanent aboveground equipment will be employed. Portable tanks containing the solutions will be temporarily staged on the MW-20 bench for the floodplain test and on the IM-3 access road for the upland test; the solutions will be conveyed via hoses to the injection wells. The tanks and hoses will be removed from the test areas following the injection.

Reagent injection activities will occur over an approximately one-week time period. The reagent injection will be performed once at the beginning of the pilot tests; however, depending on the results of the first injection, the reagents may be reinjected as necessary a few months after the first injection.

Groundwater Monitoring and Sampling

Groundwater monitoring and sampling will be conducted immediately following injection, and then daily for the first week, weekly for the first month, and monthly thereafter. The monitoring/sampling activities will follow the procedures, plans, and methods used for the Topock groundwater monitoring program. Samples from the monitoring wells will be analyzed for hexavalent chromium and total chromium, total organic carbon, volatile fatty acids, ammonia, methane, and other selected general chemistry parameters by a combination of laboratory and field methods.

Purged groundwater generated during the sampling activities will be temporarily stored in 55-gallon steel drums placed on pallets or portable storage tanks at each test site.

WASTE MANAGEMENT AND EQUIPMENT DECONTAMINATION

Several types of waste materials will be generated during the drilling, development, and sampling of the proposed pilot test wells. Investigation-derived waste (IDW) materials will include groundwater, drill cuttings, decontaminant rinsate, and incidental trash.

Drill cuttings potentially may contain chromium, although during previous drilling operations at the Topock site these materials had non-detectable concentrations of chromium. The cuttings and mud will be contained in lined roll-off bins staged on the MW-20 bench during the drilling activities. After sampling and characterization, all cuttings bins will be removed from the staging area for ultimate disposition by PG&E at an appropriate licensed facility. The cuttings will be screened for chromium, the main chemical of concern for the site. If the cuttings are characterized as a hazardous waste, they will be transported offsite for disposal at a permitted hazardous waste disposal facility. It is estimated that the soil investigation-derived waste bins temporarily staged on BLM land (MW-20 bench) will not remain in excess of 45 days.

Water generated during drilling, monitoring well development, and sampling activity will be temporarily stored in 55-gallon steel drums placed on pallets or portable storage tanks at each drill site. As part of demobilization at each location, the temporarily stored water will be removed from the well site and transferred to storage tanks on the MW-20 bench for characterization and ultimate disposal or treatment at a permitted waste disposal facility.

Decontamination of drilling and development materials will be performed on a decontamination pad such that all rinsate can be contained and collected. Decontamination rinsate will be transferred to the cuttings bin or water storage tank that contains material from the borehole last drilled.

The incidental trash, consisting of empty paper and plastic bags, cardboard boxes, wooden pallets, and miscellaneous debris, will be collected at the end of each drilling shift and hauled off the drill site to an appropriate disposal facility.

EMERGENCY RESPONSE PLAN

Spill containment equipment (e.g., sorbent materials, shovels, etc.) will be maintained onsite at all times that there is groundwater in the storage containers. For any minor leaks, such as dripping from a valve or pump, the water will be contained in a pail and added to the storage tank. As a contingency in the event of a significant leak (more than a drip), equipment (vacuum trucks, pumps, etc.) and trained spill response personnel will be on call 24 hours per day for every day that the tanks contain liquid. BLM and other notifications would occur per the procedures established in the Topock Emergency Notification Binder.

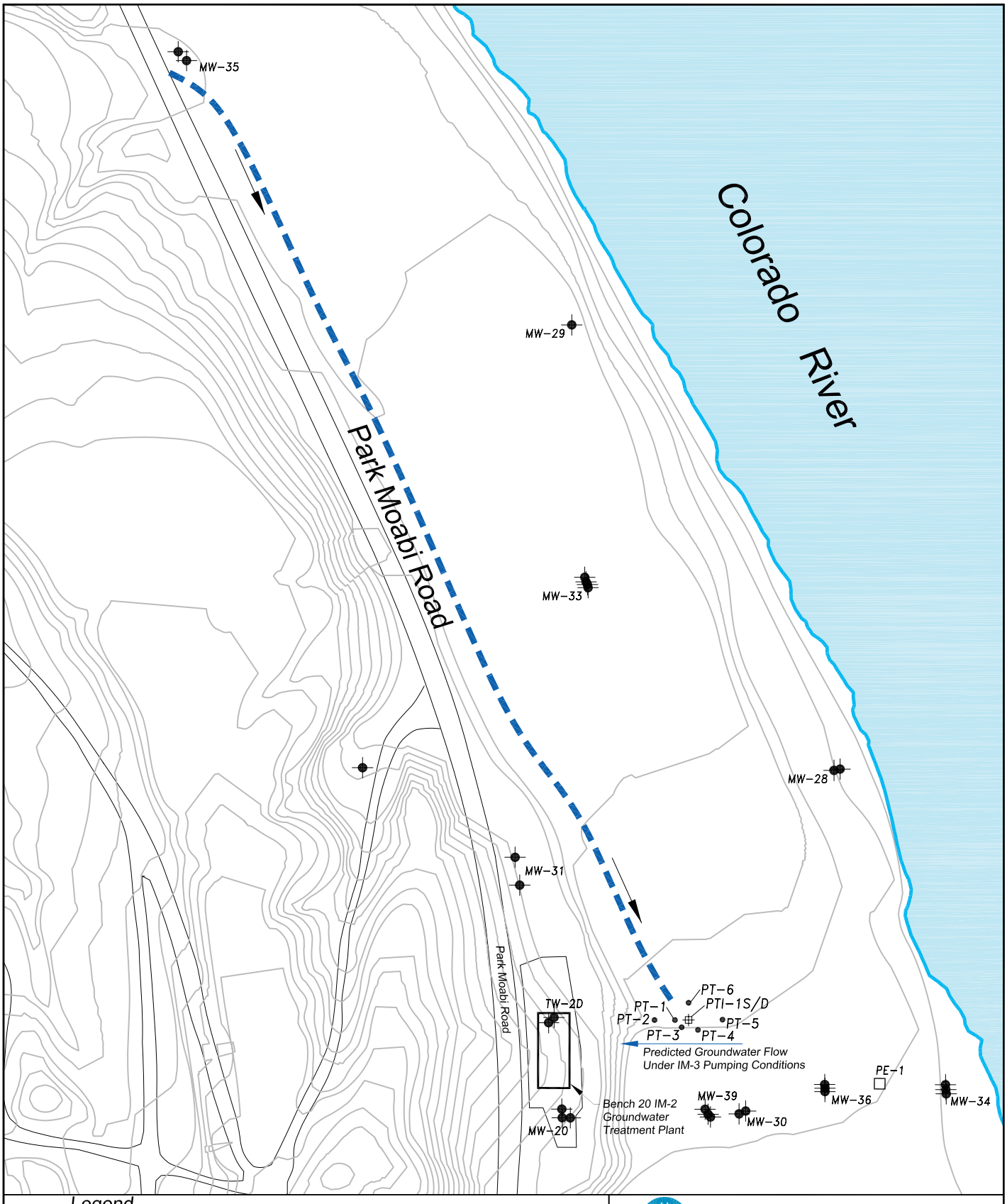
SCHEDULE

The chromium reduction pilot tests are tentatively scheduled to begin in October 2005, subject to approval by BLM and DTSC, permitting, and drill rig availability. All activities will be performed during daylight hours. The duration of specific activities on BLM land are summarized below.

Duration of Field Activities

Field Activities	**Approximate Duration**
Drilling and installation of injection/monitoring wells	1 month (2 to 5 days at each well)
Well development and pre-injection baseline sampling	2 weeks
Tracer testing	1 month (tracer injection concurrent with reagent injection)
Introduction of reagents (Phase 1)	1 week
Monitoring and sampling	1-5 days for each event; frequency will be daily for first week during injection, weekly for first month after injection, monthly or bimonthly for six to eight months
Re-injection of reagents if appropriate	1 week each
Follow-on monitoring and sampling beyond 6 months	1-5 days for each event
Storage of water and drill cuttings (IDW) for disposal	14 to 45 days per bin or per tank

Figures



MWH

FIGURE 1
PROPOSED FLOODPLAIN SITE AND ACCESS ROUTES

PG&E TOPOCK FACILITY
NEEDLES, CALIFORNIA

CH2MHILL

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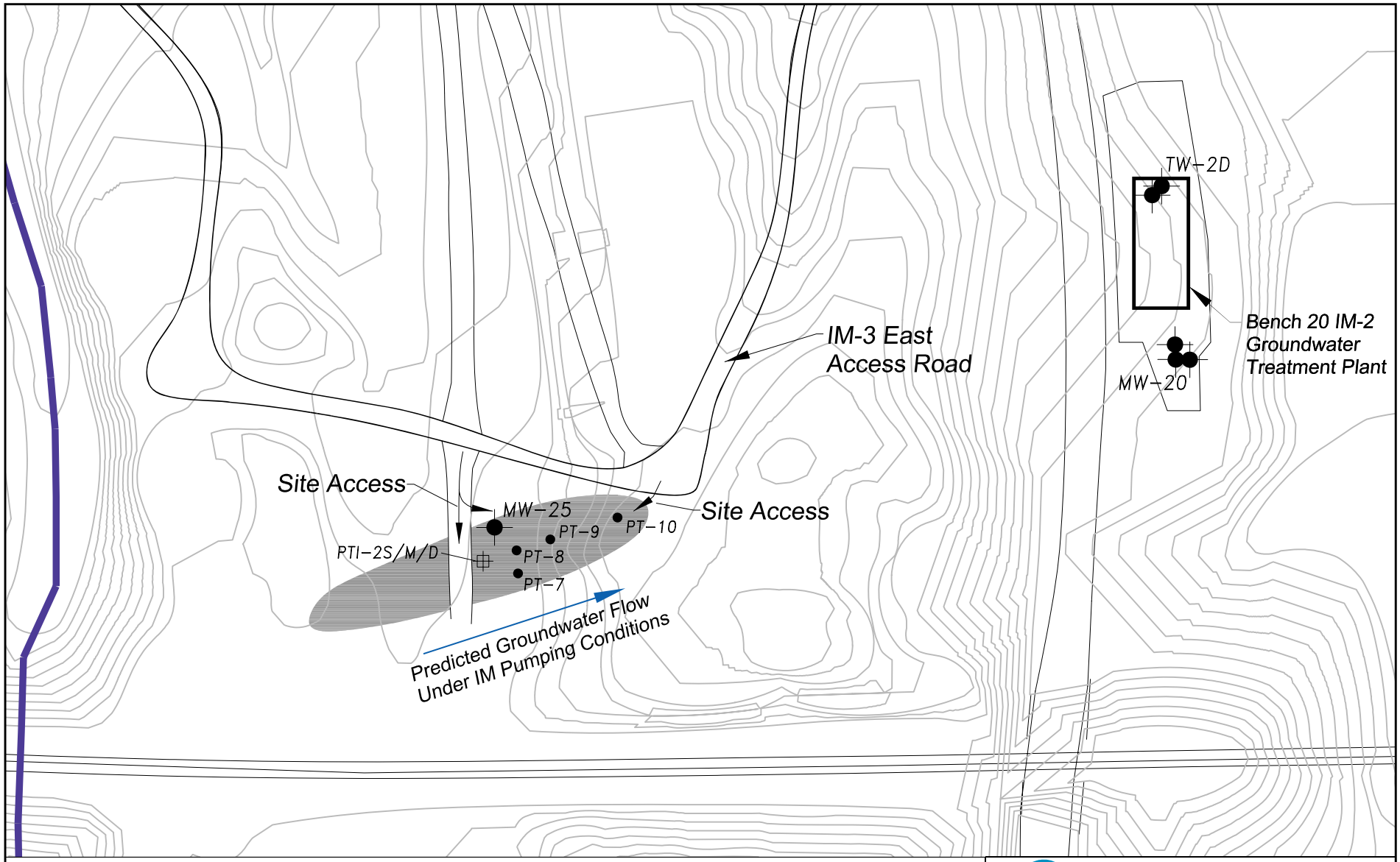


MWH

FIGURE 2
PROPOSED UPLAND SITE AND ACCESS ROUTES

PG&E TOPOCK FACILITY
NEEDLES, CALIFORNIA

CH2MHILL

331736.IS.04.00_Figure 2_07-18-05_ez_sfo

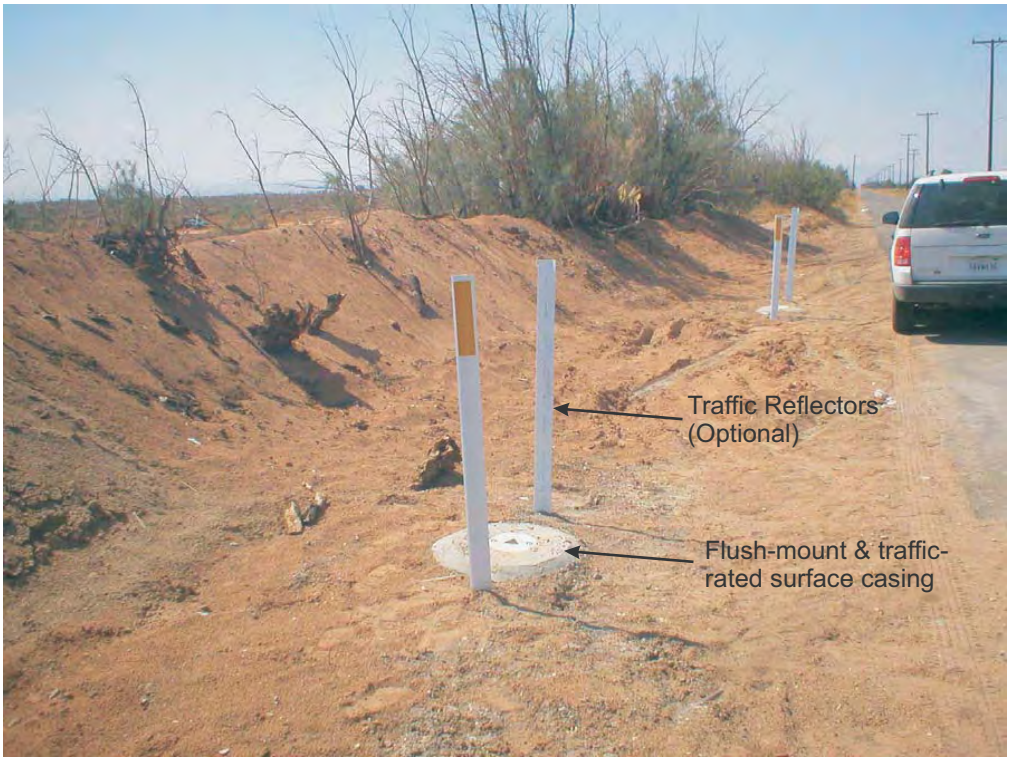
A. Typical Limited Access Sonic Drill Rig

B. Typical Well Development/Pump Service Truck

FIGURE 3
TYPICAL DRILLING AND SERVICE VEHICLES
PG&E TOPOCK FACILITY
NEEDLES, CALIFORNIA

CH2MHILL

Representative above ground well completion for Floodplain site.



Representative flush mounted well completion for Upland site.

FIGURE 4
TYPICAL WELL COMPLETION
PG&E TOPOCK FACILITY
NEEDLES, CALIFORNIA

CH2MHILL

331736.IS.04.00_Figure 4_07-21-05_ez_sfo

Appendix A10:
Well Installation Work Plan for Interim Measures Performance Monitoring Program

Pacific Gas and Electric Company®

Yvonne J. Meeks
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November 30, 2005

Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
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Berkeley, California 94710

Subject: Well Installation Work Plan for Interim Measures Performance Monitoring Program, PG&E Topock Compressor Station, Needles, California

Dear Mr. Shopay:

This letter transmits the *Well Installation Work Plan for Interim Measures Performance Monitoring Program*. The work plan is submitted for review in conformance with Condition 5 in DTSC's October 17, 2005 letter.

Please contact me at (805) 546-5243 if you have any questions on the work plan.

Sincerely,

Julie Eakins for Yvonne Meeks

cc. Kate Burger/ DTSC

Enclosure

Draft

Well Installation Work Plan for Interim Measures Performance Monitoring Program

PG&E Topock Compressor Station Needles, California

November 30, 2005

Prepared for

California Department of Toxic Substances Control

On behalf of

Pacific Gas and Electric Company

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, CA 94612

Draft

Well Installation Work Plan for Interim Measures Performance Monitoring Program

PG&E Topock Compressor Station
Needles, California

Prepared for
California Department of Toxic Substances Control

on behalf of
Pacific Gas and Electric Company

November 30, 2005

This work plan was prepared under supervision of a California Certified Engineering Geologist:

Paul Bertucci, C.E.G.
Project Hydrogeologist

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Acronyms and Abbreviations

µg/L	micrograms per liter
bgs	below ground surface
BLM	U.S. Bureau of Land Management
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
DTSC	California Department of Toxic Substances Control
HNWR	Havasu National Wildlife Refuge
IDW	investigation-derived waste
IM	Interim Measure
IM-3	Interim Measure No. 3
PG&E	Pacific Gas and Electric Company
PVC	polyvinyl chloride

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is implementing an Interim Measure (IM) to address chromium concentrations in groundwater at the Topock Compressor Station near Needles, California. The IM consists of groundwater extraction for hydraulic control of the plume boundaries near the Colorado River floodplain and management of extracted groundwater. The groundwater extraction, treatment, and injection systems are collectively referred to as Interim Measure No. 3 (IM-3). The IM-3 facilities include a groundwater extraction system, conveyance piping, a groundwater treatment plant, and an injection well field for the discharge of the treated groundwater. Figure 1-1 shows the location of the IM extraction, conveyance, treatment, and injection facilities.

In a letter dated February 14, 2005, the California Department of Toxic of Substances Control (DTSC) established the criteria for evaluating the performance of the IM. As defined by DTSC, the performance standard for this IM is to "establish and maintain a net landward hydraulic gradient, both horizontally and vertically, that ensures that hexavalent chromium concentrations at or greater than 20 micrograms per liter (µg/L) in the floodplain are contained for removal and treatment" (DTSC 2005a). The DTSC directive also defined the monitoring and reporting requirements for the IM. A draft *Performance Monitoring Plan for Interim Measures in the Floodplain Area* was submitted to DTSC on April 15, 2005 (CH2M HILL 2005a). The site monitoring, data evaluation, reporting, and response actions required under the February 2005 DTSC directive are collectively referred to as the IM Performance Monitoring Program for the floodplain area.

In a letter dated October 17, 2005, DTSC directed PG&E to prepare a well installation work plan that addresses modifications to the IM performance monitoring network (DTSC 2005b). Per DTSC direction, the work plan is to address hydraulic gradient well pairs for the expanded groundwater extraction system and additional plume characterization and delineation in the floodplain area to the north and northwest of the MW-34 well cluster.

This work plan has been prepared in compliance with DTSC's October 17 letter and describes the objectives, scope and rationale for modifications to the IM performance monitoring well network. The drilling program described in this work plan involves the installation of monitoring wells or monitoring well clusters at three locations on the western floodplain of the Colorado River near the PG&E Topock Compressor Station.

1.1 Project Background

The Topock Compressor Station is located in San Bernardino County, approximately 15 miles to the southeast of Needles, California (Figure 1-1). In February 1996, PG&E and DTSC entered into a Corrective Action Consent Agreement pursuant to Section 25187 of the California Health and Safety Code. Under the terms of that agreement, PG&E was directed to conduct a Resource Conservation and Recovery Act Facility Investigation and to implement corrective measures to address constituents of concern released in the Bat Cave Wash Area near the PG&E Topock Compressor Station. The primary constituents of concern

at Topock are hexavalent chromium (Cr[VI]) and total chromium (Cr[T]). The source was Cr(VI) salts historically used as a corrosion inhibitor in the station's cooling towers.

DTSC is the lead administering agency for the project. Assisting DTSC and PG&E with the planning and review of interim remedial measures are the members of the Topock Consultative Work Group, which was constituted under California's Site Designation Process. The Consultative Work Group consists of representatives from DTSC; the California Regional Water Quality Control Board, Colorado River Basin Region; the Metropolitan Water District of Southern California; the Arizona Department of Environmental Quality, the various federal agencies who own or manage adjacent property; and other project stakeholders.

In March 2004, as directed by the DTSC, PG&E began implementation of the Interim Measure. Components of the current IM-3 system include continuous groundwater extraction, piping, and conveyance of extracted groundwater to a treatment system; treatment of extracted groundwater using reduction-precipitation-filtration and reverse osmosis; and disposal of treated groundwater by injection wells. PG&E is currently pumping groundwater from one deep extraction well (TW-2D), located on a topographic bench along the station access road and above the Colorado River floodplain. The bench, referred to as the monitoring well MW-20 bench, is owned by the U.S. Bureau of Reclamation and is managed by the U.S. Bureau of Land Management (BLM). All well drilling sites proposed in this work plan are located in the floodplain area immediately east of the MW-20 bench on land maintained by BLM.

As part of the IM, groundwater and hydrogeologic investigations in the floodplain area were conducted by PG&E in April-May 2004 (Phase 1) and January-February 2005 (Phase 2). The results of the Phase 1 investigation are reported in the February 2005 Draft RCRA Facility Investigation/Remedial Investigation Report (CH2M HILL 2005b). The results of the Phase 2 investigation and associated installation of IM extraction well PE-1 are presented in separate well installation reports (CH2M HILL 2005c, 2005d). The results of these investigations and the floodplain wells that were installed have been incorporated in the IM Performance Monitoring Program and were used in preparing this work plan.

1.2 Objectives

As required by DTSC's October 17 letter, the primary objectives of the IM performance monitoring modifications drilling program are to address the hydraulic gradient well pairs for the expanded groundwater extraction system, and to collect data for further plume definition to the north and northwest of the MW-34 well cluster.

Accordingly, this work plan is organized as follows to address the additional drilling and well installation activities proposed for the IM performance monitoring network:

- Section 2 describes the existing IM performance monitoring program and summarizes the hydrogeologic framework and distribution of Cr(VI) in groundwater in the floodplain area.

- Section 3 describes the proposed modifications to the hydraulic monitoring network, activities to further delineate the Cr(VI) plume in the MW–34 / central floodplain area, and presents the scope of additional groundwater investigations in the floodplain.
- Section 4 describes the methods, procedures, and specifications for the drilling, groundwater sampling, monitoring well installation, and initial groundwater quality characterization for the proposed investigation sites.
- Section 5 describes the procedures for managing investigation-derived waste (IDW) and equipment decontamination associated with the field investigation.
- Section 6 outlines the approvals and approvals required from various agencies for the proposed field investigations in the floodplain area.
- Section 7 presents the implementation schedule and reporting activity for the IM performance monitoring drilling program.

2.0 Existing IM Performance Monitoring Data Summary

This section summarizes the existing IM performance monitoring network and summarizes the hydrogeologic framework and distribution of Cr(VI) in groundwater in the floodplain area, based on field investigations and monitoring data through October 2005. More complete presentation and discussion of the hydrogeologic conditions and groundwater quality data for the floodplain monitoring wells are included in the Phase 2 IM investigation report (CH2M HILL 2005c), and in recent IM performance monitoring reports (CH2M HILL 2005e, 2005f).

2.1 Performance Monitoring Well Network

The network of groundwater wells currently available for performance monitoring include four extraction wells and 49 monitoring wells in the floodplain and adjoining site area. Figure 2-1 shows the locations of wells used for the IM extraction, performance monitoring, and hydraulic gradient calculation. The wells are defined as:

- **Floodplain Wells**: MW-22, MW-27 cluster (3), MW-28 cluster (2), MW-29, MW-30 cluster (2), MW-32 cluster (2), MW-33 cluster (4), MW-34 cluster (3), MW-36 cluster (6), MW-39 cluster (6), MW-42 cluster (3), and MW-43 cluster (3).
- **Intermediate Wells**: MW-12, MW-19, MW-20 cluster (3), MW-21, MW-26, MW-31 cluster (2), MW-35 cluster (2), TW-2S, TW-2D.
- **Interior Wells**: MW-10, MW-25.

The two currently operational extraction wells, TW-2S and TW-2D, are located on the MW-20 bench (Figure 1-1). Two new extraction wells, TW-3D and PE-1, have been installed at DTSC's request to provide additional extraction system capacity. In March 2005, extraction well PE-1 was installed on the floodplain approximately 450 feet east of extraction well TW-2D (Figure 2-1). In late October 2005, extraction well TW-3D was installed approximately 15 feet west of well TW-2D, to serve as a supplemental extraction well for the IM system with a well completion similar to TW-2D.

2.1.1 Groundwater Monitoring Wells

The current network of groundwater wells used for performance monitoring includes 36 monitoring wells in the floodplain, nine wells in the MW-20 bench/Park Moabi Road area, and two monitoring wells in the interior plume area (MW-10, MW-25) (Figure 2-1). The majority of the performance monitoring wells used for hydraulic data and groundwater sampling are clusters consisting of two or three individual wells installed at one monitoring location.

2.1.2 Pressure Transducer Network

The current performance monitoring well network includes pressure transducer data collection at 49 groundwater wells and two river gauge stations (I-3, RRB). The data loggers typically record water level data at 30 minute intervals. The hydraulic monitoring data is used to prepare groundwater elevation contour maps for depth intervals in the aquifer in the floodplain area.

Hydraulic gradients are calculated each month between the following well/gradient pairs:

- MW-31-135 and MW-33-150 (northern gradient pair monitoring TW-2D)
- MW-20-130 and MW-34-80 (central gradient pair monitoring TW-2D)
- MW-20-130 and MW-42-65 (southern gradient pair monitoring TW-2D)

The location of the gradient wells pairs used in the current IM performance monitoring program are shown on Figure 2-1.

2.2 Hydrogeology of Floodplain Area

The wells screened in the unconsolidated alluvial fan and fluvial deposits, which comprise the Alluvial Aquifer, have been separated into three depth intervals to present groundwater quality and groundwater level data. The depth intervals of the Alluvial Aquifer, designated upper, middle, and lower, are based on grouping the monitoring wells screened at common elevations and do not represent distinct hydrostratigraphic units or separate aquifer zones.

The Alluvial Aquifer depth intervals and hydrogeologic setting in the floodplain is shown on Figure 2-2, a cross section extending east from the MW-20 (IM extraction wells) to the MW-34 well cluster and the Colorado River (the location of the cross section is shown on Figure 2-1). For the purposes of performance monitoring, the depth interval concept is useful for presenting and evaluating lateral gradients, while minimizing effects of vertical gradients and observing the influence of pumping from partially penetrating wells. It should be noted, however, that these divisions do not correspond to any lithostratigraphic layers within the aquifer. The floodplain aquifer is considered to be hydraulically undivided.

Figure 2-3 shows structure elevation contours on the Miocene bedrock surface that underlies the floodplain area. The map shows the boring locations and elevations of the top of the cemented, hard Miocene sedimentary rock formation (also referred to as the Miocene conglomerate unit). It should be noted that some of the drilling investigations in the floodplain area have encountered an interval of weathered conglomerate formation that overlies the hard, cemented Miocene bedrock surface depicted on Figure 2-3.

2.3 Chromium Distribution in Floodplain Area

The groundwater monitoring wells in the floodplain area are sampled for Cr(VI), Cr(T), and field water quality parameters under quarterly, monthly, and biweekly schedules, in accordance with the approved groundwater monitoring plan and DTSC directives. Figure 2-4 presents a plan view of the October 2005 Cr(VI) results for wells in the upper, middle, and lower depth intervals of the Alluvial Aquifer. Figure 2-4 also shows the

approximate locations of the 20 µg/L and 50 µg/L Cr(VI) contour lines in groundwater within each depth interval. The California drinking water standard for Cr(T) is 50 µg/L.

Figure 2-5 presents Cr(VI) concentrations for floodplain monitoring wells on a north-south oriented cross section that parallels the Colorado River. The location of cross section B is shown on Figure 2-1. The cross section posts the groundwater Cr(VI) concentration results for sampling events conducted in March, July, and October 2005, and shows the inferred distribution of Cr(VI) in groundwater in the plane of this cross section. As shown on Figure 2-5, Cr(VI) concentrations above 20 µg/L are found in the deep interval of the aquifer in the vicinity of well MW-34-100. At the MW-33 well cluster, Cr(VI) concentrations ranged from 18.6 µg/L (mid-depth interval) to 5.6 µg/L (base of the lower interval). Cr(VI) was not detected above analytical reporting limits in any of the upper, middle, or lower depth wells in the southern well clusters MW-27 and MW-43 during the sampling events performed in March through October 2005.

3.0 Proposed IM Performance Monitoring Modifications

This work plan is focused on 1) expanding the performance monitoring system for the IM extraction system by adding additional gradient control well pairs associated with well PE-1 and 2) providing further characterization of the chromium distribution in the area north of the MW-34 well cluster.

3.1 Gradient Control Well Pairs for Performance Monitoring

Per DTSC letter of February 14, 2005, the successful performance of the IM pumping is measured by achieving a minimum landward gradient of 0.001 feet per foot in a set of three gradient control well pairs centered on the TW-2 pumping location. Gradient control wells are all completed in the deep portion of the aquifer, where Cr(VI) concentrations are most prevalent. When the PE-1 well is brought on line, it will create a second, smaller cone of depression in the floodplain. To continue to assess IM performance based on gradient control wells, new gradient control well pairs will be needed that are appropriately located to measure the gradients in the vicinity of PE-1.

Groundwater model simulations were conducted to evaluate the gradient that will likely exist when both TW-2D and PE-1 are pumping. The model projected groundwater contours with TW-2D pumping 90 gpm and PE-1 pumping 40 gpm are shown on Figure 3-1. Dashed lines on Figure 3-1 denote the existing and proposed new gradient control well pairs, and show the relative alignment of those well pairs in relation to the projected groundwater contours. Ideally, well pairs should be oriented in a line perpendicular to the groundwater level contours to more accurately measure the gradient. Well pairs not aligned perpendicular to the contours will indicate a smaller than actual gradient, and therefore provide a more conservative measure of IM success.

As shown on Figure 3-1, two new wells and two existing wells are proposed to measure the gradient associated with pumping at PE-1. A new well (MW-45, Site B) will be installed approximately 15 feet from PE-1 to provide the central gradient control well for all three well pairs associated with PE-1. A new well (MW-44, Site A) will be installed approximately 170 feet north of PE-1 to provide the northern gradient control pair (with new well MW-45). Ideally, MW-44 would be located in the vegetated area further to the east to align the well pair with the gradient. However, this would involve significant cutting of riparian vegetation and could significantly delay the approval of the project. Consequently, the location for MW-44 is a compromise that is intended to achieve adequate measurement of the gradient without damaging sensitive habitat. If actual gradients created by pumping PE-1 are different than model projections, MW-44 may not be appropriately located to measure the gradients produced by PE-1 pumping. In this event, the central and southern PE-1 gradient control pairs would be used for evaluating the gradients induced by PE-1 pumping.

A third well (MW-46, Site C) is proposed for a location approximately 480 feet east of the TW-2D pumping center (Figure 3-1) to provide additional hydraulic gradient control for performance monitoring. The MW-46 location is selected to supplement the existing performance monitoring wells at the MW-28 cluster. Well MW-28-90, screened at the top of the lower depth interval, is currently the only well used for the deeper gradient control in this area. Accordingly, a deeper monitoring well in this area is proposed to provide additional performance data for gradient control in the lower depth interval.

Existing wells MW-34-100 and MW-27-85 paired with the new MW-45 well will provide central and southern gradient control well pairs for measuring gradients associated with pumping at PE-1. These two well pairs are optimally aligned with the projected groundwater gradients.

With PE-1 pumping, the existing northern and southern gradient control well pairs associated with TW-2 will still be usable. These well pairs comprise MW-33-150/MW-31-135 and MW-42-65/MW-20-130. The northern and southern TW-2 well pairs are slightly off-axis to the gradient because they include wells at the MW-20 and MW-31 locations which are not very close to the pumping center. When well TW-3D begins pumping, consideration should be given to using well TW-2D as the central gradient control well for both MW-33-150 and MW-42-65. This would provide a more accurate measure of the hydraulic gradient around the TW-3D pumping center because the well pairs would be better aligned with the gradient.

3.2 Chromium Distribution in MW-34 Area

A second objective of the current scope of work involves additional characterization of the chromium distribution north and northwest of well MW-34-100. Chromium concentrations in well MW-34-100 have gradually increased over the last several months, from about 400 µg/L to over 700 µg/L. At the MW-34 cluster, Cr(VI) is only present in the deepest well. MW-34-80 screened only 20 feet above MW-34-100 has not shown detectable concentrations of Cr(VI) since March 2004. There is a slight bedrock ridge located in the vicinity of PE-1 that may provide some geologic control on the distribution of Cr(VI) in the deepest portion of the aquifer (Figures 2-2 and 2-3). If this ridge does exert geologic control, the Cr(VI) plume may be confined to the deeper portion of the aquifer in the area north of MW-34-100 where the bedrock is deeper.

Wells at Sites A and C shown on Figures 3-1 and 3-2 are proposed to provide characterization of the distribution of Cr(VI) in the area north of MW-34-100. Site A is located in an area where the Cr(VI) plume could be present in the deep portion of the aquifer around the end of the bedrock ridge. Well MW-44 will be used for hydraulic monitoring for gradient control and further characterization of Cr(VI) distribution.

Site C is located near the MW-28 well cluster. The deep screened interval at well MW-28-90 is at 70 to 90 feet bgs, near the contact between the fluvial and the alluvial sediments. The MW-28-90 screen was placed, in consultation with DTSC, in what was determined to be the deepest permeable zone of the aquifer at this location. Because the drilling met refusal before encountering the hard, unweathered Miocene conglomerate bedrock unit, questions have been raised about the possible presence of a permeable zone between the screened interval of MW-28-90 and the hard bedrock. Drilling at Site C (MW-46) is proposed to

provide additional characterization of the deepest portion of the aquifer, and to augment the MW-28 well cluster.

3.3 Proposed Groundwater Investigation and Well Installation

The scope of work described here includes well installation at three locations. The drilling locations, labeled Sites A, B, and C, are shown on Figure 3-2, along with the proposed access routes and staging areas. Table 3-1 provides the objectives, rationale, and general number of wells at each location. Screened intervals in all wells will be 10 feet in length. This work plan provides general target depths for screened intervals. The actual screened interval depths will be chosen based on review of the lithologic core logs from the pilot borings and the results from the depth specific sampling. The target depth intervals for depth specific sampling and well screens for drilling Sites A and C are shown on hydrogeologic section B (Figure 3-3).

Depth specific sampling will be conducted using an Isoflow® groundwater sampling system. This characterization method was used in the January-February 2005 floodplain drilling program (CH2M HILL 2005c). Samples will be collected using a submersible pump attached to a packer. The packer will be set at the bottom of the drive casing and the pump will draw water from an open section of borehole below the drive casing. Using this method, it is possible to purge and sample a vertically-discrete section of the aquifer during drilling. Field parameters will be measured to determine the electrical conductivity and oxidation reduction potential of the water. A water sample will be collected and analyzed for hexavalent chromium using the HACH onsite laboratory at the IM-3 treatment plant. Water levels will be measured during purging to provide a comparison of relative permeability throughout the borehole. The data from the Isoflow® samples will be used in conjunction with the lithologic logs to select screened intervals for the wells, in consultation with DTSC.

Site A – A total of three well screens will be installed at Site A (to be designated MW-44). The proposed general depth intervals for the well screens and the approximate depths of Isoflow® samples are shown on Figure 3-3. Two of the well screens will be located in the deep portion of the aquifer. The target depths for these screens are just above bedrock, and at a depth similar to MW-34-100. These target depths may be adjusted based on a review of Isoflow® sample results and lithologic logs in consultation with DTSC. A mid-depth well will be installed at Site A at an elevation approximately coincident with MW-34-55. The deepest well screen and the mid-depth well screen at Site A will be installed as nested wells in a common borehole. The upper screen in the deep portion of the aquifer will be installed in a separate borehole.

Site B – One well screen will be installed at Site B (MW-45). The screened interval in this well will be just above the bedrock, similar to extraction well PE-1. The purpose of the well at Site B is to provide water level data for gradient determination. Isoflow® sampling was conducted in the nearby well PE-1, approximately 15 feet away from Site B. Cr(VI) was not detected in any of the six Isoflow® samples collected from PE-1 (CH2M HILL 2005d). No Isoflow® sampling is planned for the boring at Site B.

Site C – One or two well screens will be installed for hydraulic monitoring in the deep portion of the aquifer at Site C (MW-46). The target depth for screens and proposed

Isoflow® sampling depths at this location are shown on Figure 3-3. The number of well screens installed will depend on the geologic conditions encountered. In nearby well MW-28, the deep section of the borehole encountered stiff, weathered Miocene conglomerate that did not appear to be water bearing. If similar conditions are encountered in the deep portion of the borehole at Site C, a single screen may be installed in the overlying alluvium. If a substantial thickness of permeable alluvium is encountered, two well screens will be installed. The target geologic formation for well screens at Site C is the alluvium that underlies the fluvial materials.

Further details about proposed well installation and sampling methodologies are provided in Section 4.

4.0 Drilling, Sampling and Well Installation

4.1 Site Preparation, Materials Staging, and Equipment Access

The proposed access routes and equipment staging areas for this field investigation are shown on Figure 3-2. The drilling equipment access routes on the floodplain are based on the approved access routes described in the final Technical Memorandum addressing access routes for site monitoring activities (CH2M HILL 2005g). The Technical Memorandum summarizes sampling access routes and proposed mitigation measures for the floodplain that were reviewed and field surveyed with representatives of BLM and the Havasu National Wildlife Refuge (HNWR) in June and July 2005. In addition to the primary equipment access route shown on Figure 3-2, a secondary contingency access route is proposed for the Site A and Site B drilling locations. This contingency access route, would be used if other construction, operation, or testing activities in the central floodplain associated with the piping of PE-1 or In-Situ Pilot Study preclude access to these sites from the north.

For all proposed drilling sites shown on Figure 3-2, it is anticipated that no clearing of vegetation will be needed to allow access for drilling equipment. Prior to mobilization of drilling equipment, the proposed access routes and drilling sites will be field-checked and clearly delineated by PG&E, BLM, and CH2M HILL If modifications to the access routes or minor clearing vegetation are needed, additional surveys will be conducted to ensure that no sensitive habitat will be impacted. All field activities associated with the equipment access and well drilling for this project will be coordinated with BLM to ensure the protection of cultural and biological resources.

Site preparation shall take place prior to execution of drilling and monitoring well installation tasks. Site preparation shall include identifying and avoiding biologically and/or culturally sensitive areas and site hazards, to the extent possible. The drill rig shall be cleaned before mobilization to each site and following completion of drilling at each site if visible grease, oil, or other contamination is evident on the equipment. After the drill rig has mobilized into place, short-term staging areas will be established. Plastic sheeting will be laid on the ground surface in the staging areas to keep the drilling materials and equipment clean and to minimize impacts to the ground surface from the drilling materials and equipment. Materials to be stored at the well site include drilling equipment and well construction materials (e.g., casing, sand, bentonite, and grout). Locations of staging areas are shown on Figure 3-2. Additional materials may be stored on PG&E Topock Compressor Station property.

4.2 Drilling and Sampling Activities

Drilling and well installations shall conform to state and local regulations. CH2M HILL will obtain authorizations and applications required for drilling and well installation. Utility clearances will also be obtained prior to commencement of drilling. The drilling, core/borehole logging, and well construction will be performed under the supervision of a

California Professional Geologist. The drilling and well installation activities will be conducted in accordance with methods and standard operating procedures in the *Topock Program Sampling, Analysis and Field Procedures Manual* (CH2M HILL 2005h).

The methods, equipment, and procedures for drilling, logging, and depth specific groundwater sampling are described below. The methods and procedures are based on the successful implementation and experience from the prior drilling programs conducted in the floodplain area in 2005 (CH2M HILL 2005c, 2005d).

4.2.1 Rotosonic Drilling Method

Drilling will be accomplished using the rotosonic drilling technique, which involves advancing a rotating and vibrating drill head or core barrel through the subsurface. This method produces a continuous core from the land surface to target drilling depths (ranging from 40 to 130 feet below ground surface [bgs]), generates minimal drilling wastes, and typically can drill through gravel, cobble, and softer bedrock formations. The continuous core obtained from sonic drilling will facilitate the core logging, sampling, and core preservation requirements for the IM Phase 2 drilling program (CH2M HILL 2005c).

4.2.2 All-terrain Rig with Rotosonic Method

The monitoring wells planned for the floodplain area will require use of track-mounted all-terrain rotosonic drilling equipment. This type of drilling equipment was previously used to install monitoring wells on the floodplain in April and May 2004 and January to March 2005.

To support the all-terrain drilling rig, a tracked or balloon-tired forklift and one or more all-terrain vehicles will be used to transport crew, equipment, and materials from staging areas near the roadways to the drill sites on the floodplain. The forklift will also be used to transport cuttings and excess core generated from drilling the soil borings to lined, steel roll-off soil bins that will be temporarily stored, with permission of the BLM, at staging areas located at the MW-35 area adjacent to Park Moabi Road and on the MW-20 bench (see Figure 3-2). Disposal procedures for the investigation-derived waste (IDW) are discussed in Section 5.

4.2.3 Core Logging

Lithologic descriptions will be logged under the supervision of a California Registered Geologist at each soil boring based on visual inspection of the retrieved core. The field log will document the following information at each soil boring:

- Unique soil boring or well identification
- Purpose of the soil boring (e.g., monitoring well)
- Location in relation to an easily identifiable landmark
- Names of the drilling subcontractor and logger
- Start and finish dates and times
- Drilling method
- If applicable, types of drilling fluids and depths at which they were used
- Diameters of surface casing, casing type, and methods of installation
- Depth at which saturated conditions were first encountered

- Lithologic descriptions (based on the Unified Soil Classification System)
- Sampling-interval depths
- Zones of caving or heaving
- Depth at which drilling fluid was lost and the volume lost
- Changes in drilling fluid properties
- Drilling rate
- Drilling rig reactions, such as chatter, rod drops, and bouncing

Consistent with the Phase 2 IM drilling investigation (CH2M HILL 2005c), the results of the continuous core logging of the pilot borings will be summarized in grain-size core plots for the hydrogeologic characterization and to assist in selecting well screen intervals.

4.2.4 Depth-Specific Groundwater Sampling

Groundwater samples will be collected at discrete depths from the deep boreholes, at Sites A and C (MW-44 and MW-46). The Isoflow® sampler or equivalent will be used for groundwater sample collection. Samples will be collected from a 10-foot open borehole, at 20-foot intervals. Where feasible, a sample will also be collected from the zone just above the bedrock. Table 4-1 summarizes the proposed target sampling depths for depth specific groundwater sampling.

Depth specific samples will be obtained from an open section of borehole below the drive casing either by bailing or by pumping using the Isoflow® vertical aquifer profiling system, a special sampling system designed by the drilling contractor, Prosonic. The sampling pump incorporates a packer that is placed in the bottom of the temporary casing to isolate the open hole below the casing. Attached below the packer is a submersible pump enclosed in a short section of well screen. By using a packer to hydraulically isolate the sampling interval from the water standing in the temporary casing above, the purge volumes can be minimized and representative samples can be obtained from a discrete section of the borehole. An alternative to the hydraulic packer equipped Isoflow® tool, a mechanical "segregation-block" may be used on the Isoflow® pump assembly. The advantage of this method is that the water level response inside the sonic casing can be measured during borehole purging to assess the relative permeability of the open borehole interval (see Section 4.2.5).

Purging will involve pumping one to three borehole volumes from the open borehole interval being sampled and monitoring the field parameters (temperature, pH, electrical conductivity, and oxidation-reduction potential). After the field parameters have stabilized and at least one borehole volume has been removed, groundwater samples will be collected for Cr(VI) analysis. The Cr(VI) analyses will be conducted at the onsite field laboratory currently set up at the IM-3 treatment plant using the HACH colorimetric method. A sufficient quantity of sample will be collected and filtered in the field so that confirmation samples can be sent to a certified laboratory if Cr(VI) is detected in any of the grab samples. Because the time of field sample collection and screening precludes laboratory analysis of these samples within the Cr(VI) 24-hour holding time, the confirmation samples will be run for Cr(T) only. All groundwater grab samples will be filtered in the field prior to preservation and analysis.

4.2.5 Water Level Measurements during Borehole Groundwater Sampling

Additional characterization of the Alluvial Aquifer is proposed as part of the depth specific sampling activity. The Isoflow® sampling system can be configured with a casing "segregation-block" (as opposed to an inflatable packer) to allow the measurement of water levels during 10-foot open hole intervals for qualitative assessment of aquifer permeability. The recording of drawdown response for each zone purged may allow for distinguishing low, medium, and higher permeability zones within the boreholes tested. Drawdown will be measured during pumping with an electronic sounder. Pumping rate will be measured by timing the filling of a bucket or measuring the depth of water in the purge tank. An estimate of specific capacity will be obtained that can provide a relative measure of the permeability of the borehole at the depth of the sample. This is considered screening level data for use in selecting more permeable zones for well screens. It is not considered suitable for more quantitative purposes such as model calibration.

4.2.6 Cased-Well Geophysical Logging

Following installation, cased-well geophysical logging (natural gamma ray and induction) will be conducted in the deep monitoring wells constructed at Site A (MW-44) and Site C (MW-46). This type of geophysical survey provides formation characteristics of the aquifer intervals and can be used for hydrogeologic interpretation and water quality characterization. It may also be useful for selecting the screened interval in the mid depth well at Site A.

4.3 Well Construction Requirements and Specifications

Monitoring wells will be installed and developed sequentially. The design approach for the new performance monitoring wells is outlined in Section 3.3. Table 4-1 provides a summary of the target intervals for depth specific groundwater sampling and well installation at the three drilling sites.

A cluster of three monitoring wells (mid-depth and lower interval completions) are planned at Site A (MW-44). As described in Section 3.3 and Table 4-1, a single-boring, nested well design is proposed for installing the deep and shallow monitoring wells at the MW-44 location. The middle well at this cluster would be installed in a separate boring drilled within 15 feet of the MW-44 pilot boring. A single-completion monitoring well will be installed at Site B (MW-45) to serve as the gradient monitoring well adjacent to extraction well PE-1. At the third location Site C (MW-46), up to two monitoring wells (separate boring well-pair) will be installed in the lower interval of the aquifer.

The final well screen intervals selected in consultation with DTSC based on the lithologic log and results of the depth specific groundwater sampling. Consistent with the existing floodplain wells, the new monitoring wells will be identified by the well number (e.g., MW-44) followed by the bottom depth of the well screen, rounded to the nearest 5 feet (e.g., MW-44-65, screened to a depth of 65 feet bgs).

4.3.1 Well Casing and Screen

All new performance monitoring wells will be constructed with Schedule 40 PVC casing and 10 feet length of factory-slotted well screen. Two-inch diameter PVC wells will be installed for all lower interval monitoring wells, depths anticipated to range from approximately 100 to 160 feet bgs (Table 4-1). The shallowest monitoring well to be installed at the MW-44 location will be constructed of one-inch diameter Schedule 40 casing in a nested well completion with the deeper well. Casing requirements are as follows:

- All casing will be new, unused, and decontaminated
- Glue will not be used to join casing, and casings will be joined only with compatible threads that will not interfere with the planned use of the well
- All PVC will conform to ASTM Standard F 480-88A or the National Sanitation Foundation Standard 14 (Plastic Pipe System)
- The casing will be straight and plumb.

Well screen requirements are as follows:

- All requirements that apply to casing will also apply to well screen, except for strength requirements
- All well screens will be factory slotted, with slot size of 0.020 inch.

The bottom of the screen of the shallow and middle-depth wells will be capped with a threaded blank end-cap (sediment trap).

4.3.2 Borehole Completion Materials

The annular space will be filled with a filter pack, a bentonite seal, or casing grout between the well casing and the borehole wall. In middle and/or shallow interval wells more than 50 feet deep, at least two stainless steel centralizers will be used, one at the bottom and one at the top of the screen.

Filter Pack

The filter pack will consist of No. 3 silica sand (consistent with other monitoring wells completed in the Alluvial Aquifer) and will extend from the bottom of the hole to approximately 2 feet above the top of the well screen. The top of the sand pack will be sounded to verify its depth during placement. Additional filter pack will be placed as required to return the level of the pack to 2 feet above the screen. A minimum 1-foot-thick layer of fine sand will be placed above the No. 3 sand filter pack to minimize the potential for the bentonite slurry (seal) material to invade the filter pack adjacent to the top of the well screen during well construction.

The contractor will record the volume of the filter pack emplaced in the well. Potable water may be used, with the approval of the field geologist, to emplace the filter pack, as long as no contaminants are introduced to the subsurface.

Bentonite Seal and Annular Grout

The bentonite seal requirements are as follows:

- The bentonite seal will consist of at least 2 feet of bentonite between the filter pack and the casing grout
- Only 100 percent sodium bentonite will be used
- Bentonite chips or pellets will be hydrated with potable water if the transition seal is not below the water table, otherwise a bentonite slurry (1 gallon water for 2 pounds bentonite) will be used.

The casing grout requirements are as follows:

- The casing grout will extend from the top of the bentonite seal to ground surface
- The grout will be either a 30 percent solids bentonite grout or a cement mixture in the following proportions:
  - 94 pounds of neat Type I or II Portland or American Petroleum Institute Class A cement
  - Not more than 4 pounds of 100 percent sodium bentonite powder
  - Not more than 8 gallons of potable water
- All grout will be pumped into place using a tremie pipe
- The expected volume of each ingredient in the grout mixture will be pre-calculated and documented

San Bernardino County should be notified at least 2 hours prior to grouting to provide them the opportunity to have a representative onsite during grouting.

4.3.3 Shallow Well MW-44 Construction Requirements

Well shallowest well at MW-44, constructed of 1-inch PVC casing and screen, will be completed in the same borehole (and within the same surface completion) as the deeper 2-inch well at MW-44. The deep well will have the same well screen and filter pack requirements as the other proposed wells. However, because shallower MW-44 well will be part of a double-well completion, the following describes the special requirements applying to this well:

- The casing grout will extend from the top of the deeper MW-44 well bentonite seal to 6 feet below the shallower MW-44 bottom of screen.
- Four feet of bentonite pellets or medium chips will be placed above the casing grout (alternatively, for expediency, medium chips may be used instead of casing grout between the deep and shallow MW-44 well screens).
- One foot of fine sand will be place as transition sand will be placed above the pellet seal.

- The filter pack for shallower MW-44 well will be placed from one foot below to not more than two feet above the shallow MW-44 screen.
- One foot of transition sand will be placed above the shallow MW-44 well filter pack, and a one-foot bentonite pellet seal will be placed above the transition sand.

4.3.4 Surface Completion Requirements

Surface completions for all wells installed in this program will consist of above-ground, steel, locking wellhead monument. A watertight expanding rubber seal type locking cap will be provided for each well. The wellhead monument (steel stovepipe) completion will be placed over the casing and cap and seated in a 3-foot by 3-foot by 4-inch-thick concrete pad. The ground surface will be freed of grass and scoured to a depth of 4 inches before setting the concrete pad. The diameter of the sleeve or stovepipe will be at least 4 inches greater than the diameter of the casing. The concrete pad will be sloped away from the well sleeve. The identity of the well will be permanently marked on the casing cap and the protective sleeve.

All wells will be secured as soon as possible after drilling by using corrosion-resistant locks. The locks will be keyed for opening with one master key.

4.3.5 Well Development

Within 24 to 72 hours following well construction and annular seal placement, the monitoring wells will be developed using a combination of surge block, bailer, and pumping. During development, temperature, pH, specific conductance, and turbidity will be measured using field instruments. Well development will continue until field parameters stabilize and turbidity is reduced to less than 50 nephelometric turbidity units. The purge water produced during well development will be collected in portable tanks or drums at the drill site and transferred to cuttings bins or storage tanks in the staging area. Disposal procedures for the IDW are discussed in Section 5.

4.3.6 Well Surveying and Completion Diagram

Following surface completion, all new monitoring wells will be surveyed for well datum elevation and location. In addition to the lithologic core logs to be prepared for all pilot borings (Section 4.2.3), a well completion diagram will be prepared for each monitoring well installed. It will include the following information:

- Well identification
- Drilling method
- Installation date(s)
- Elevations of ground surface and the measuring point
- Total boring depth
- Lengths and descriptions of the screen and casing

- Lengths and descriptions of the filter pack, bentonite seal, casing grout, and any back filled material
- Depth to groundwater in the constructed well.

4.4 Initial Groundwater Sampling

All new IM performance monitoring wells shall be sampled within approximately 10 days after well development using a temporary adjustable-rate submersible pump (2-inch wells) and peristaltic pump (1-inch well). The wells will be purged and sampled using the casing-volume method purge rates be selected to obtain representative groundwater samples from the aquifer zone and be consistent with the existing monitoring wells in the floodplain.

The groundwater samples collected from the new monitoring wells will be analyzed for Cr(VI), dissolved Cr(T), total dissolved solids, specific conductance, chloride, sulfate, alkalinity, carbonate/bicarbonate, nitrate, calcium, magnesium, potassium, sodium, and stable isotopes oxygen 18 and deuterium. Field water quality parameters (temperature, pH, specific conductance, oxidation-reduction potential, dissolved oxygen, and turbidity) will also be measured and recorded.

Initial groundwater sampling activities will follow the procedures, analytical methods, reporting limits, and quality control plan described in the *Topock Program Sampling, Analysis, and Field Procedures Manual*, dated March 2005 (CH2M HILL 2005h). The Cr(VI) and Cr(T) samples will be filtered in the laboratory before analysis consistent with prior IM field investigations and the groundwater monitoring program.

Following initial sampling, the new wells will be incorporated in the Topock groundwater monitoring program and hydraulic monitoring (pressure transducer) network used for the IM performance monitoring program.

5.0 Waste Management and Decontamination

5.1 Waste Management

Several types of waste materials will be generated during the drilling, development, and sampling of the performance monitoring wells. IDW materials that will be generated include groundwater, drill cuttings, and incidental trash.

Water generated during drilling, development, and sampling activities will be collected in bins or portable storage tanks temporarily located on the MW-20 bench. Secondary containment will be set-up at the drilling area for the portable storage tanks or bins. Water generated from the monitoring well installations will be introduced to the IM-3 treatment facility, or transported offsite to a permitted disposal facility.

Drill cuttings include the fragments of rock and soil that are removed to create the borehole. The cuttings will be contained in lined roll-off bins at the staging areas during the drilling and sampling activities (see Figure 3-2). After sampling and characterization, all cuttings bins will be removed from the staging areas for disposal in a permitted offsite disposal facility. It is estimated that the soil IDW bins temporarily stored in the staging areas will not remain in excess of 45 days.

Incidental trash will be collected at the end of each drilling shift and hauled from the drill site to an appropriate offsite disposal facility.

5.2 Equipment Decontamination

The back of the track-mounted drilling rig and all down-hole drilling tools will be decontaminated prior to arrival at the site and subsequent to finishing the well installation. Decontamination will be accomplished by steam cleaning the core barrel, drill stem, drive casing, and back of the drilling rig. With BLM approval, the pre- and post-mobilization steam cleaning will be conducted on a temporary decontamination pad (lined plastic-sheeting) located on the MW-20 bench (Figure 3-2). Rinsate from the decontamination operation will be collected on the containment pad and transferred to the cuttings bin or purge water tanks located on the north end of the MW-20 bench. The decontamination rinsate will be managed along with the cuttings or purge water. Between borings, the sonic well casing, core barrel, and down-hole tools will be steam-cleaned at the temporary decontamination pad on the MW-20 bench or on the PG&E Topock Compressor Station property.

6.0 Approvals and Authorizations

Table 6-1 summarizes the anticipated approvals and authorizations applicable to the drilling and installation of new IM performance monitoring wells on the BLM-managed floodplain at the Topock site, subject to agency concurrence. Refer to Figure 3-1 for the locations and proposed access routes to the drilling sites addressed in this work plan. All applicable and necessary approvals and authorizations will be documented prior to moving drilling equipment to the drilling sites.

The project area lies within a larger area of significant cultural, biological, and tribal sacred site resources and all activities outlined in this workplan will be conducted in a manner which recognizes and respects these resources. In addition, the Colorado River itself is of spiritual and cultural importance to local tribes. All field work will be planned and conducted in a manner which recognizes the importance of these resources. It is anticipated that mitigation measures identified for previously authorized activities (i.e., stipulations listed by the BLM Lake Havasu Field Office Action Memorandum 3) remain in effect, subject to further BLM/DTSC direction. Because cultural resources surveys have been conducted and have not identified any cultural resources within or near the project area, it is anticipated that an onsite cultural resources monitor will not be required during the well construction and completion activities described in this work plan. Prior to the start of any ground-disturbing activities, a qualified biologist will be conduct a 'pre-activity' survey. If no significant biological resources are found at that time, an on-site biological monitor will not be required during the outlined activities.

7.0 Schedule and Reporting

The schedule for the drilling and installation of the additional IM performance monitoring wells is provided in Table 7-1. The implementation schedule is subject to obtaining approvals and authorizations from DTSC, BLM, and other agencies. The investigation field work will be conducted during daylight hours.

Following completion of the fieldwork, a summary report will be prepared to document the well installation and the results of initial sampling of the new IM performance monitoring wells. The report will include the drilling, depth specific groundwater sampling, well completion, well development, and initial groundwater sampling results and records. The field activities summary report will be submitted approximately 6 weeks after the completion of the initial well sampling.

8.0 References

California Department of Toxic Substances Control (DTSC). 2005a. Letter to PG&E. "Criteria for Evaluating Interim Measures Performance Requirements to Hydraulically Contain Chromium Plume in Floodplain Area." February 14.

_____. 2005b. Letter to PG&E. "Conditional Approval of Final Installation Work Plan and Design Plan for Conveyance Piping and Power Supply for Extraction Well TW-3D, Pacific Gas and Electric Company, Topock Compressor Station". October 17.

CH2M HILL. 2005a. Draft Performance Monitoring Plan for Interim Measures in the Floodplain Area, *PG&E Topock Compressor Station, Needles, California.* April 15.

_____. 2005b. *Draft RCRA Facility Investigation / Remedial Investigation Report, Topock Compressor Station.* February 28.

_____. 2005c. *Interim Measure Phase 2 Monitoring Well Installation Report, PG&E Topock Compressor Station, Needles, California.* May 2.

_____. 2005d. *Groundwater Extraction Well PE-1 Installation Report, PG&E Topock Compressor Station, Needles, California.* March 31.

_____. 2005e. *Performance Monitoring Report for September 2005, PG&E Topock Compressor Station, Needles, California.* October 14.

_____. 2005f. *Performance Monitoring Report for October 2005 and Quarterly Performance Evaluation, August through October 2005, PG&E Topock Compressor Station, Needles, California.* November 30.

_____. 2005g. Technical Memorandum: *PG&E Topock Project: Review of Access Routes for Groundwater and Surface Water Data Collection Locations, and Proposed Mitigation Measures.* September 14.

_____. 2005h. *Topock Program Sampling, Analysis, and Field Procedures Manual, Revision 1, PG&E Topock Compressor Station, Needles, California.* March 31.

Tables

TABLE 3-1
Proposed Drilling and Well Installation Activities
Well Installation Work Plan for IM Performance Monitoring Program
PG&E TopockCompresor Station

Drill Site ID Location	Objective	Proposed Activities	Rationale
Site A (MW-44)	Gradient Monitoring Well Pair	Continous-core hydrogeologic logging	New well required for PE-1 performance monitoring
170' north of PE-1	Delineation & Characterization	Depth-discrete groundwater sampling	Delineate plume limit northwest of MW-34-100
		Install 3 monitoring wells (mid-depth & lower intervals)	
		Initial water quality characterization	
		Incorporate wells in hydraulic monitoring network	
Site B (MW-45)	Gradient Monitoring Well Pair	Selected-core hydrogeologic logging	New well required for PE-1 performance monitoring
15' east of PE-1		Install 1 monitoring well (lower interval)	
		Initial water quality characterization	
		Incorporate well in hydraulic monitoring network	
Site C (MW-46)	Hydraulic Gradient Control	Continous-core hydrogeologic logging	New well needed for better control on gradient mapping in lower aquifer interval
90' west of MW-28	Delineation & Characterization	Depth-discrete groundwater sampling	
		Install 1 to 2 monitoring wells (lower interval)	
		Initial water quality characterization	
		Incorporate wells in hydraulic monitoring network	

NOTES:

See Figures 3-1 and 3-2 for location of proposed drilling sites.

TABLE 4-1
Drilling and Sampling Plan
Well Installation Work Plan for IM Performance Monitoring Program
PG&E TopockCompresor Station

Drill Site ID Location	Approximate Surface Elevation feet MSL	Estimated Depth Miocene Bedrock feet bgs	Core Logging and Sampling - Pilot Hole			Proposed Well Installations	
			Target Drilling Depth feet bgs	Interval for Core Log & Archive feet bgs	Intervals Targeted for Groundwater Grab Sampling feet bgs	Alluvial Aquifer Completion	Well Construction
Site A (MW-44) 170' north of PE-1	467	120	130	20 - total depth	46 - 56 66 - 76 86 - 96 106 - 116 total depth	 Mid-Depth Interval Lower Interval Base Lower Interval	 1" PVC - 10' screen 2" PVC - 10' screen 2" PVC - 10' screen
Site B (MW-45) 15' east of PE-1	470	95	105	70 - total depth	no sampling location characterized	Lower Interval	2" PVC - 10' screen
Site C (MW-46) 90' west of MW-28	472	160	170	20 - total depth	46 - 56 66 - 76 86 - 96 106 - 116 126 - 136 146 - 156 total depth	 Lower Interval Base Lower Interval install 2nd well pending groundwater grab sample results	 2" PVC - 10' screen 2" PVC - 10' screen

NOTES:

1. See Figure 3-2 for proposed locations for drilling sites and Figure 3-3 for target intervals for depth-specific groundwater sampling and screen selection
2. Depth-specific groundwater grab samples to be collected from 10-foot open-borehole intervals using Isoflow ™ system
   Target intervals are listed for general planning and subject to drilling conditions.
3. Groundwater grab samples will be analyzed for Cr(VI) with IM-3 treatment plant laboratory (HACH analytical method) and field water quality parameters.
   Supplemental groundwater samples (field-filtered and preserved) will be collected for Cr(T) laboratory analysis if confirmation of Cr(VI) HACH method results is required.
4. Well screen intervals will be selected in consultation with DTSC based on core log and results of groundwater grab sampling.

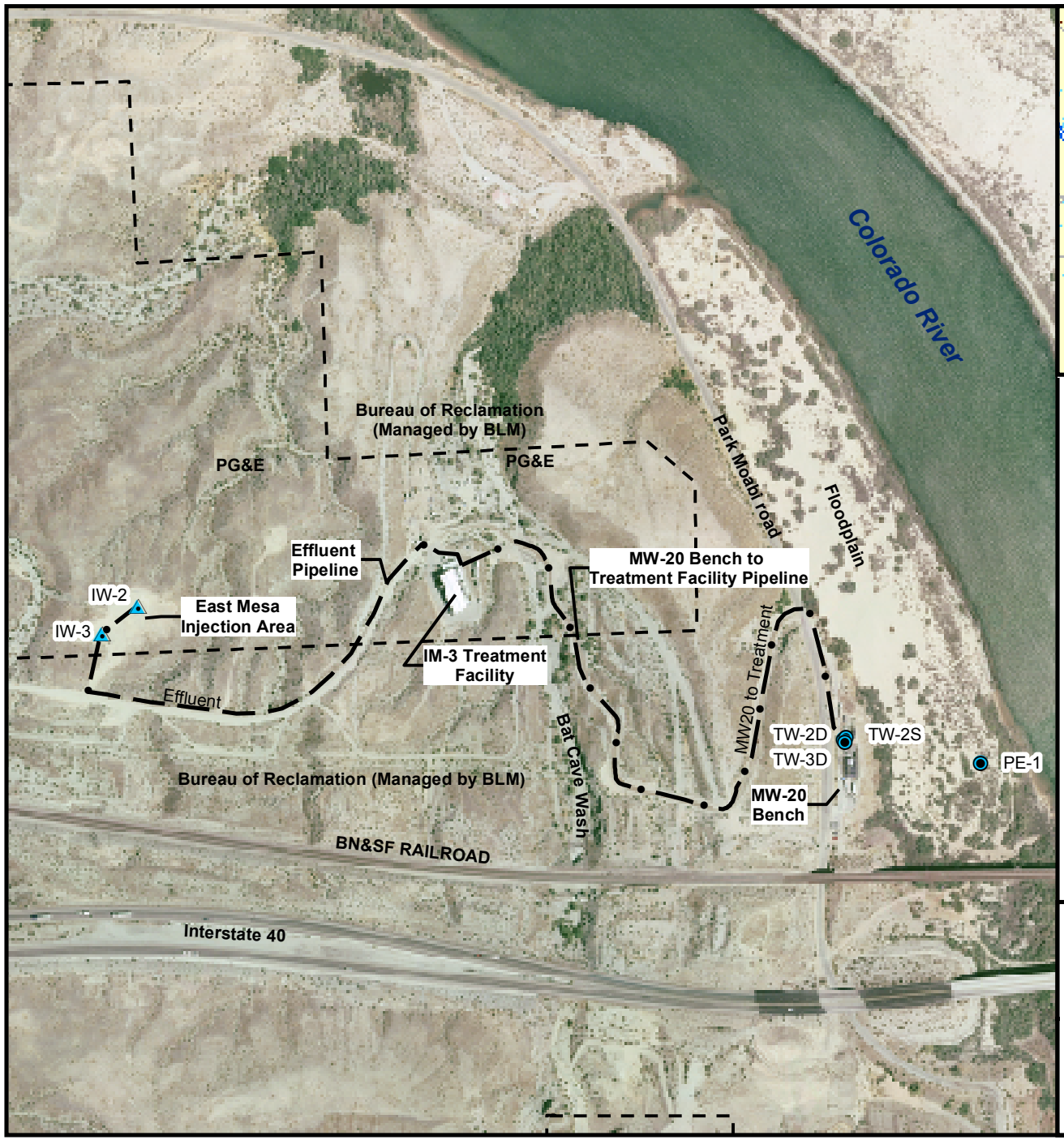
TABLE 6-1
Approvals and Authorizations for Additional Performance Monitoring Wells
Well Installation Work Plan for IM Performance Monitoring Program
PG&E Topock Compressor Station, Needles, California

Agency	Approvals and Authorizations
U.S. Bureau of Land Management	BLM Action Memorandum dated March 3, 2004 authorized additional groundwater wells. Approval letter from BLM Lake Havasu Field Office required, subject to consultations with tribes, SHPO, and USFWS (see below).
California DTSC	CEQA compliance will be determined based on review of the proposed activities described in this work plan.
California Department of Fish and Game	Streambed Alteration Agreement required pursuant to Fish and Game Code Section 1600 et seq.
U. S. Fish and Wildlife Service	BLM to consult with USFWS in accordance with Section 7 of the Endangered Species Act.
State Historic Preservation Office	May include Tribal consultation followed by SHPO consultation.
San Bernardino County	Well drilling approvals

TABLE 7-1
Project Implementation Schedule
Well Installation Work Plan for IM Performance Monitoring Program
PG&E Topock Compressor Station, Needles, California

Activity	Duration
Site Preparation and Driller Mobilization	Within 10 days of DTSC and BLM approvals
Drilling, Hydrogeologic Characterization, and Well Installation (total six wells at three drilling sites)	4 weeks
Initial Groundwater Sampling (six wells)	2 days
Field Activities Summary Report	6 weeks from completion of initial groundwater sampling

Figures



N

0 550 1,100 Feet

1 inch equals 550 feet

LEGEND

PG&E Property Line

Existing IM Extraction Well

Existing IM Injection Well

Notes: Location map shows Interim Measures No.3 (IM-3) wells as of of November 2005. Aerial photography taken May 2005.

FIGURE 1-1
LOCATIONS OF IM-3 GROUNDWATER EXTRACTION, CONVEYANCE, AND TREATMENT FACILITIES

WELL INSTALATION WORK PLAN FOR
IM PERFORMANCE MONITORING PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

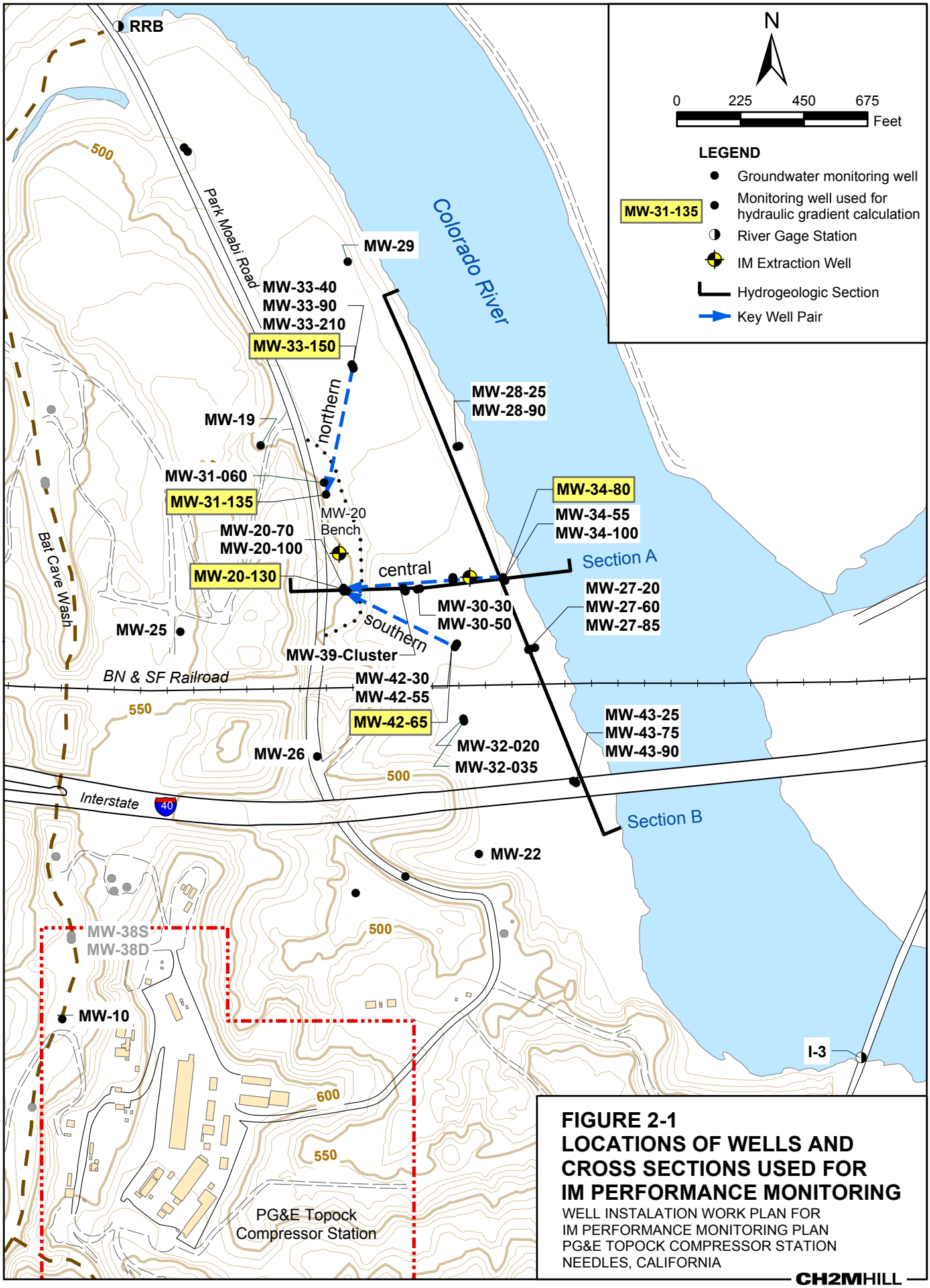


FIGURE 2-1
LOCATIONS OF WELLS AND CROSS SECTIONS USED FOR IM PERFORMANCE MONITORING

WELL INSTALATION WORK PLAN FOR
IM PERFORMANCE MONITORING PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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IMPM_WELLS_SECTIONS_8X11.PDF 11/30/2005 10:18:25

West

East
Section A

TW-2S
TW-2D
projected: 140'

TW-3D
projected: 130'

MW-20 Cluster

MW-39 Cluster

MW-30-30
MW-30-50

MW-36 Cluster

PE-1
projected: 20'

MW-34-55
MW-34-80
MW-34-100

Colorado River

static water level (no pumping)

ALLUVIAL AQUIFER

Upper Depth Interval

Middle Depth Interval

Lower Depth Interval

Approximate geologic contact between alluvial fan (west) and fluvial deposits (east)

132'

157'

180'

67'

118'

108'

105'

116'

?

Miocene Conglomerate (Bedrock)

Elevation (feet above MSL)

550
500
450
400
350
300
250

0
100
200
300
400
500
600
700

Distance (feet)

Current (Nov. 2005) Extraction:
TW-2D at approx 95 gpm.
TW-3D to be operational and
supplement TW-2D pumping Dec. 2005.

True-Scale (No Vertical Exaggeration)

water level
well screen
Top of cemented Miocene bedrock formation
boring depth (feet) 103

Notes:
See Figure 2-1 for cross-section location

FIGURE 2-2
EAST-WEST FLOODPLAIN HYDROGEOLOGIC SECTION A

WELL INSTALLATION WORK PLAN
FOR IM PERFORMANCE MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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N

0 300 600

Feet

LEGEND

- Monitoring Well (Deep Boring)
- Exploration Boring
- Groundwater Supply or Test Well
- Groundwater Extraction Well
- Bedrock elevation contour, dashed where inferred
- 436 — Elevation of Top Miocene Conglomerate (cemented bedrock formation) feet above mean sea level (MSL)
- (est) 330 — Bedrock elevation estimated

Colorado River

River elevation typically ranges from 453 to 457 feet MSL

Park Moabi Road

Bat Cave Wash

BN & SF Railroad

Interstate 40

Miocene Bedrock at Surface

PG&E

PG&E

PG&E Topock Compressor Station

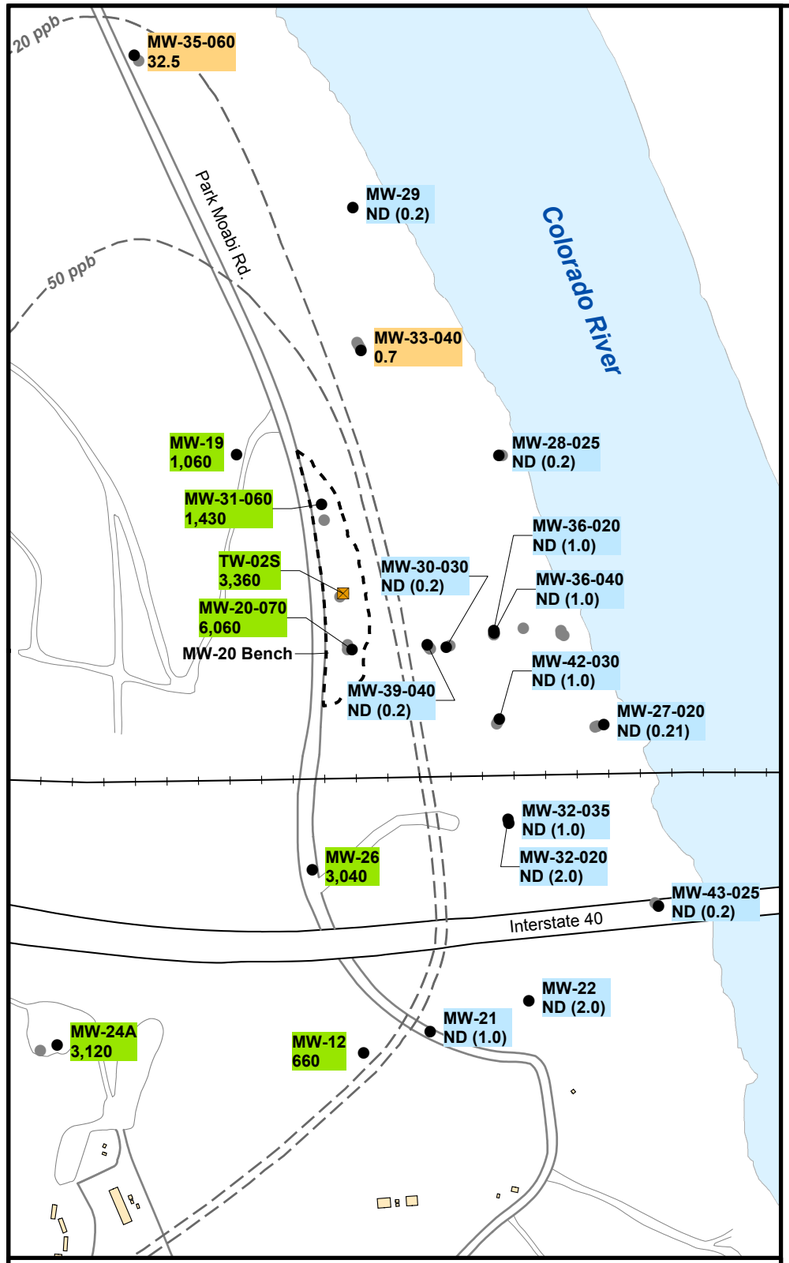
MW-35-135 (est) 245
MW-41D 177
MW-37D 284
MW-19 (est) 310
MW-28-90 (est) 305
MW-31-135 (est) 330
MW-20 Bench
TW-2D 347
MW-20-130 (est) 350
MW-39-100 357
MW-36-100 369
MW-34-100 361
PE-1 378
PE-1A 378
MW-27-85 372
PE-1B 381
MW-25 (est) 320
MW-32-35 424
MW-26 (est) 370
MW-43-90 369
MW-40D 325
MW-22 446
MW-21 450
MW-12 436
MW-23 504
MW-38D 338
TW-1 350
XMW-9 475

200 225 250 275 300 325 350 375 400 425 450 475

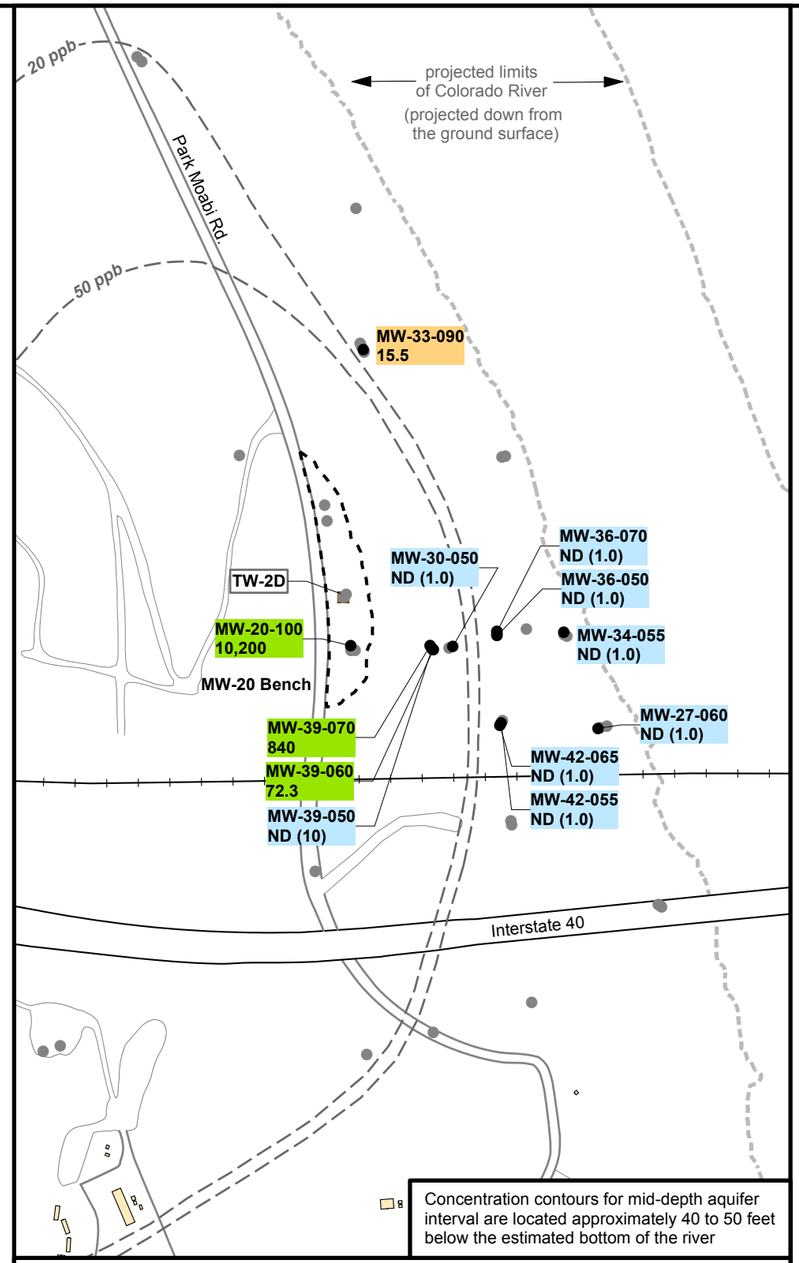
FIGURE 2-3
ELEVATION CONTOUR MAP FOR TOP OF MIOCENE BEDROCK

WELL INSTALATION WORK PLAN FOR
IM PERFORMANCE MONITORING PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

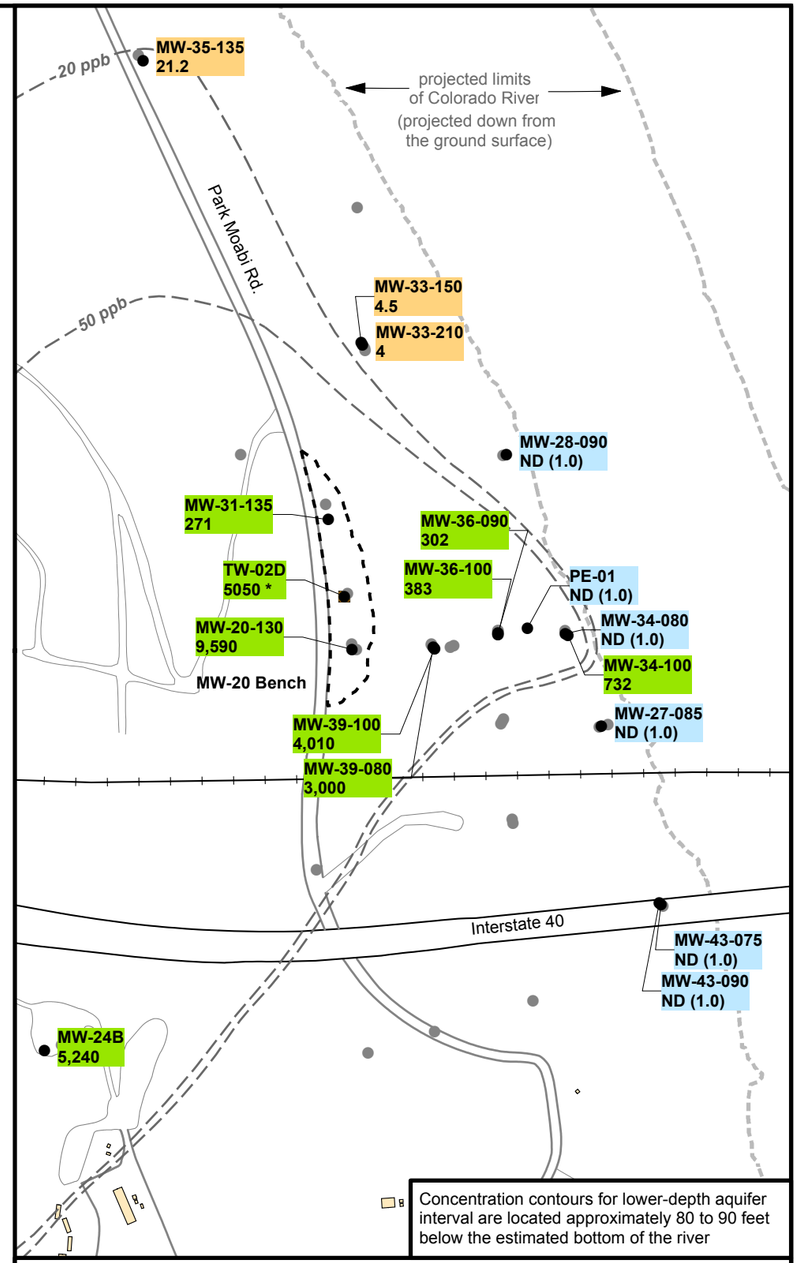
CH2MHILL



Shallow Wells (Upper Depth Interval)



Intermediate Wells (Middle Depth Interval)



Deep Wells (Lower Depth Interval)

ND (1) Not detected at listed reporting limit (ppb)

41 Less than 50 ppb

3,810 Greater than 50 ppb

— · 50 — · Inferred Cr(VI) concentration contour

Notes:
Results plotted are from primary samples for monitoring event.
Results marked * are from the June 2005 sampling event. All other results are from the October 2005 quarterly sampling event.

Hexavalent Chromium Concentrations in Groundwater
October 2005 Quarterly Sampling Event

Concentrations in micrograms per liter (µg/L)
equivalent to parts per billon (ppb)
ND = not detected at listed reporting limit.

N

0 400 800 Feet

1 inch equals 400 feet

FIGURE 2-4
CR(VI) CONCENTRATIONS IN ALLUVIAL AQUIFER, OCTOBER 2005

WELL INSTALATION WORK PLAN FOR
IM PERFORMANCE MONITORING PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

North

South
Section B

MW-33 wells
projected 200' onto line of section

MW-33-40
MW-33-90
MW-33-150
MW-33-210

Cross-Section Parallel to the Colorado River

BN & SF
Railroad

I-40
Bridge

MW-28-25
MW-28-90
projected: 40'

MW-34-55
MW-34-80
MW-34-100

MW-27-20
MW-27-60
MW-27-85

MW-43-25
MW-43-75
MW-43-90

water table (average 454' MSL)

Upper Depth Interval

Middle Depth Interval

Lower Depth Interval

ALLUVIAL AQUIFER

Oldest Alluvium (Toa)

Approximate geologic contact between alluvial fan and fluvial deposits

Miocene Conglomerate (Bedrock)

MW-33-40	MW-28-25	MW-34-55	MW-27-20	MW-43-25
ND (1.0)	ND (0.2)	ND (1.0)	ND (0.2)	ND (0.2)
ND (1.0)*	ND (0.2)	ND (1.0)	ND (0.2)	ND (0.2)*
0.7	ND (0.2)	ND (1.0)	ND (0.21)	ND (0.2)
18.6	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
16.1	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
15.5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
ND (1.0)		ND (1.0)	ND (2.0)	ND (1.0)
5.2		ND (1.0)	ND (1.0)	ND (2.0)
4.5		426	ND (1.0)	ND (1.0)
1.4		617		
5.6		732		
4.0				
237'	148'	116'	107'	97'

20 50 500

Elevation (feet above MSL)

560 540 520 500 480 460 440 420 400 380 360 340 320 300 280 260 240

-200 0 200 400 600 800 1,000 1,200 1,400 1,600 1,800

Distance (feet)

water level

well screen

Top of cemented Miocene bedrock formation

boring depth (feet)

Mar-05
July-05
Oct-05

103'

50 Inferred Hexavalent Chromium concentration contour

Hexavalent Chromium concentration in micrograms per liter (ug/L) equivalent to parts per billion (ppb)

ND (1)	Not detected at listed reporting limit (ppb)
42	Less than 50 ppb
3,810	Greater than 50 ppb

Notes:
See Figure 2-1 for cross-section location.
Results marked * are from June 2005 sampling events.

FIGURE 2-5
CR(VI) CONCENTRATIONS
FLOODPLAIN CROSS-SECTION B
MARCH, JULY, AND OCTOBER 2005

WELL INSTALLATION WORK PLAN
FOR IM PERFORMANCE MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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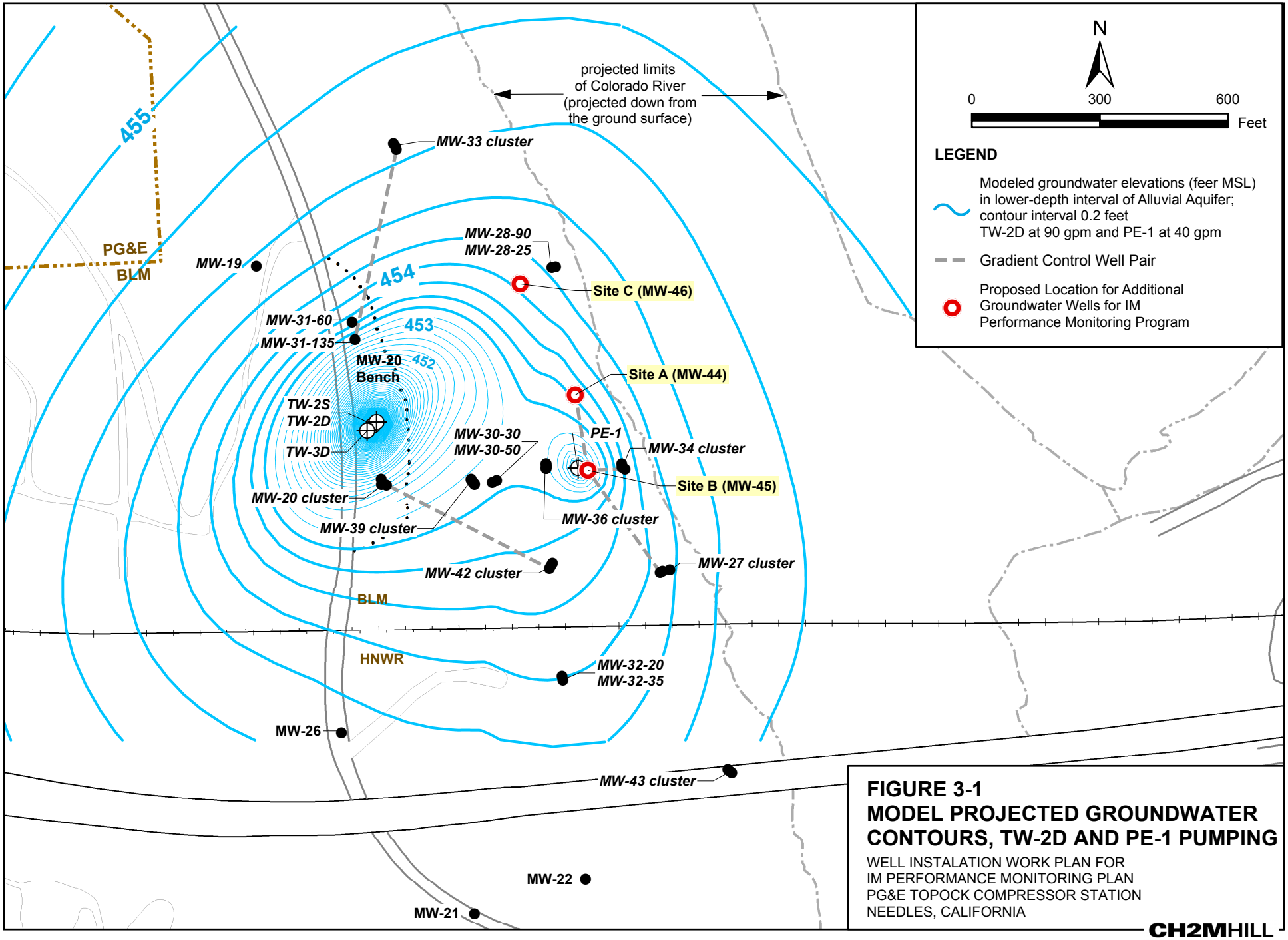

FIGURE 3-1
MODEL PROJECTED GROUNDWATER CONTOURS, TW-2D AND PE-1 PUMPING

WELL INSTALATION WORK PLAN FOR
IM PERFORMANCE MONITORING PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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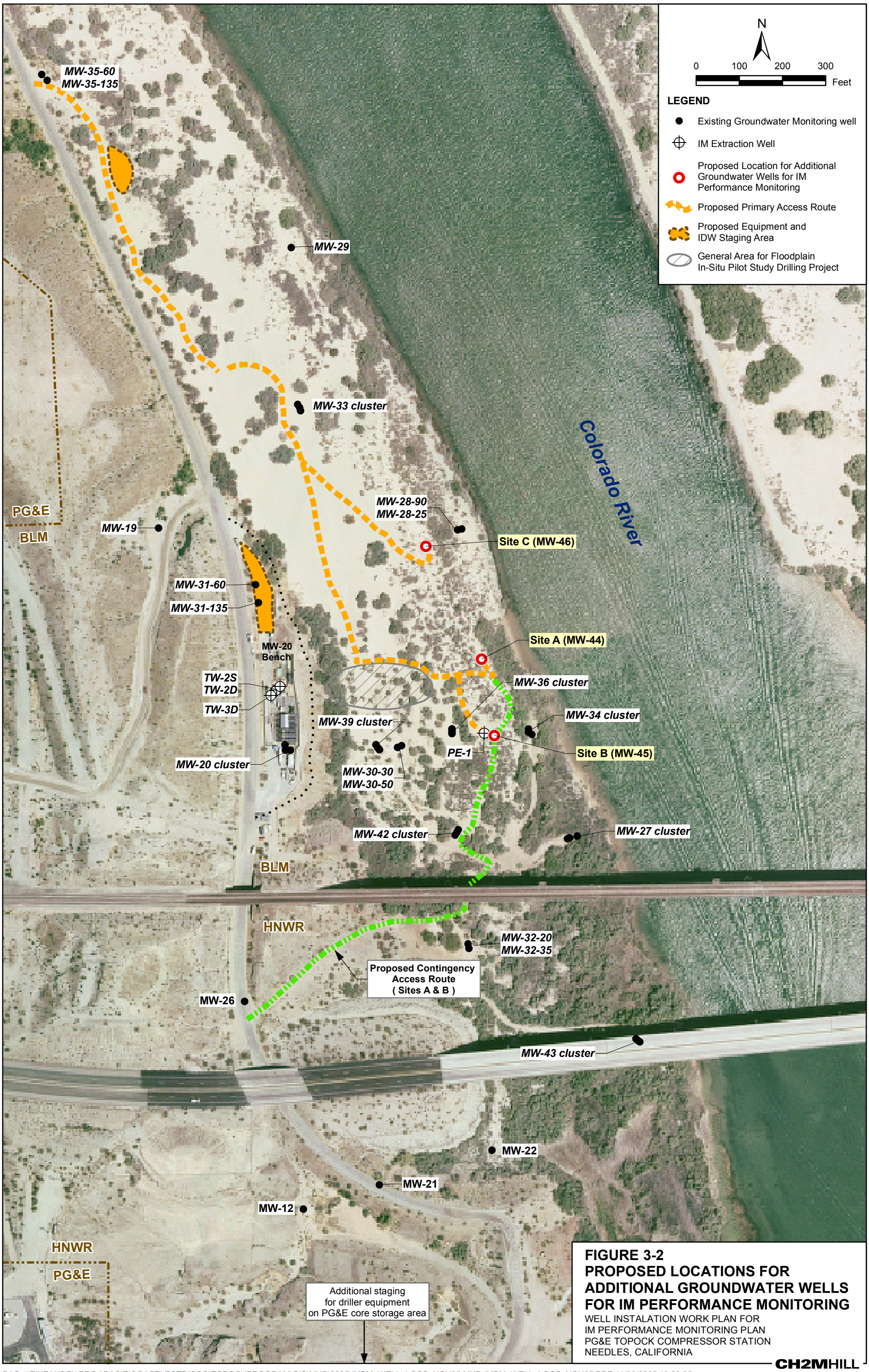

FIGURE 3-2
PROPOSED LOCATIONS FOR ADDITIONAL GROUNDWATER WELLS FOR IM PERFORMANCE MONITORING

WELL INSTALATION WORK PLAN FOR
IM PERFORMANCE MONITORING PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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North

South
Section B

Cross-Section Parallel to the Colorado River

MW-33 wells
projected 200' onto line of section

MW-33-40
MW-33-90
MW-33-150
MW-33-210

Site C
projected 90' onto line of section

Proposed
MW-46
(1 to 2 wells)

MW-28-25
MW-28-90

projected: 40'

Site A

Proposed
MW-44
(3 wells)

MW-34-55
MW-34-80
MW-34-100

BN & SF
Railroad

MW-27-20
MW-27-60
MW-27-85

I-40
Bridge

MW-43-25
MW-43-75
MW-43-90

water table (average 455' MSL)

Upper Depth
Interval

Middle Depth
Interval

Lower Depth
Interval

ALLUVIAL AQUIFER

Oldest Alluvium (Toa)

Approximate geologic contact
between alluvial fan
and fluvial deposits

20
50
500

237'
148'
170'
target
130'
target
116'
107'
97'

Miocene Conglomerate (Bedrock)

Elevation (feet above MSL)

560 540 520 500 480 460 440 420 400 380 360 340 320 300 280 260 240

-200 0 200 400 600 800 1,000 1,200 1,400 1,600 1,800

Distance (feet)

water level
Inferred Hexavalent Chromium Contour — 50
well screen
Top of cemented Miocene bedrock formation
boring depth (feet) — 103'

Proposed Characterization Boring and New Wells

Target interval for installing performance monitoring well(s) (10-foot screen)

Approximate Intervals Targeted for Groundwater Isoflow Sampling

target drilling depth — 130' target

FIGURE 3-3
PROPOSED LOCATIONS FOR ADDITIONAL PERFORMANCE MONITORING WELLS AT SITE A AND SITE C

WELL INSTALLATION WORK PLAN
FOR IM PERFORMANCE MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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Appendix B
IM No. 2

Appendix B1:
IM No. 2 Final Work Plan

Pacific Gas and Electric Company

WE DELIVER ENERGY.

Robert C. Doss, P.E.
Principal
Site Remediation
Environmental Support
and Services

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March 3, 2004

Mr. Aaron Yue
Project Coordinator
California Department of Toxic Substances Control, Region 4
Geology and Corrective Action Branch
5796 Corporate Avenue
Cypress, California 90630

Subject: Interim Measures Workplan Number 2
PG&E Topock Compressor Station, Needles, California

Dear Mr. Yue:

Enclosed is the Interim Measures Workplan Number 2 (Workplan) for the Topock project, which has been revised to reflect the final comments of the U. S. Department of the Interior/Bureau of Land Management (BLM) received this morning.

Copies of this revised Workplan will be delivered by overnight Federal Express to BLM for their use in preparing and approving the Action Memorandum.

If you have any questions, please do not hesitate to call me.

Sincerely,

Robert C. Doss

Enclosure:
Final Interim Measures Workplan No. 2

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Final Interim Measures Workplan No. 2 Topock Compressor Station Needles, California

Prepared for

Department of Toxic Substances Control

On behalf of

Pacific Gas and Electric Company

March 2, 2004

CH2MHILL

This document was prepared by CH2M HILL under the supervision of:

Julie Eakins, P.E.
No. C47243

CH2M HILL
155 Grand Avenue, Suite 1000
Oakland, California 94612

March 2004

I certify that the information contained in or accompanying this submittal is true, accurate, and complete. As to those portions of this submittal for which I cannot personally verify the accuracy, I certify that this submittal and all attachments were prepared at my direction accordance with procedures designed to assure that qualified personnel properly gathered and evaluated the information submitted. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations

Robert C. Doss

Robert C. Doss, P. E.
Principal, Site Remediation
Pacific Gas & Electric Company
March 2, 2004

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1-2 Interim Measure Area of Hydraulic and Gradient Control

2-1 Location of Hydrogeologic Sections

2-2 Hydrogeologic Section A-A′ Groundwater Sampling Results June – December 2003

2-3 Hydrogeologic Section B-B′ Groundwater Sampling Results June – December 2003

2-4 Hexavalent Chromium Sampling Results – December 2003

3-1 Interim Measures Location Map

3-2 Schematic Diagram of Interim Measure at MW-20 Cluster

Appendix

A Preliminary O&M Inspection Forms

Acronyms and Abbreviations

BLM	Bureau of Land Management
CACA	Corrective Action Consent Agreement
CMS	Corrective Measures Study
CCR	California Code of Regulations
CRBRWQCB	Colorado River Basin Regional Water Quality Control Board
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
CWG	Consultative Workgroup
DTSC	Department of Toxic Substances Control
gpm	gallons per minute
IDW	investigation-derived waste
IM	Interim measures
IMWP	Interim Measures Work Plan
mg/L	milligrams per liter
MWD	Metropolitan Water District
O&M	operations and maintenance
PG&E	Pacific Gas and Electric Company
RFI	RCRA Facility Investigation
ROW	right-of-way
STLC	Soluble threshold limit concentration
TDS	total dissolved solids
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). In a letter dated February 9, 2004, DTSC directed PG&E to prepare immediately an Interim Measures Workplan Number (No.) 2 to address pumping, transport, and disposal of groundwater from existing monitoring wells at the MW-20 cluster. The DTSC determined that immediate action is required to prevent and/or mitigate potential impacts to the Colorado River pursuant to the Section IV.A. of the Corrective Action Consent Agreement (CACA) between DTSC and PG&E.

By Action Memorandum, Dated March 3, 2004, the Arizona State Director, United States Bureau of Land Management (BLM), has authorized PG&E to conduct a time-critical removal action encompassing this groundwater extraction and other specified activities on BLM-managed property pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

This Interim Measures Workplan (IMWP) No. 2 describes the components to implement the specific actions prescribed by the DTSC in the February 9, 2004 letter to PG&E, and authorized by the BLM Action Memorandum. Pumping of the MW-20 cluster is considered the first phase of interim remedial measures. Additional groundwater extraction, as defined in the IMWP No. 1 (submitted to the DTSC on February 11, 2004 [CH2M HILL, 2004]) will be initiated, subject to BLM review and authorization, if pumping from the MW-20 cluster does not meet the objectives of the interim measures.

This IMWP follows the guidelines provided in Chapter 4 of the DTSC Corrective Action Orientation Manual (DTSC, 1994). The IMWP includes the following main components: 1) project background and objectives of the IM; 2) the conceptual site model; 3) a description and rationale for the proposed IM; 4) project management and schedule; and 5) a description of required related activities, including additional data collection, waste management, required authorizations, and monitoring. An evaluation of IM alternatives is not included due to the specific nature of DTSC's directive. A complete evaluation of remedial alternatives will be performed as part of the Corrective Measures Study.

Assisting DTSC and PG&E with the planning and review of interim remedial measures are the members of the Topock Consultative Workgroup (CWG), constituted under California's Site Designation Process, and consisting of representatives of DTSC, the Colorado River Basin Regional Water Quality Control Board (CRBRWQCB), Metropolitan Water District of Southern California (MWD) and the various federal agencies who own or manage land overlying the chromium plume. If required, further details necessary to implement IM activities will be submitted following review of this document by the CWG and DTSC and upon IMWP approval by the DTSC.

1.1 Project Background

The Topock Compressor Station is located in San Bernardino County, approximately 15 miles to the southeast of Needles, California (Figure 1-1). In February 1996, PG&E and DTSC entered into a CACA pursuant to Section 25187 of the California Health and Safety Code. Under the terms of the CACA, PG&E was directed to conduct a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and to implement corrective measures to address constituents of concern released in the Bat Cave Wash Area near the PG&E Topock Compressor Station. The primary constituents of concern at Topock are hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]. The source was Cr(VI) salts used historically as a corrosion inhibitor in the station's cooling towers. DTSC is the lead administering agency for the project.

PG&E is currently proceeding with the corrective measures process to select and implement a long-term remedy for the site. PG&E submitted the Corrective Measures Study (CMS) Workplan in December 2002, pursuant to the RCRA corrective action process and in accordance with the DTSC CACA. The DTSC approved the CMS Workplan in June 2003.

Beginning in August 2003, DTSC and PG&E began working in a collaborative process with affected and interested agencies through a CWG. CWG members include:

- CRBRWQCB
- United States Fish and Wildlife Service (USFWS)
- BLM
- United States Bureau of Reclamation
- MWD
- United States Geological Survey (USGS).

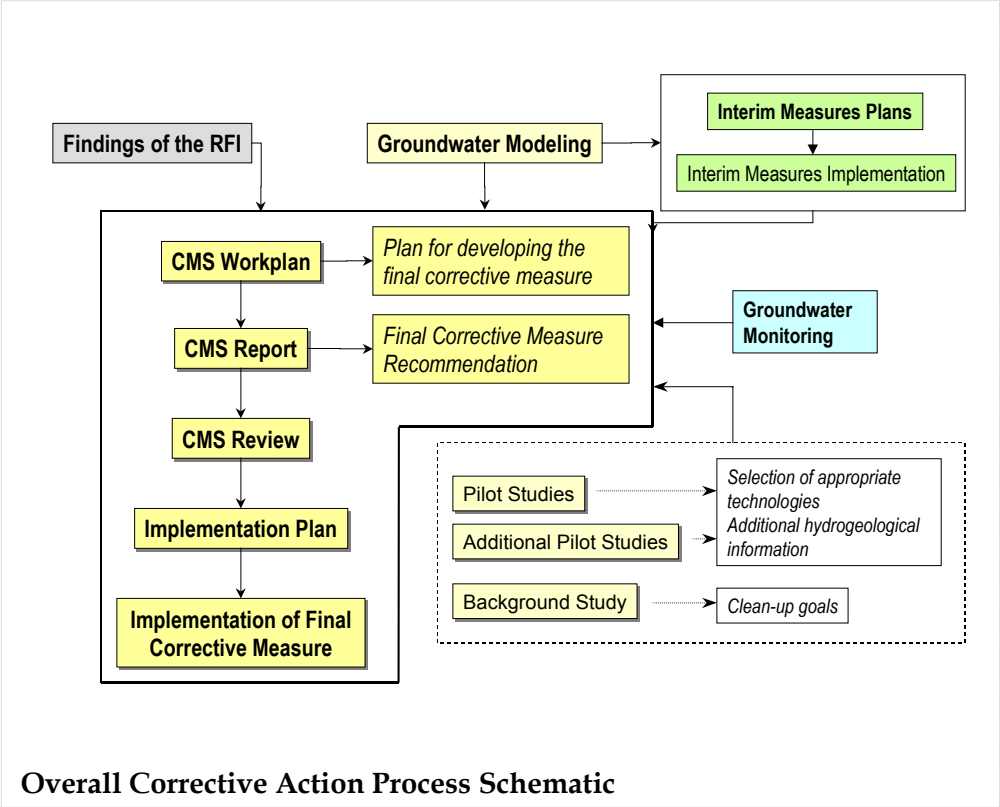
At the direction of DTSC and in accordance with recommendation of the CRBRWQCB, PG&E agreed in August 2003 to conduct a pilot study of groundwater extraction and treatment. The primary purpose of the pilot study is to initiate hydraulic control of the chromium plume. The secondary objectives of the pilot study are to gather information on the hydrogeologic properties of the shallow aquifer and to test the treatment system effectiveness (CH2M HILL, 2003). Startup of the pilot system is estimated to take place in early July 2004. In advance of startup of the pilot system and in compliance with the DTSC directive of February 9, 2004, PG&E will commence pumping, transport and disposal of groundwater from existing wells at the MW-20 cluster no later than February 27 2004, subject to approval of the BLM.

1.2 Overall Approach to Site Remediation

This IM is part of the overall corrective measures process for the site. It is a step in establishing a long-term approach for site remediation. The IMs and the results of the pilot study will be integrated into the long-term corrective measure for the site. A schematic of the corrective measures process is shown below.

The groundwater extraction/treatment pilot study is currently in the design phase, with permitting and procurement phases underway. Implementation of the pilot study on PG&E

property will be conducted concurrently with implementation of the IMs No. 1 and No. 2 on lands adjacent to the Colorado River. Components of these projects will occur in parallel, followed by the implementation of supplemental field studies. The results of the pilot study, the IMs, and supplemental field studies will be incorporated in the evaluation of the final remedy and in the preparation of the CMS report.



Overall Corrective Action Process Schematic

1.2.1 Interim Measures Objective and Target Zone

To ensure success of the IM, a clear objective is needed to guide implementation activities and to evaluate the performance of the IM. In defining the IM objective, it is critical to define the target area or zone that will be addressed during the implementation of the IM. This target zone will be used to monitor the effectiveness of the performance of the IM.

DTSC has determined that the objective of the IM is defined as follows:

> ***Initiate hydraulic control of the plume boundaries near the Colorado River to achieve a net reversal of gradient away from the Colorado River***

Hydraulic control will be initiated by pumping groundwater near the eastern edge of the plume to mitigate potential impacts to the Colorado River. If pumping from the MW-20 cluster does not achieve the objective of the IM, additional extraction wells will be sited, installed, tested, and pumped as a part of IM No. 1, subject to review and approval of BLM for those wells located on BLM-managed land. The process of implementing the interim

measures is designed to be iterative. This iterative process of bringing additional extraction wells online will continue until groundwater extraction is sufficient to hydraulically control the plume boundaries near the Colorado River. The target zone of capture for the IM has been identified based on the December 2003 groundwater-monitoring results. Figure 1-2 shows the Cr(VI) results from the December 2003 sampling event, the estimated extent of the plume, and the target zone of capture for the IM.

2.0 Conceptual Site Model

A conceptual site model has been developed to understand the flow patterns of the chromium plume. The model is a work in progress that is refined and updated as new information becomes available from the ongoing and future investigations. This section briefly describes the geological, hydrogeological, and geochemical conditions at the site based on the conceptual site model. The focus of this section is on the floodplain study area between Interstate 40 and the Colorado River, corresponding to the target zone of capture for the IM (Figure 1-2).

2.1 Geology and Hydrogeology

The site is characterized by arid conditions (with precipitation averaging less than 5 inches/year) and high temperatures. Vegetation is very sparse except in the river floodplain where dense stands of tamarisk and occasional mesquite trees occur. The local near-surface geology consists of recent and older river deposits in the flood plain area progressing westward to older alluvial deposits derived from the local mountains. The alluvial deposits and fluvial deposits in the flood plain comprise the principal groundwater aquifer at the site. The main surface water drainage into the Colorado River is from Bat Cave Wash, an ephemeral streambed that flows only briefly following rain events. The Bat Cave Wash drainage originates in the Chemehuevi Mountains west of the site and extends to the Colorado River. This north-tending wash received the original discharges of cooling water-containing chromium, as described below. Topography near the site is abrupt, rising from around 450 ft above mean sea level at the Colorado River to over 1,200 feet above mean sea level within a mile to the south and southwest.

Hydrogeologic cross-sections have been prepared for the locations shown on Figure 2-1. Figure 2-2 shows a north-south hydrogeologic cross-section parallel to the Colorado River and Figure 2-3 shows a southwest–northeast hydrogeologic cross-section perpendicular to the River.

Groundwater occurs primarily in unconsolidated alluvial sediments that underlie the study area north of the mountains. The saturated unconsolidated sediments are referred to as the Alluvial Aquifer. The main water-bearing zone of the subsurface is within sands and gravels associated with river and alluvial deposition.

Recent unconsolidated fluvial sediments consisting primarily of sand, silt, and clay occur along the floodplain area of the Colorado River. These sediments include Colorado River dredge materials blanketing the floodplain. The fluvial sediments are mostly saturated and are hydraulically connected to the Alluvial Aquifer.

The unconsolidated alluvial sediments cover the majority of the study area and consist of poorly-sorted sand and gravel with minor silt and clay deposits. The aquifer is highly heterogeneous, as is typical of most alluvial aquifers. The saturated thickness of the Alluvial Aquifer is approximately 100 feet near the River and thins to the west, pinching out along

the bedrock outcrops west and south. Sediments comprising the Alluvial Aquifer are very porous and permeable, with hydraulic conductivity ranging from 1.0×10^{-4} centimeters per second (cm/sec) to 1.0×10^{-2} cm/sec (0.3 to 30 feet per day).

On the basis of screen elevations from these well clusters, the alluvium may be divided into upper, middle, and lower subzones. The majority of site wells are in the upper alluvium subzone. These subzones do not represent distinct lithostratographic units, but rather provide a framework for understanding the three-dimensional aspects of the groundwater flow system and contaminant distributions at the site.

Underlying the alluvium at the Topock site is the Red Fanglomerate, a Miocene deposit of cemented sandy gravel (Ecology and Environment, 2003). The fanglomerate has been identified in several site wells, though the depth of the alluvium-fanglomerate contact varies. The Bouse Formation has been mapped nearby, and where present, it lies between the fanglomerate and the alluvium. It has not been positively identified in the boring logs of site wells, though distinction from the alluvium may not be apparent. The Bouse Formation was deposited in brackish or salt water and where present, may be a source of salts in site groundwater (see Section 2.2).

The basement bedrock of the area is composed of metadiorite and gneiss evident in the surrounding mountains. In both the fanglomerate and bedrock, groundwater occurs in secondary fractures. Local wells in these zones (PGE-7, PGE-8, MW-23, and MW-24BR) yield very little to moderate volumes of water.

Groundwater is encountered as little as 4 feet below ground surface in shallow wells in the current floodplain to over 200 feet at MW-16 in the western portion of the site. Horizontal groundwater gradients are slight, from 10^{-4} to 10^{-3}. The gradients suggest a north-northeast flow direction, and the distribution of chromium in groundwater samples supports these flow directions. Water levels in well clusters at MW-20, -24, -32, -33, and -34 all display upward gradients on the order of 10^{-2}, about 10 to 20 times the magnitude of the horizontal gradients. This is consistent with the typical conceptual model of regional groundwater flow systems in arid basins, where groundwater recharge occurs primarily at the margins of the basin and groundwater discharges to streams or springs near the center of the basins.

Interaction of groundwater with the Colorado River is complex. The daily fluctuations in river stage cause the surface water-groundwater interaction at this site to be very dynamic. Pressure transducers have been installed in newer wells close to the River to monitor more closely the changes in water levels and to define better the surface water-groundwater interaction.

2.2 Groundwater Geochemistry

Groundwater in the Needles-Topock vicinity has high total dissolved solids (TDS) concentrations. TDS concentrations in local groundwater can be over 40,000 milligrams per liter (mg/L). Samples collected from most of the monitoring wells have TDS in the range of 1,000 to 3,000 mg/L. However, groundwater sampled in bedrock/fanglomerate wells and deep alluvium wells displays higher values (8,000 to 12,000 mg/L). In contrast, water from the Colorado River has TDS concentrations ranging from 400 to 800 mg/L.

Sources of salts are connate water in bedrock, remnants of the Bouse Formation where it still exists, evaporite salts associated with recent fluvial sands, dredge spoils, salts exuded by tamarisk (*Tamarix* sp.), and potentially by historic PG&E cooling water discharges, reported to be about 6,600 mg/L (PG&E, 1997). As a result, the concentration of TDS in groundwater varies considerably across the site.

Results of groundwater sampling show major ions are dominated by sodium and chloride, with sulfate also significant in some wells (up to 1,300 mg/L). Indications of reduction-oxidation (redox) conditions reflect oxidizing conditions in which Cr(VI) is stable in the Alluvial Aquifer: dissolved oxygen concentrations range from 3.0 to 7.2 mg/L, nitrate is stable up to 77 mg/L and field oxidation reduction potential measurements up to 170 millivolts (indicative of oxidizing conditions). More reducing conditions are observed in monitoring wells in the floodplain. Under reducing conditions, Cr(VI) may convert to the relatively immobile trivalent Cr(III) state. It is important to note that the oxidation or reduction of chromium in water typically is dominated by the solid-phase aquifer material and soil structure, and not by the water itself. The hydrochemical nature of the groundwater and geochemical conditions of the site will be verified following further data collection during IM implementation and the pilot study.

2.3 Nature and Extent of Chromium in Groundwater

Routine sitewide monitoring of the Topock site began in 1997. Currently, there are approximately 35 wells from which groundwater samples are collected and analyzed for the constituents of concern. Monitoring wells have been installed near and along Bat Cave Wash and to the east of the wash to characterize the Cr(VI) distribution in groundwater. The most recent installations included five wells located parallel to, and within, the Colorado River floodplain to better define the leading edge and vertical extent of the chromium plume.

The majority of the monitoring wells are screened in the uppermost portion of the unconsolidated alluvium. In addition, seven nearby surface-water monitoring stations are located along the Colorado River and its tributaries. Figure 2-4 shows the locations of the wells and river stations. In accordance with the CACA, constituents of concern on the site are: Cr(T), Cr(VI), nickel, copper, zinc, pH, and electrical conductivity (DTSC, 1996). Groundwater and surface water are routinely monitored for these constituents. In addition, groundwater and surface water are sampled periodically for general chemistry parameters including iron, lead, manganese, and TDS.

Given the historic chromium disposal location near MW-10, the current distribution of Cr(VI) in groundwater at concentrations greater than the State of California maximum contaminant level for drinking water for Cr(T) of 0.05 mg/L is consistent with flow patterns suggested by groundwater elevation contours. Figure 2-4 illustrates this distribution with analytical results from the December 2003 sampling round (wells with orange symbols indicate concentrations greater than 0.05 mg/L Cr(VI)).

The reporting limit for analysis of Cr(VI) in groundwater used in the RFI and prior monitoring was 0.010 mg/L as specified in the approved RFI workplan (PG&E, 1997). Beginning in September 2003, as directed by the DTSC, a reporting limit of 0.002 mg/L is

being used for Cr(VI) analyses for all surface-water samples and groundwater samples collected from wells that historically have not reported detectable Cr(VI) concentrations above the reporting limit of 0.010 mg/L.

As described in the previous section, analytical results from site investigations and groundwater monitoring show that most of the chromium found in groundwater is in the hexavalent form. The highest concentrations of chromium in the groundwater are in the area of the MW-20 well cluster (Figure 2-4). Vertical profiles of Cr(VI) concentrations show variations at the MW-20 and MW-30 cluster. As seen from the cross-section in Figure 2-3, the highest concentration of Cr(VI) occurs in the upper aquifer subzone (at the water table).

3.0 Description of Interim Measure

This section presents the tasks and activities necessary to achieve the objective of this IM. The primary IM tasks include:

- Site preparation.
- Groundwater extraction from monitoring wells MW-20-70, MW-20-100 and MW-20-130.
- Onsite management of extracted groundwater.
- Transport and disposal of the extracted groundwater.

Figure 3-1 shows the location of the MW-20 bench where the IM will be staged. **Figure 3-2** schematically shows the components of the interim measure. A description of each component follows below.

3.1 Planning and Site Preparation

Planning and site preparation activities include the following:

- Obtain authorization from BLM to implement this IM on BLM-managed property as a time-critical removal action pursuant to Section 104 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).
- Inspect site to evaluate equipment placement and inspect transportation routes including the Red Rock Bridge.

The following activities will be conducted upon review and approval by BLM:

- Perform minor regrading to level ground as required for staging on-site holding tanks and to provide smooth ingress and egress for tanker trucks.
- Install new well pumps (if necessary), piping and appurtenances, and instrumentation.
- Site and install water holding facilities, secondary containment, power supply (portable diesel-generator equipped with an auxiliary fuel tank), and auxiliary lighting (if required).
- Install fencing to provide site security.

3.2 Groundwater Extraction

In compliance with the DTSC directive, existing monitoring wells MW-20-70, MW-20-100 and MW-20-130 will be used for groundwater extraction. Existing submersible pumps will be used if suitable. New pumps will be installed in each well, if necessary. The table below summarizes the anticipated sustainable pumping rates at each well based on previous hydraulic testing at the MW-20 well cluster.

Anticipated Sustainable Pumping Rates at MW-20 Cluster

Well	Well Screen Interval (ft bgs)	Anticipated Sustainable Pumping Rate[a] (gpm)
MW-20-70	50 to 70	2
MW-20-100	89.5 to 99.5	3
MW-20-130	121 to 131	7

NOTES:
ft bgs = feet below ground surface
gpm= gallons per minute
[a] E&E, 2002

Well MW-20-130 will be pumped at the highest sustainable rate (anticipated to be 7-8 gpm) until observed drawdown, if any, in nearby well cluster MW-30 has stabilized. This period is anticipated to take place for two to twelve hours. The pump in well MW-20-130 will then be shut off and the aquifer allowed to recover for a period of at least half of the pumping duration. Next, well MW-20-100 will be pumped using the same criteria for rate and duration as discussed above for well MW-20-130. The recovery duration will be at least half of the pumping period. After MW-20-100 has been tested, pumping and recovery for well MW-20-70 will be conducted using the same criteria. Following the aquifer tests using the wells individually, simultaneous pumping of the three MW-20 wells will be conducted. The combined pumping rate of the three wells will be adjusted to yield the maximum sustainable pumping rate (likely to be 8-12 gpm). Pumping at this rate will continue for at least one week, during which time pumping will be "pulsed" (shutting a well off for a period of 3-4 hours to allow for recovery) to allow a better observation of the hydraulic effects of pumping.

The combined pumping of the three wells will be maintained at that rate at which observed data and model output indicate the IM objectives are achieved (see discussion below). Well TW-2 (fully penetrating) will be located in the optimal location for this purpose as determined from data collected during the initial 5-10 days of pumping and model calculations, subject to BLM approval.

In the event that pumping from the Monitoring Well 20 cluster does not achieve the objectives of the IM, pumping from additional wells on the MW-20 bench or at other locations will be evaluated and implemented as necessary. Any such additional wells that are located on BLM-managed property must be approved by BLM prior to installation or use.

The groundwater model will be used to predict effects of planned pumping scenarios during the IM No. 2 operations at the MW-20 cluster. Groundwater levels in all nearby wells will be monitored during pumping with pressure transducers. Observed levels will be compared with model-predicted levels during the testing period, and alterations will be made to the model as necessary to match more closely the observed data. Other pumping scenarios will be run and the process will be repeated until the model matches observed data to a reasonable degree.

The extraction rates and well combinations will be determined based on observed effects of previous trials. When satisfactory agreement between modeled and observed response is achieved, the model will be used to set optimal pumping rates to achieve the IM objectives. Data will continue to be collected and compared with predicted values as extraction proceeds.

3.3 Onsite Management of Extracted Groundwater

3.3.1 Holding Tanks

Water pumped from the wells will be temporarily stored on site in steel 18,000-gallon holding tanks before transfer to trucks for transport to a permitted waste disposal or treatment facility. The holding tanks will be equipped with secondary containment consisting of lined berms in accordance with requirements in Title 22 of the California Code of Regulations (CCR). Initially, at least three to four tanks will be needed to provide sufficient holding capacity at the site. Pumping operations may require additional holding tanks. Up to eight tanks will be brought online if needed during operations.

3.3.2 Water Conveyance Piping and Appurtenances

Double wall piping or equivalent measures will convey extracted groundwater across any areas outside the secondary containment areas to prevent releases of extracted groundwater at the site. System appurtenances to monitor system operations will include:

- Flow meter/totalizers to measure flow rate and cumulative flow from each extraction well.
- In-line sample ports for each extraction well.
- Sample port (or equivalent location) for sampling combined flow stream.
- Electronic or visual indication of pipe leakage within the containment piping.

Piping and appurtenances will be sized to accommodate the anticipated system flow rates.

3.4 Transportation and Disposal

Groundwater in the holding tanks will be sampled and analyzed for Cr(VI), Cr(T), and other constituents, as yet unspecified, that may be required for waste profiling by the treatment or disposal facility. Groundwater will be disposed at a permitted waste disposal or treatment facility. Depending on pumping rates and truck capacities, as many as six 5,000-gallon trucks per day may be needed to haul water from the site.

During the initial phase of the pumping operations, and as described previously, PG&E will transport the extracted water by truck from the MW-20 cluster wells to an offsite disposal facility. To minimize long-term costs and risks associated with trucking hazardous wastes, PG&E is evaluating treatment of the water prior to trucking. Any proposed treatment of hazardous wastes occurring on BLM land is subject to review and prior approval by BLM and DTSC. The treatment method presently being considered is batch treatment by addition of ferrous chloride or ferrous sulfate to the holding tanks. Chromium would be removed

through precipitation, and would be separated from the water in a clarifier. The treated water could then be managed as non-hazardous waste or possibly reused at the PG&E plant site. Additional infrastructure needed for batch treatment would include a frame and plate clarifier to separate the precipitated chrome slurry from the water and a holding tank of up to 5,000-gallon capacity to contain the slurry. The clarifier and the holding tank would be located on a lined containment area.

The permitted treatment and disposal facility preliminarily selected to receive wastes from the IM processes, including extracted groundwater, is the U. S. Filter Recovery Service site located at 5375 South Boyle Avenue, Los Angeles, California. An alternate treatment and disposal facility is Romic Environmental Technologies located at 6760 West Allison Road, Chandler, Arizona.

A comprehensive Transportation Plan will be developed to route traffic to and from the site. A qualified traffic engineer visited the site on Tuesday, February 17, 2004 to identify any traffic-related issues prior to system start-up. The Transportation Plan will be submitted to DTSC and BLM for their review and approval as an addendum to this IMWP on March 1, 2004. Implementation of the IM will not commence until written approval of the Transportation Plan has been received from both DTSC and BLM.

PG&E will be responsible for complying with all applicable hazardous waste generator requirements, including the obtaining of generator identification numbers, manifesting, transportation, and disposal requirements.

3.5 Site Management

3.5.1 Operators

Site operators will be responsible for daily operation of the system. Each operator will be trained on proper operation of system equipment, field instruments, and monitoring equipment, and will be familiar with the normal operating ranges of system components. The operator will also have the necessary training for hazardous waste operations. The pumping and storage system will be equipped with automatic shutoffs to prevent tank overflow and pipe failures. The automatic shutoffs combined with site inspection will provide operational reliability and safety.

3.5.2 System Operations and Maintenance

System operations and maintenance (O&M) will be completed by the site operators. The site operator will record O&M activities in designated field log books, daily logs, and inspection forms.

Written operational procedures will include information on, or copies of (as applicable), the following:

- Procedures for system start-up, shutdown, and restart.
- The ranges for normal system operating parameters.

- A contact list of individuals to be notified in the event of a system malfunction or emergency.
- Troubleshooting guide.
- Equipment maintenance schedule.
- Spare parts list.
- Health and Safety Plan.
- Environmental Compliance Plan.

The Health and Safety Plan and Environmental Compliance Plan will be submitted to DTSC and BLM for their review and approval as addenda to this IMWP on March 1, 2004. Implementation of the IM will not commence until written approval of the Health and Safety Plan and the Environmental Compliance Plan has been received from both DTSC and BLM.

Scheduled maintenance activities include:

- System readings and measurements.
- System adjustments.
- System power (hour meters, power issues).
- Site conditions.
- Maintenance notes.
- Sample collection (e.g., waste characterization).
- Inspections and record keeping required for hazardous waste management.

Appendix A includes a set of preliminary set inspection forms for the system. These forms will be reviewed and revised to delete unnecessary data collection or to add new data as needed. Unscheduled maintenance and troubleshooting (e.g., pump failure, power failure) actions will be recorded on a troubleshooting and report form.

3.5.3 Site Security

Site security will be provided to safeguard against vandalism and injury. During implementation of this IM, all appropriate security measures will be implemented for the express purpose of providing safety to operators and the public. These measures include:

- Maintaining appropriate staffing during operations until security measures can be installed.
- Maintaining a visitor log to document person(s) accessing the property.
- Installing and maintaining site security fencing of 6-foot tall steel chain-link fabric and post construction which encloses completely all extraction, storage and treatment facilities and appurtenances. Access will be provided by locked truck and personnel gates in the fencing. Access for trucks will be provided 24 hours per day, although every effort will be made to schedule all truck loading and shipments to occur during daylight hours.

- Posting warning signs (*e.g.*, no trespassing, safety hazard signs) at several locations on each leg of the security fence.

The Environmental Compliance Plan, to be submitted as an addendum to this IMWP, will provide details on the language of warning signs, their number and specific placement on the fence, and the types, locations and sizes of gates and locks to be used. The site security measures will be inspected and maintained as necessary during system operation.

3.5.4 Emergency Response

Spill containment equipment (e.g., sorbent materials, shovels, etc.) will be maintained on-site at all times. As a contingency in the event of a leak from the storage tank or equipment (vacuum trucks, pumps, etc.), trained spill response personnel will be on call 24 hours per day. PG&E will retain the services of a spill response contractor who will have the capability to mobilize to the site within 2 hours, if needed. As an added contingency, the Topock Compressor Station is manned 24 hours per day. Emergency response procedures, including the identification of the on-call spill response contractor, will be provided in the Environmental Compliance Plan, submitted as an addendum to this IMWP.

The secondary containment at the tank storage area will be inspected continuously during extraction and at regular intervals thereafter. For any minor leaks, such as dripping from a valve or pump, the water will be contained in a pail and added to the storage tank. In the event of a significant leak (more than a drip), or a spill, within the secondary containment unit, the following steps will be taken: (1) the pumping operations and pump test will be ceased if it is occurring at the time the leak is discovered; (2) if the leak is small, an attempt will be made to stop or temporarily plug the leak if possible; and (3) the emergency response crew will be mobilized to (a) pump out the leaking tank and properly dispose of the liquid at an approved facility, (b) repair or replace the leaking tank, and (c) pump out and properly dispose of the liquid in the secondary containment unit.

Given the design of the storage tank, a major spill is not expected. However, in the event of a catastrophic failure of the storage tank, including breaching of the secondary containment berm, all efforts will be made to prevent the flow of water towards the Colorado River. Any water that was released from the containment area would likely infiltrate into the existing sand dunes immediately below the containment area. Cleanup operations will then be instituted to remediate any contaminated soil, as necessary.

In the event of any release or other event necessitating an emergency response at the tank area, PG&E will notify the BLM Lake Havasu Field Office and the U. S. Bureau of Reclamation Lower Colorado Regional Office.

3.6 Performance Monitoring

Hydraulic data including water levels and hydraulic parameters have been collected at wells across the site and adjacent to the Colorado River. Water levels are measured quarterly at over 50 locations and are measured more frequently at selected locations.

Data will be collected during pumping to understand the aquifer behavior and to gauge the success of the interim measure. The floodplain groundwater zone is complex, with river

elevations fluctuating approximately three feet per day affecting the groundwater levels. Eight locations (seven wells and one river station) currently are equipped with electronic pressure transducers for monitoring water levels.

Additional electronic transducers will be installed so that all of the following stations/wells are equipped with transducers: I-3, MW-10, -19, -20-70, -20-100, -20-130, -24A, -24B, -25, -26, -27, -28, -29, -30-30, -30-50, -31, -32-20, 32-35, -33-40, -33-90, 34-55, and -34-80.

The daily fluctuations in river stage cause the surface water-groundwater interaction at this site to be very dynamic. It is anticipated that assessing the effects of pumping at the MW-20 cluster on floodplain wells will be complicated by the river's influence, requiring that several methods be employed. In addition to evaluating the effect of pumping during constant rate discharge, it is proposed that the pumping well be periodically shut off, allowed to recover for a brief period, and then turned on again. This "pulsing" technique is intended to show a noticeable interference effect on the sinusoidal head pattern of the floodplain wells. In this way, a more clear comparison between floodplain well head data during and without pumping will be possible. The difference may be plotted in the form of a background-corrected groundwater drawdown map. This will provide firm evidence of pumping influence, whereas constant pumping may not.

In the event the background-corrected groundwater drawdown map does not provide sufficient evidence of pumping influence, PG&E will consider, subject to DTSC and BLM approval, constructing a line of wells between the river and the MW-20 cluster to measure pumping effects. Such wells would be perforated at the same altitude and water-level data from these wells would be used to determine if a flow reversal is created during pumping.

A combination of transducer head data and model output will be used to assess the success of the interim pumping measure. Though not the focus of this IMWP, PG&E proposes to collect additional hydraulic and hydrogeologic data to calibrate the groundwater model for long-term performance evaluation. The proposed data collection efforts were presented to DTSC in PG&E's February 11, 2004 submittal (IMWP No. 1).

Measurement of pumping effects will involve monitoring subtle changes in head from river-influenced data. Because of the hydrogeologic complexity, using chemical data as a primary means of assessing IM progress is not recommended. While hydraulic effects in semi-confined zones will be nearly instantaneous, chemical changes can require long periods of time to be discernable from natural variation, even with the most conservative (stable) constituents.

Prior to commencing pumping, cased-hole geophysical logging will be conducted in the MW-20 cluster wells. Logging will consist of induction logging and gamma-ray logging, and will be used to evaluate hydrostratigraphy in the vicinity of the wells.

In addition, baseline sampling will be conducted at the following wells prior to commencement of pumping at the MW-20 cluster: MW-20-70, MW-20-100, MW-20-130, MW-30-30, MW-30-50, MW-34-55, MW-34-80, MW-27, MW-28, MW-31, MW-25, MW-27, MW-26, MW-32-20, MW-32-35. Samples will be analyzed for Cr(T), Cr(VI), general chemistry, selected trace elements (boron, bromide, iodide), and the stable isotopes of oxygen and hydrogen. These results will provide baseline conditions that can be used to

compare against future sampling results. The current groundwater sampling program will continue to be performed throughout the IM period as determined necessary.

If testing results indicate incomplete capture, then additional measures (*e.g.*, install additional wells, modify pumping strategy) will be recommended and initiated following their approval to achieve the objective of the IM. Locations and depths of any additional extraction wells will be determined on the basis of the testing/pumping results at the MW-20 cluster.

3.7 Documentation and Reporting

The following documentation and reporting activities are proposed to effectively communicate the system operation and effectiveness of the IM.

- System operations documentation: Logs and forms will be used to record information on the operational status of the system, including system runtime(s), flow data, sampling/waste characterization data (as available), transportation and disposal information, system troubleshooting, site security, and maintenance activities. System operations notes and forms will be compiled and summaries made available monthly to DTSC as part of the performance monitoring reports (see below).
- Performance monitoring reports: These reports will summarize data collected and modeling activities used to evaluate the effectiveness of the IM. Performance evaluation will be presented using observed data and comparisons of that data against model output. The effects of rising and falling heads from the river's influence will be subtracted from the time trends so that drawdown maps may be produced to evaluate pumping effects. Recalibrated model output will be used to revise capture zone estimates of steady-state pumping. Recommendations for system modifications will be provided in each report to achieve the objective of the IM. Performance monitoring reports will be prepared bi-weekly and will be submitted to DTSC by the 1st and 15th of the following month, with the schedule subject to reevaluation and adjustment by DTSC.

3.8 Interim Measure Integration

The immediate IM described herein will eventually be integrated into the comprehensive IM for the site described in IMWP No. 1 (CH2M HILL, 2004). Modifications to system operations will be documented in performance monitoring reports to the DTSC, subject to DTSC approval. The comprehensive IM will include onsite treatment and discharge management, reducing or eliminating the need for transportation and offsite disposal.

Pumping from wells at or near the MW-20 bench (with the understanding that the installation and operation of any well or wells on BLM land will require the review and approval of BLM) is expected to continue until implementation of the final remedy at this site, in accordance with the RCRA Corrective Action process; depending on the final remedy chosen, pumping in this area may well be an integral part of that final remedy and may continue for several years.

Containment of extracted groundwater at the MW-20 bench location in tanks, and the shipment of that water from this location in trucks, will continue until adequate facilities, such as pipelines, are in place to allow the direct conveyance of extracted groundwater to holding and treatment facilities located elsewhere (such as on PG&E property), with the understanding that the construction and operation of any such facilities on BLM land will require the review and approval of BLM. At a minimum, the storage of extracted groundwater in tanks on the MW-20 bench, and the shipment of that groundwater by trucks, is anticipated to occur for 6-12 months.

3.9 Indemnity

PG&E agrees to indemnify and hold harmless BLM, its agents, and employees from any and all claims or causes of action arising from or on account of acts or omissions of PG&E, its employees, successors, agents, contractors, subcontractors, or other persons, in carrying out activities under this IMWP. PG&E further agrees that the United States, and its agencies and employees, shall not be held as a party to any contract entered into by PG&E in carrying out activities under this IMWP.

4.0 Project Management

CH2M HILL will manage the IM activities. The proposed project management approach is intended to:

- Ensure a direct, continuous line of communication among DTSC, the PG&E project team and all stakeholders in the CWG.
- Facilitate effective and efficient coordination and management of the various tasks.
- Implement this IM on time and in compliance with the requirements of the DTSC.

The progress and performance of the project will be monitored through:

- Monthly performance monitoring reports.
- Regular meetings with DTSC representatives.
- Regular meetings and conference calls with the CWG.
- Meetings specially convened by DTSC to resolve project issues and concerns, as applicable.

5.0 Project Schedule

The table below shows the proposed project schedule with estimated duration of many critical activities. System operations reports will be submitted as discussed in Section 3.7. Performance monitoring reports will be submitted on the 1st and 15th of each month. Future modifications of the groundwater extraction system for the comprehensive IM are not shown in this schedule. PG&E's ability to meet this schedule is dependent upon BLM's authorization of the IM through the issuance of an Action Memorandum as a time-critical removal action under CERCLA. Without this authorization, PG&E does not have permission to conduct any site preparation or installation activities.

Interim Measure No. 2 Project Schedule

Activity	Duration	Start	Finish
Interim Measure No. 2	**29 days**	**2/09/04**	**3/08/04**
DTSC Directive	1 day	2/09/04	2/09/04
PG&E Concurrence	1 day	2/09/04	2/09/04
IMWP No. 2	**18 days**	**2/10/04**	**2/26/04**
Prepare Draft	8 days	2/10/04	2/17/04
DTSC Review	6 days	2/18/04	2/23/04
BLM Review	7 days	2/18/04	2/24/04
Final to DTSC and BLM	3 days	2/24/04	2/26/04
System Installation	**11 days**	**2/27/04**	**3/08/04**
Obtain BLM Authorization	2 days	3/01/04	3/02/04
Site Inspection (equipment staging/transportation route)	1 day	2/27/04	2/27/04
Site Preparation	5 days	3/03/04	3/07/04
System Start-up	1 day	3/08/04	3/08/04

6.0 Waste Management Practices

This section describes the waste management practices for the waste streams anticipated for this IM.

6.1 Extracted Groundwater Management

The primary waste stream generated during project activities is extracted groundwater. The only constituent of concern that may exceed hazardous waste regulatory levels in the extracted groundwater is chromium, which may exceed the California soluble threshold limit concentration (STLC) for chromium, which is 5 mg/L[1].

Based on the anticipated pumping rates, up to 19,000 gallons of water is expected to be generated daily. Extracted groundwater will be pumped from the well(s) to aboveground holding tanks. The holding tanks and associated piping will meet state and federal requirements for storage of hazardous waste in tank systems (*e.g.*, secondary containment)[2]. Representative samples of the waste will be taken and analyzed at least weekly to determine chromium concentrations. As necessary, additional analyses will be performed to meet requirements of the receiving treatment/disposal facility.

The groundwater will be pumped to vacuum trucks for transportation offsite. If analytical results show that the groundwater exceeds the STLC, it will be transported offsite under a Uniform Hazardous Waste Manifest by a licensed hazardous waste hauler.

It is estimated that each holding tank will be emptied weekly. All hazardous waste generated on site, including the precipitated chromium slurry, will be removed for disposal within 90 days of generation.

Additional hazardous waste management practices include:

- Labeling of tanks to including the tank number, contents, designation as hazardous waste (if appropriate), and the National Fire Protection Association hazard warning "fire diamond."
- Daily inspections of the tank systems[3] which includes tanks, piping and pumps.
- Periodic inspections of emergency equipment[4].
- Training of personnel in hazardous waste management, commensurate with their responsibilities[5].
- Preparation of procedures for responding to unplanned releases, etc.[6]

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[1] California Code of Regulations, Title 22, Division 4.5 (22CCR), Chapter 11, Section 66261.24(a)

[2] 22CCR Section 66262.34 and Section 66265.190 et seq.

[3] 22CCR Section 66262.34 and 66265.195

[4] 22CCR Section 66262.34 and 66265.33

[5] 22CCR Section 66262.34 and 66265.16

Details of the practices described/listed above will provided in the Environmental Compliance Plan that will be maintained onsite. This plan will include copies of permits, forms, and procedures for environmental practices at the site that ensure compliance with federal, state, and local requirements. The primary focus of the Environmental Compliance Plan is hazardous materials and waste management. It addresses the requirements of the Certified Unified Program Agency (San Bernardino County Fire Department) for a Business Plan, including spill prevention and response measures and manifesting of hazardous waste. The Environmental Compliance Plan will be maintained at the site for the purpose of training, recordkeeping, emergency response, and ongoing guidance related to environmental compliance (e.g., hazardous materials, hazardous waste).

A U. S. EPA Spill Prevention, Control and Countermeasure (SPCC) Plan is not required at the IM site because the oil storage capacity will not exceed the threshold of 1,320 gallons. Storage capacity for fuel to be used in the onsite generator is anticipated to be no more than four 55-gallon drums (located in a secondary tub). Fuel for the generator is the only oil that will be stored onsite. Spill prevention and control measures for the fuel is addressed in the (Hazardous Materials) Business Plan prepared in accordance with the requirements of the local Certified Unified Program Agency, the San Bernardino County Fire Department.

6.1.1 Other Wastes

Personal protective equipment and disposable sampling equipment designated as non-hazardous waste will be double-bagged and disposed of in dumpsters at the station. In the unlikely event that such equipment is ever designated as hazardous waste, it will be disposed of at a permitted facility in compliance with all hazardous waste regulatory requirements. Soil excavated during construction (*e.g.*, trenching, grading) will be placed in temporary stockpiles nearby and used as backfill. If soil is excavated from areas known or suspected to contain Cr(VI), then soil will be sampled and analyzed for Cr(VI) and will be disposed of according to the results of that analysis.

[6] 22CCR Section 66262.34 and 66265.30-37

7.0 Required Filings and Authorizations

The primary required filings and authorizations to implement the IM are listed in the table below.

Action	Responsible Agency
Facility/Generator Identification Number Issuance	U.S. Environmental Protection Agency
Hazardous Materials Business Plan approval	San Bernardino County Fire Department
Authorization of IMWP by an Action Memorandum as a time-critical removal action pursuant to CERCLA	U.S. Bureau of Land Management

8.0 Sampling and Monitoring

Sampling and monitoring activities planned for this IM include:

- Baseline sampling and geophysical logging prior to start-up of extraction system.
- Waste disposal profiling as required by the treatment/disposal facility.
- Discrete sampling from each extraction well to evaluate mass removal rates. Analyses for chromium species and total dissolved solids will be conducted as frequently as necessary until a concentration trend is established, and then at least weekly until DTSC determines that a reduced frequency of sampling is appropriate.
- Water level measurements (manual and continuous) from existing monitoring well locations near the MW-20 cluster and in floodplain wells. Electronic pressure transducers will measure water levels continuously.

Ongoing and planned sampling and monitoring activities at the site will also be valuable in assessing the effectiveness of the IM. These activities include:

- Low-flow/well-volume purging comparison testing.
- Characterization and isotopic analysis of transpirate on the floodplain.

Additional sampling or characterization may be conducted, as directed by DTSC and considering the input of the Consultative Workgroup. These measures may include:

- The collection of Colorado River groundwater flux data to help determine if the IM pumping and future pumping changes the quantity and direction of flux between the aquifer and the river.
- Installation of additional wells between the MW-20 bench and the Colorado River to provide additional water-level and chemical data to evaluate the effectiveness of the IM and any future remediation measures.

9.0 Mitigation Measures

The following restrictions and controls, at minimum, related to protection of biological and cultural resources, will be complied with in implementing this IM.

1. The Mojave population of the desert tortoise is federally protected as a threatened species under the Endangered Species Act of 1973 and is protected by California law. Prohibited actions include capture, handling, harassing, collecting, injuring, or destroying animals or their burrows. Any sightings of desert tortoise must be reported immediately to the BLM Lake Havasu Field Office Wildlife Biologist.

2. All personnel are to report any sightings of desert tortoise, bighorn sheep, other wildlife species and federally listed migratory birds (such as bald eagle, brown pelican, etc.) to the BLM Lake Havasu Field Office, Wildlife Biologist.

3. If a desert tortoise is endangered by any activity, that activity will cease until the desert tortoise moves out of harm's way on its own accord. A desert tortoise that needs to be handled, to prevent injury or death, must be handled by a certified/qualified handler only.

4. The area within the fence will be inspected at least every four hours during periods when the gates are open for desert tortoise that may become trapped inadvertently within the enclosure. All vehicles stationary for 15 minutes or longer will be inspected underneath for desert tortoise prior to moving. In the event that a tortoise is found within the fenced area or under a vehicle, that tortoise will be handled only by a certified handler.

5. All native riparian species (e.g., cactus, ocotillo, mesquite, Palo Verde, etc.) will be avoided at all times. California-listed sensitive species of plants can be trimmed but not removed.

6. All construction trash and/or debris will be removed.

7. All vehicles must stay on the existing and approved routes. No vehicles are authorized to drive in the existing washes.

8. PG&E will notify immediately the BLM Lake Havasu Field Manager (or his designated representative) of any cultural resources (prehistoric/historic sites or objects) and/or paleontological resources (fossils) encountered during permitted operations and will maintain the integrity of such resources pending subsequent investigation. All operations in the immediate area of the discovery must be suspended until written authorization from BLM to proceed is issued. An evaluation of the discovery shall be made by a qualified archaeologist or paleontologist to determine appropriate actions to prevent the loss of significant cultural or scientifically important paleontological values.

9. No permanent improvements that affect the integrity of the bridge/culvert over Bat Cave Wash on historic Route 66 will be implemented. This feature has been analyzed by a structural engineer to determine if there will be any adverse effects as a result of

transporting the pumped water from the MW-20 bench via truck. Caltrans maintenance records indicate that the structure has an operation rating that exceeds the anticipated load of the haul trucks.

10. Actions that result in impacts to archaeological or historical resources, are subject to the provisions of the Archaeological Resources Protection Act of 1979, as amended, and the Federal Land Policy and Management Act of 1976.

10.0 References

CH2M HILL, 2003. *Draft Technical Memorandum, Groundwater Pilot Study, Topock Compressor Site, Needles, California.* September.

_____, 2004. *Draft Interim Measures Workplan, Topock Compressor Station, Needles, California.* February 11.

Department of Toxic Substances Control (DTSC), 1994. Correction Action Orientation Manual, Cal-EPA – DTSC Draft Working Copy. June 1994.

_____, 1996. Corrective Action Consent Agreement, Docket HWCA 95/96-027. February 2.

Ecology and Environment Inc. (E&E), 2000. *Draft RCRA Facility Investigation (RFI) Report: Bat Cave Wash Area, PG&E Company's Topock Compressor Station*. April 17.

_____, 2002. *Hydrogeologic Testing Results, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California.* April 1.

Pacific Gas and Electric (PG&E), 1997. Letter to Mr. Robert M. Senga, Department of Toxic Substances Control, Region 4. "*RCRA Facility Investigation at Bat Cave Wash Area.*"

Figures

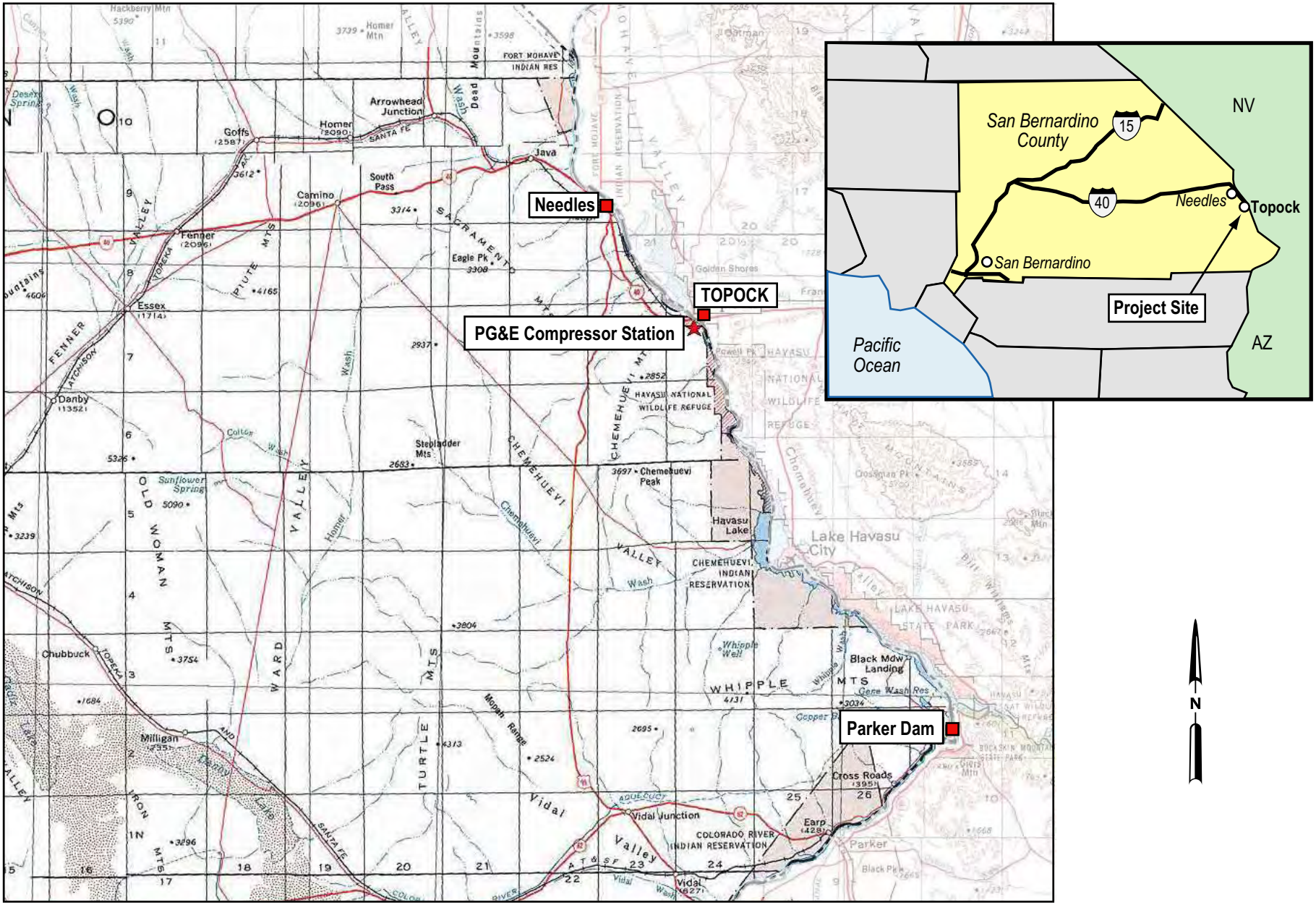


FIGURE 1-1
SITE LOCATION MAP
INTERIM MEASURES WORK PLAN NO. 2
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

184004.PS.06_E022004001SFO_Topock Site LocMap_2/13/04_ccc

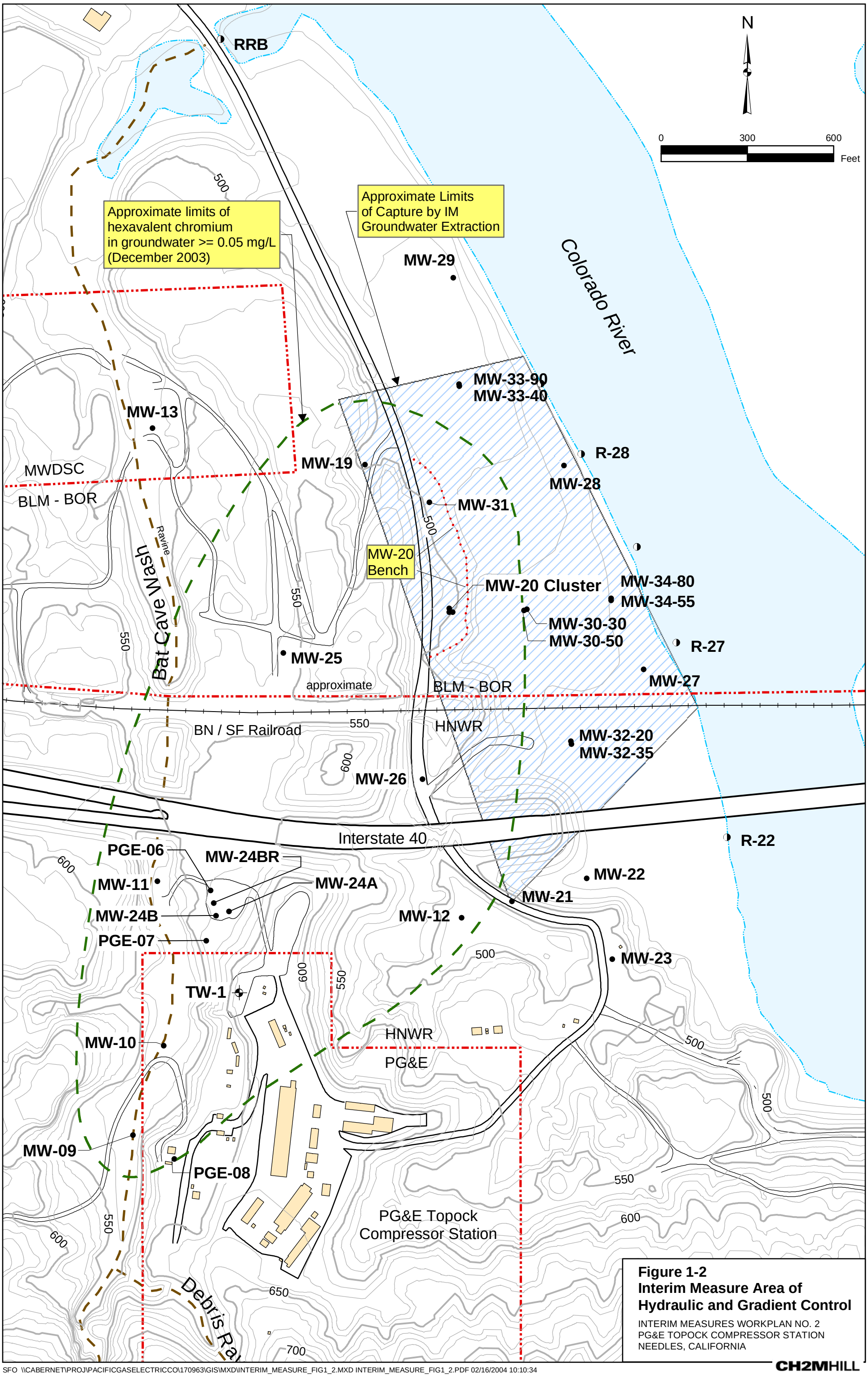


Figure 1-2
Interim Measure Area of Hydraulic and Gradient Control

INTERIM MEASURES WORKPLAN NO. 2
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

SFO \\CABERNET\PROJ\PACIFICGASELECTRICCO\170963\GIS\MXD\INTERIM_MEASURE_FIG1_2.MXD INTERIM_MEASURE_FIG1_2.PDF 02/16/2004 10:10:34

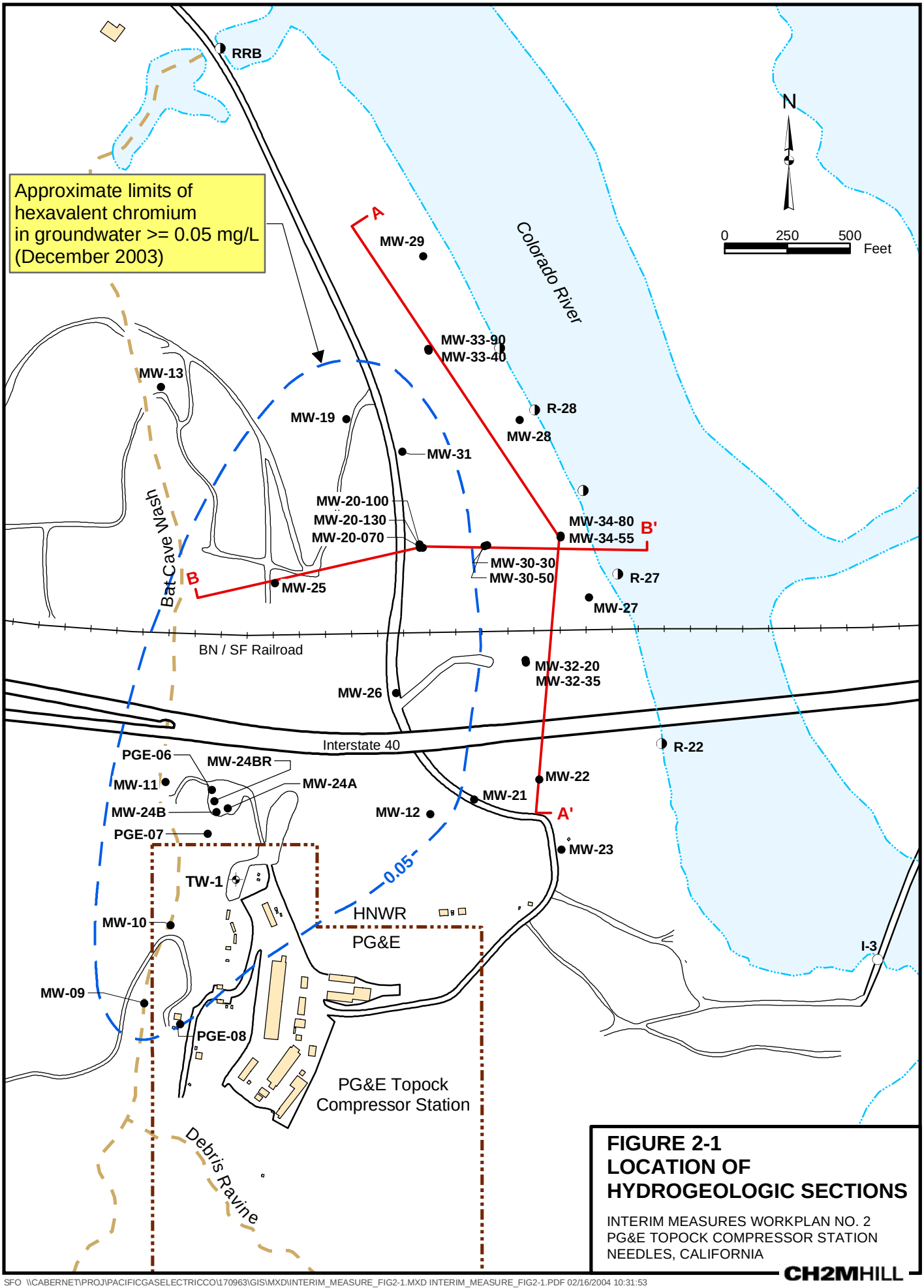


FIGURE 2-1
LOCATION OF HYDROGEOLOGIC SECTIONS

INTERIM MEASURES WORKPLAN NO. 2
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

North

A

South

A'

MW-29
proj. 120'

MW-33-40
MW-33-90

MW-28
proj. 150'

MW-30-30
MW-30-50
proj. 200'

MW-34-55
MW-34-80

MW-27
proj. 100'

MW-32-20
MW-32-35
proj. 100'

MW-22

ground surface

water table

approximate maximum depth of Colorado River

MW-29	MW-33-40 / MW-33-90	MW-28	MW-30-30 / MW-30-50	MW-34-55 / MW-34-80	MW-27	MW-32-20 / MW-32-35	MW-22
ND <0.01	ND <0.01 J	ND <0.01	ND <0.01	ND <0.01	ND <0.01	ND <0.01	ND <0.01
ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002
---	ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002
ND <0.0002	---	ND <0.0002	2.77	ND <0.01		ND <0.01	
	ND <0.01 J		0.0906	ND <0.0002		ND <0.0002	
	ND <0.0002		ND <0.0002	ND <0.0002		ND <0.0002	
	ND <0.0002		ND <0.0002	ND <0.0002		ND <0.0002	

39	39	23	32	17	20	11	
	89		50	59	35		
			67		37		
	130		ND <0.01	83			
			ND <0.0002				
			ND <0.0002				
			0.0377				
				93			

Alluvial Aquifer
unconsolidated sand, gravel, silt, clay

Red Fanglomerate
cemented silt, gravel, sand

Red Fanglomerate

Elevation (Ft. MSL)

500
400
300

MW-29

water level

well screen
depth at bottom of well screen
total depth of boring

85
103

Hexavalent Chromium Sampling Results

Results in milligrams per liter (mg/L) for recent sampling events

Jun-03
Sep-03
Nov-03
Dec-03

ND = not detected at listed reporting limit
J = estimated result
(---) = not sampled

30 ft.
Vertical Scale
0
0 Horizontal Scale 300 ft.

FIGURE 2-2
HYDROGEOLOGIC SECTION A - A'
GROUNDWATER SAMPLING RESULTS
JUNE - DECEMBER 2003
INTERIM MEASURES WORK PLAN NO. 2
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Southwest

B

Northeast

B'

Bat Cave Wash

ground surface

MW-25
proj. 200'

MW-20-70
MW-20-100
MW-20-130

MW-30-30
MW-30-50

MW-34-55
MW-34-80

MW-27
proj. 200'

R-27

water table

Elev. 454

Colorado River

500

400

300

Elevation (Ft. MSL)

MW-25	MW-20-70	MW-30-30	MW-34-55	MW-27	R-27
2.48	11.90	ND <0.01	ND <0.01	ND <0.01	ND <0.01
2.35	9.69	ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002
---	---	ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002
2.21	9.87	ND <0.0002	ND <0.0002	ND <0.0002	ND <0.0002
85	70	32	55	17	
	2.77	2.77	ND <0.01		
	2.74	0.0906	ND <0.0002		
	---	ND <0.0002	ND <0.0002		
	2.79	ND <0.0002	ND <0.0002		
	100	50	ND <0.01		
	6.44		ND <0.0002		
	6.08		ND <0.0002		
	---		0.0377		
	5.94		83		
	132	67	93		

Alluvial Aquifer
unconsolidated sand, gravel, silt, clay

Red Fanglomerate

Red Fanglomerate
cemented silt, gravel, sand

Recent fluvial sediments and dredged sands

MW-25

water level

well screen

85 depth at bottom of well screen

103 total depth of boring

Hexavalent Chromium Sampling Results

Results in milligrams per liter (mg/L) for recent sampling events

Jun-03
Sep-03
Nov-03
Dec-03

ND = not detected at listed reporting limit

(---) = not sampled

40 ft.

Vertical Scale

0

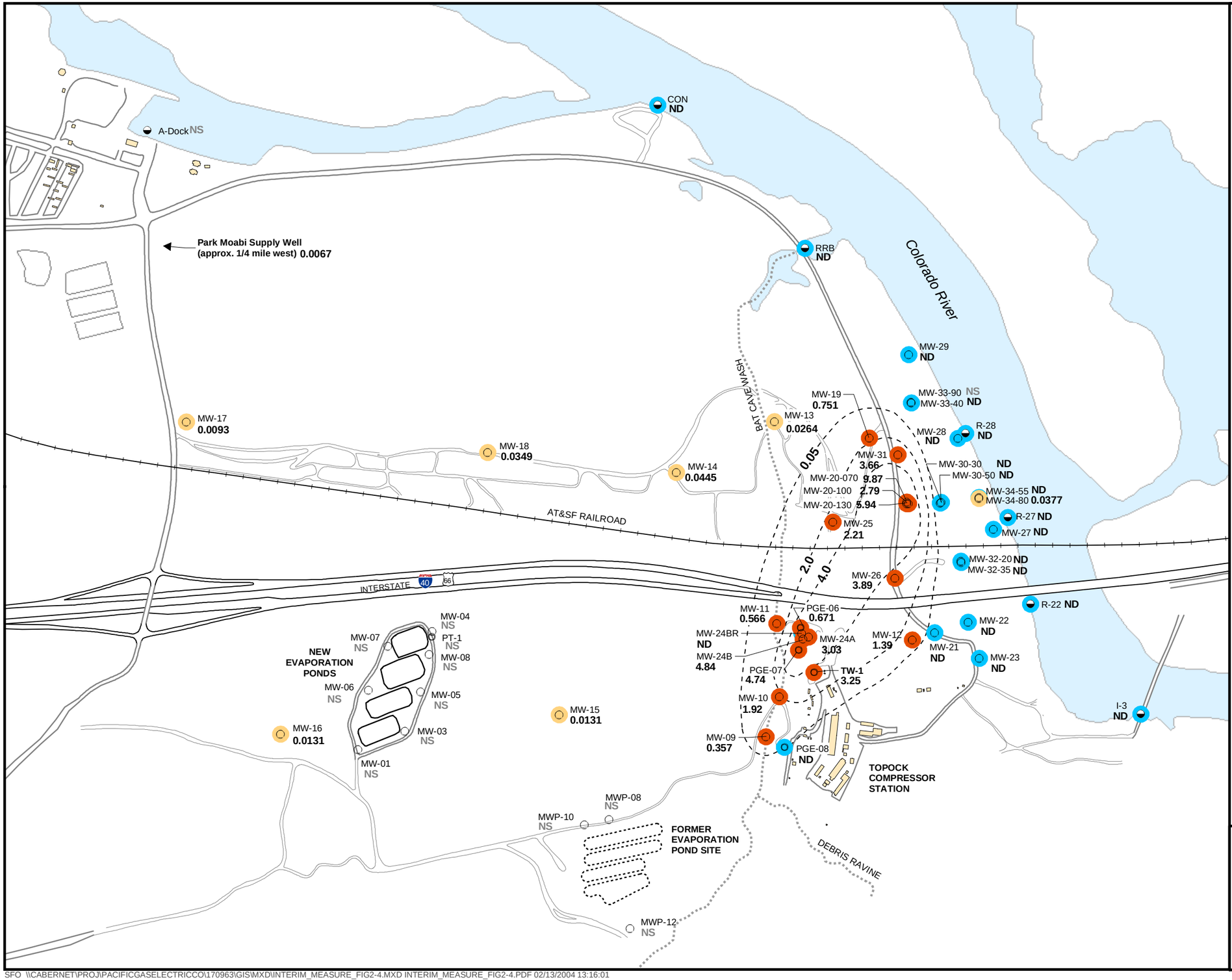
0 Horizontal Scale 200 ft.

FIGURE 2-3
HYDROGEOLOGIC SECTION B - B'
GROUNDWATER SAMPLING RESULTS
JUNE - DECEMBER 2003

INTERIM MEASURES WORK PLAN NO. 2
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

184004.PS.06_E022004001SFO_Fig 2-3 Jun-Dec CrG X-Sect B-B_2/13/04_ccc



Legend

- Groundwater Monitoring Well
- Groundwater Test Well or Supply Well (Inactive)
- Surface Water Monitoring Location

Sampling conducted December 9-12,16, 2003

3.47 Concentration of hexavalent chromium [Cr(VI)] in milligrams per liter (mg/L)
Results shown are maximum concentrations of primary and duplicate samples

ND Cr(VI) not detected, at 0.0002 mg/L detection limit using analytical method SW 7199

NS Not sampled

Cr(VI) Concentrations in Water Samples

- Not detected (<0.0002 mg/L)
- Concentration between 0.0002 and 0.05 mg/L
- Concentration greater than 0.05 mg/L

0.05 Cr(VI) isoconcentration contours in groundwater, at 0.5, 2.0, and 4.0 mg/L intervals. Contours are approximate and are based on 2003 sampling results and site conceptual model.

N

0 500 1,000 Feet

Figure 2-4
Hexavalent Chromium Sampling Results
December 2003
Groundwater and Surface Water Monitoring

INTERIM MEASURES WORKPLAN NO. 2
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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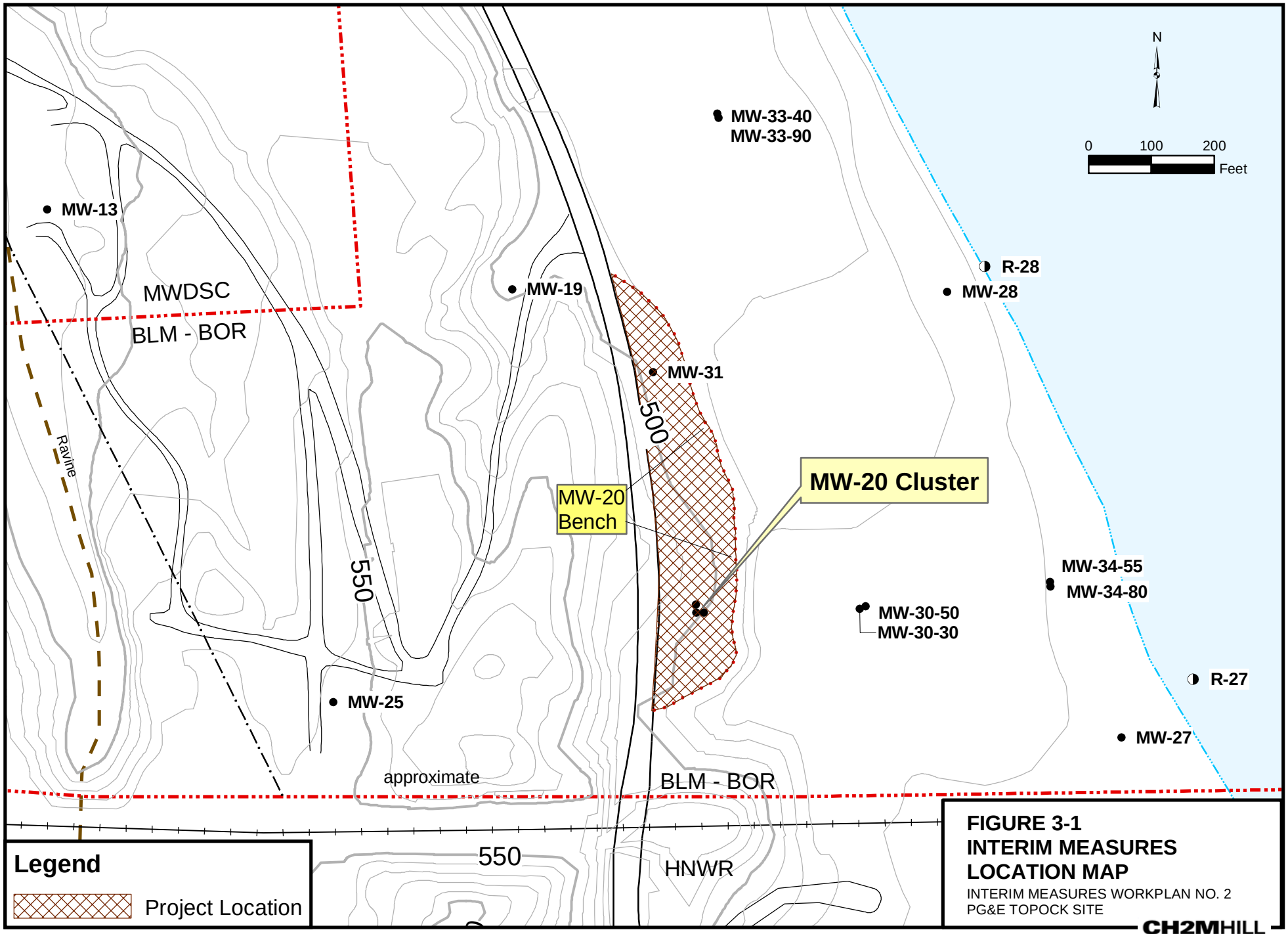
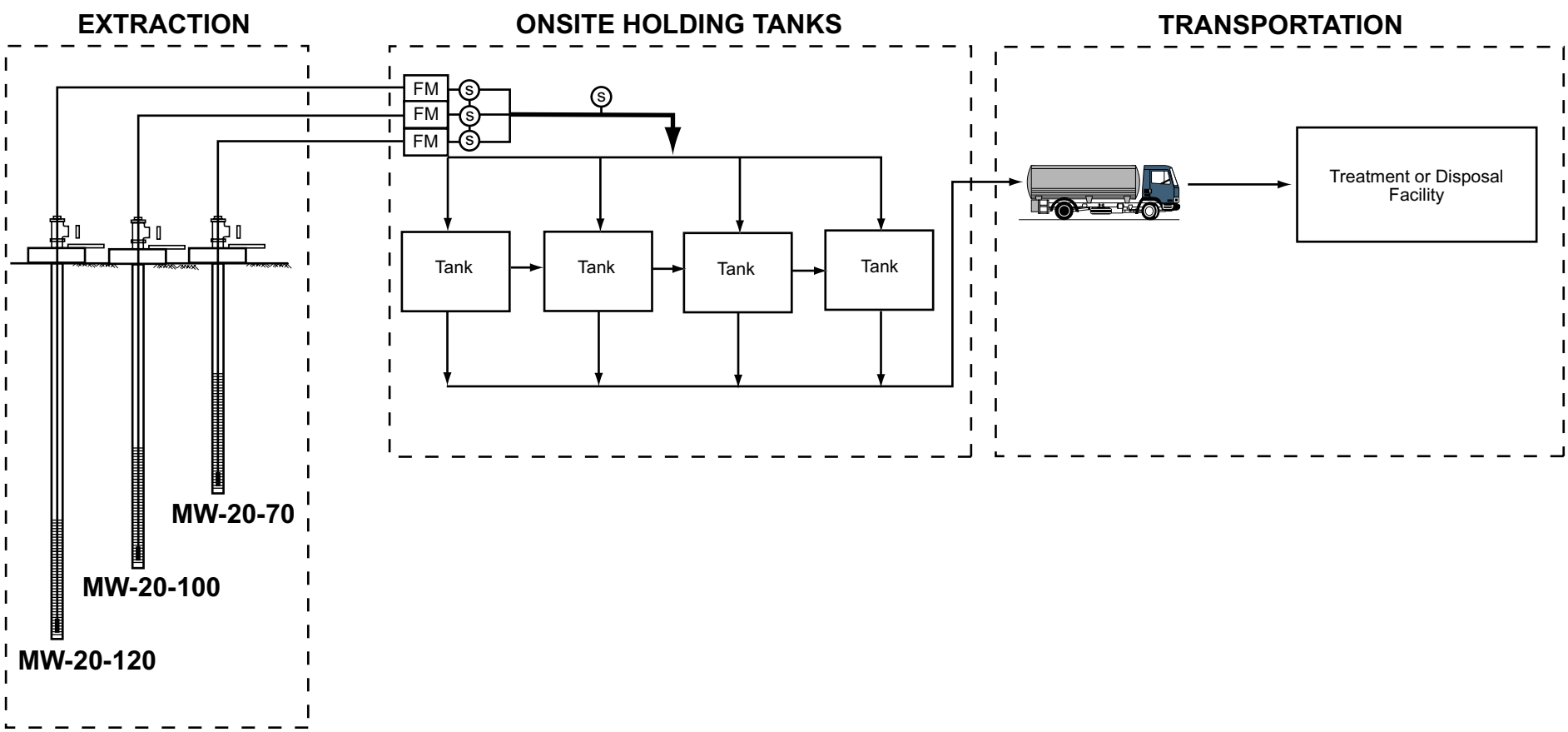


SFO \\CABERNET\PROJ\PACIFICGASELECTRICCO\170963\GIS\MXD\INTERIM_MEASURE_FIG3-1.MXD INTERIM_MEASURE_FIG3-1.PDF 02/13/2004 13:27:12



Legend:

FM Flow meter

S Sample port

Note: The number of tanks will be selected after evaluation of flow rates, required storage capacity, and available hauling capacity.

FIGURE 3-2
SCHEMATIC DIAGRAM OF INTERIM MEASURE AT MW-20 CLUSTER
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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Appendix A
Preliminary Operations and Maintenance Inspection Forms

DAILY LOG

Report Date: _____ Weather Conditions: _____

Arrival Time: _____ Temperature: _____

Departure Time: _____ Wind (est. speed and dir.): _____

Inspector Name: _____

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Items to be checked upon arrival

Unit Identification	Yes	No	Unit Identification	Yes	No
Site Security Intact:			Secondary Containment Dry		
Compound Secure:			Leaks from Piping		
System Power On:					
MW-20-70 Online					
MW-20-100 Online					
MW-20-130 Online					
Holding Tank T-1 Online			MW-20-70 Flow Rate (gpm)		
Holding Tank T-2 Online			MW-20-100 Flow Rate (gpm)		
Holding Tank T-3 Online			MW-20-130 Flow Rate (gpm)		
Holding Tank T-4 Online					

General Description of Tasks Completed or Started:

Personnel On Site

Name	Company	Purpose of Visit

Items Rented or Purchased & Purpose

Comments/ Concerns/ Problems/ Variances

Issue	Recommendation	Priority

Material Disposal Information

Material	Quantity	Transporter / Disposal Location

Upon Departure (end of each day)

Unit Identification	Yes	No	Unit Identification	Yes	No
System Power on:			Compound Secure:		
MW-20-70 Online			Road Gate Secure:		
MW-20-100 Online					
MW-20-130 Online					

System Adjustments

Component ID	Status Upon Arrival (ON or OFF)	Description of Adjustment	Status Upon Departure (ON or OFF)

Additional Comments:

Reported By: **Date:**

SYSTEM INSPECTION LOG

Report Date: _____ Weather Conditions: _____

Arrival Time: _____ Temperature: _____

Departure Time: _____ Wind (est. speed and dir.): _____

Inspector Name: _____

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MW-20-70 EXTRACTION WELL (PUMP STATUS ON/OFF)

Unit Identification	Reading/ Status	Operating Range	Comments
Flow Rate (gpm)			
Flow Totalizer (gallons)			
Water level in well (ft btoc)			
Grab sample collected			

MW-20-100 EXTRACTION WELL (PUMP STATUS ON/OFF)

Unit Identification	Reading/ Status	Operating Range	Comments
Flow Rate (gpm)			
Flow Totalizer (gallons)			
Water level in well (ft btoc)			
Grab sample collected			

MW-20-130 EXTRACTION WELL (PUMP STATUS ON/OFF)

Unit Identification	Reading/ Status	Operating Range	Comments
Flow Rate (gpm)			
Flow Totalizer (gallons)			
Water level in well (ft btoc)			
Grab sample collected			

POWER SUPPLY

Unit Identification	Reading/ Status	Operating Range	Comments
Hour Meter Readings			
Voltage Reading			
Fuel Tank Level			

GROUNDWATER LEVEL DATA

Well	Water Level (ft btoc)	Comments

Additional comments: _____

TROUBLESHOOTING AND REPAIR ACTIVITIES
Groundwater Extraction System at MW-20 Cluster
PG&E Topock Compressor Station, Needles, CA

Date	Troubleshooting and Repair Activities

Appendix B2:
IM No. 1/2 BLM Action Memo

BLM Fax Cover Sheet

Bureau of Land Management
Lake Havasu Field Office
2610 Sweetwater Avenue · Lake Havasu City, Arizona 86406
Phone (928) 505-1200 · *Fax* (928) 505-1208
Toll Free 1-888-213-2582 · *Website:* lakehavasu.az.blm.gov

Number of Pages 5
(Including this cover sheet)

Date 3-3-2004

Deliver To Terri Herson

Office CH2MHILL

Phone (___) _____ Fax (___) _____

Sender Janice Easley
for Pat Taylor Phone (928) 505-1239

Notes/Comments: The signed Action Memorandum

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAKE HAVASU FIELD OFFICE

In Reply Refer To:
CAAZCA 43660 (070)

March 3, 2004

ACTION MEMORANDUM

TO: Elaine Zielinski
State Director

FROM: Don Ellsworth
Field Manager, Lake Havasu Field Office

SUBJECT: Time Critical Removal Action,
Pacific Gas and Electric Topock Compressor Facility

I. PURPOSE

This Action Memorandum documents the basis for authorizing a time critical removal action to address the release of hazardous substances from the Pacific Gas and Electric (PG&E) Compressor Station near Topock, Arizona (hereafter "PG&E facility"). Hazardous substances released from the PG&E facility have migrated onto or under land managed by the Bureau of Land Management ("BLM") on behalf of the Bureau of Reclamation ("BOR"). Specifically, hazardous substances including, without limitation, hexavalent chromium released from the PG&E facility have been detected in groundwater under BLM-managed land. This plume of contaminated groundwater has been detected in groundwater samples collected within 150 feet of the Colorado River and is or may be migrating toward the Colorado River.

This time critical removal action is authorized pursuant to the response action authority of Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. §9604. Pursuant to Executive Order 12580, as amended, and Department of the Interior ("DOI") Departmental Manual, Section 104 response action authority has been delegated to BLM to address the release or threatened release of hazardous substances on or from land under BLM's jurisdiction, custody, or control. The purpose of the proposed time critical removal action is to prevent or abate the release of hexavalent chromium into the Colorado River.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The PG&E facility comprises approximately 265 acres located 15 miles southeast of Needles, California, south of Interstate 40, in the north end of the Chemehuevi Mountains. The facility is an inholding within the Havasu National Wildlife Refuge, is located within half a mile of BLM-managed land, and is less than one mile from the Colorado River.

PG&E has been the owner and operator of the PG&E facility since 1951 and has owned the property on which the facility is located since 1965. Beginning in 1951 and continuing to approximately 1989, PG&E conducted onsite disposal of significant quantities of wastewater

containing hexavalent chromium from the cooling towers of the compressor station at the facility. According to PG&E's estimates, from 1951 to 1969 PG&E disposed annually at least six million gallons of untreated chromium-contaminated wastewater into Bat Cave Wash, an ephemeral stream that flows north from the facility across Havasu National Wildlife Refuge and BLM-managed land emptying into the Colorado River. From 1970 until approximately 1989, PG&E also disposed of wastewater in evaporation ponds on the Refuge adjacent to BLM-managed property. In addition to these evaporation ponds, PG&E disposed of wastewater and/or other waste containing hazardous substances in a percolation bed and an unlicensed injection well at or near the facility.

B. Other Actions to Date

In 1988, PG&E completed a soil investigation in the Bat Cave Wash area at the request of the California Department of Health Services (now known as the Department of Toxic Substances Control ("DTSC")) and the U.S. Environmental Protection Agency ("EPA"). The soil investigation documented chromium contamination in the environment around the former percolation bed. A 1989 "Comprehensive Ground Water Monitoring Evaluation" prepared by the California Regional Water Quality Control Board ("CRWQCB") identified chromium contamination associated with the injection well.

By letter dated May 29, 1995, PG&E reported the presence of chromium in groundwater samples taken on the east side of Bat Cave Wash near the north boundary of the PG&E facility. In response, on February 26, 1996, DTSC and PG&E executed a Corrective Action Consent Agreement pursuant to State law under which DTSC directed PG&E to perform a "Facility Investigation" as well as any "Interim Measures" determined to be necessary to address immediate or potential threats to human health and/or the environment.

In the course of implementing groundwater monitoring required under the Corrective Action Consent Agreement, PG&E has documented an extensive plume of groundwater contaminated with hexavalent chromium that stretches from the PG&E facility under National Wildlife Refuge and BLM-managed property toward the Colorado River. On February 3, 2004, reported concentrations of hexavalent chromium of 111 parts per billion ('ppb") in groundwater taken from monitoring well MW34-80. This monitoring well is located on BLM-managed property approximately 150 feet from the Colorado River. Based on this finding, DTSC has ordered PG&E to prepare and submit Interim Measures ("IM") Workplan No. 2 "to immediately begin pumping, transport and disposal of groundwater from existing monitoring wells at the MW20 cluster." These monitoring wells are located on BLM-managed property. To facilitate the coordination of BLM and DTSC authorities for responding to groundwater contamination from the PG&E facility, this Action Memorandum authorizes PG&E to perform the activities described in IM Workplan No. 2, as specified herein.

III. THREATS TO PUBLIC HEALTH, OR WELFARE, OR THE ENVIRONMENT

As documented by recent groundwater sampling results, hexavalent chromium has been detected in significant concentrations in wells within 150 feet of the Colorado River. The Colorado River is an important drinking water source utilized by the Metropolitan Water District of Southern California, which provides drinking water to approximately 18 million people. While investigation to date has not yet confirmed that contaminated groundwater has reached the Colorado River, the proximity of the groundwater plume to the River constitutes an actual or potential threat of contamination of a significant drinking water supply. In addition, the proximity of the groundwater plume to the Colorado River constitutes an actual or potential threat to the environment.

IV. ENDANGERMENT DETERMINATION

Actual, ongoing, or threatened releases of hazardous substances through groundwater may continue to migrate toward the Colorado River and may reach the River if not addressed by implementing the time critical removal action described in Attachment 1 of this Action Memorandum. This time critical removal action is necessary to prevent or abate the release or substantial threat of release of hazardous substances into the Colorado River. Due to the proximity of the groundwater plume to the River, BLM determines, in accordance with Section 300.415(b)(2) of the National Oil and Hazardous Substances Contingency Plan ("National Contingency Plan" or "NCP"), 42 U.S.C. §300.415(b)(2), that a time critical response is necessary.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

As described specifically in Attachment 1, which is incorporated herein, the proposed time critical removal action is to pump, and transport and dispose offsite, groundwater from existing monitoring wells at the MW20 cluster in order to achieve a net reversal of the groundwater gradient away from the Colorado River. Activities on BLM-managed land called for in any transportation plan, site health and safety plan, or other plans identified in Attachment 1 that have not yet been reviewed and approved by BLM are authorized by this Action Memorandum: provided, however, that such plans are subject to BLM review and approval prior to implementation.

In the event such reversal of gradient is not achieved by pumping from the existing wells identified in Attachment 1, additional existing wells may be pumped, or new wells may be sited, installed, tested and pumped, to achieve such reversal. Any such additional wells are authorized by this Action Memorandum: provided, however, that utilization of such wells is subject to BLM review and approval prior to installation or pumping.

Because such actions will be financed by PG&E, BLM has not determined the estimated costs to implement this time critical removal action.

VI. EXPECTED CHANGE IN SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

In the event response action is delayed or not taken, hazardous substances may be released, or there is a substantial threat of such release, into the Colorado River.

VII. OUTSTANDING POLICY ISSUES

BLM is coordinating this time critical removal action with work required of PG&E pursuant to the Corrective Action Consent Agreement issued by DTSC. This coordination of BLM CERCLA authorities and State RCRA authorities is intended to facilitate and streamline PG&E's performance of work necessary to protect the Colorado River. BLM must ensure, however, that such work is performed in a manner consistent with CERCLA, the National Contingency Plan (42 U.S.C. Part 300), and other applicable Federal requirements. In the event that Federal requirements are not satisfied through this coordination effort, BLM may be required to initiate, or require PG&E to perform, activities independent of State law.

VIII. ENFORCEMENT

BLM and DOI have determined that PG&E is a responsible party pursuant to Section 107 of CERCLA, 42 U.S.C. § 9607. As defined by CERCLA, PG&E is the owner and operator of the PG&E facility from which hexavalent chromium has been released into the environment. Hexavalent chromium is a hazardous substance under CERCLA.

By letter dated February 12, 2004, DOI has notified PG&E of its potential liability under CERCLA and has requested that PG&E enter into an administrative order on consent ("AOC") by which PG&E would agree to reimburse DOI, BLM, and other DOI bureaus for response costs incurred in overseeing PG&E's performance of response action on Federal property. In the event that DOI is unable to reach an agreement with PG&E over the terms of this AOC, DOI may decide to take response action unilaterally, may initiate enforcement action or take any other measures necessary to direct or require PG&E to perform response action, and seek to recover all response costs incurred from PG&E.

IX. RECOMMENDATION

This decision document identifies the current proposed time critical removal action to prevent or abate releases of hexavalent chromium from the PG&E facility from migrating to the Colorado River. BLM has determined that PG&E is capable of performing this removal action in a manner consistent with the NCP, contingent on PG&E's full compliance with the requirements of this Action Memorandum including Attachment 1. Conditions at the site meet the criteria for undertaking the proposed time critical removal action, as specified by Section 300.415 (b)(2) of the NCP, 40 CFR § 300.415(b)(2). We recommend your approval of the proposed time critical removal action.

Carl Rountree

Approval

5/3/04

Date

Disapproval

Date

Attachment:

Interim Measures Workplan No. 2

Appendix B3:
Batch Treatment Work Plan

Batch Treatment Work Plan
Topock Compressor Station
Needles, California

Prepared for

Department of Toxic Substances Control

United States Bureau of Land Management

On behalf of

Pacific Gas and Electric Company

April 30, 2004

CH2MHILL

Batch Treatment Work Plan
Topock Compressor Station
Needles, California

Prepared for
Department of Toxic Substances Control
and the Bureau of Land Management
on behalf of
Pacific Gas and Electric Company

This work plan was prepared under supervision of a
California Professional Engineer

John Porcella, PE
Senior Engineer

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A Conditional Authorization Submittal to San Bernardino County Fire Department (provided as separate volume)

B Notification of Conditional Authorization from San Bernardino County Fire Department (provided as separate volume)

C Influent and Effluent Water Quality Concentrations

Acronyms and Abbreviations

BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CUPA	Certified Unified Program Agency
DTSC	Department of Toxic Substances Control
IMWP	Interim Measures Work Plan
mg/L	Milligrams per liter
O&M	Operations and maintenance
PG&E	Pacific Gas and Electric Company

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). In a letter dated January 22, 2004, DTSC directed PG&E to prepare an Interim Measures Work Plan (IMWP) to mitigate potential impacts of chromium in groundwater on the Colorado River pursuant to the Section IV.A. of the Corrective Action Consent Agreement between DTSC and PG&E. The DTSC determined that immediate action was required to prevent and/or mitigate potential impacts to the Colorado River pursuant to the Section IV.A. of the Corrective Action Consent Agreement between DTSC and PG&E. Assisting DTSC and PG&E are the members of the Topock Consultative Workgroup, constituted under California's Site Designation Process and consisting of representatives of DTSC, the Colorado River Basin Regional Water Quality Control Board, State Water Resources Control Board, Metropolitan Water District of Southern California, Arizona Department of Environmental Quality, Mohave County Department of Public Health (Arizona), and the various federal agencies, including the Bureau of Land Management (BLM), Bureau of Reclamation, the United States Fish and Wildlife Service, who own or manage land overlying the chromium plume.

By an Action Memorandum dated March 3, 2004, the Arizona State Director of the United States BLM has authorized PG&E to conduct a time-critical removal action encompassing groundwater extraction and other specified activities on BLM-managed property pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). PG&E is currently extracting groundwater and storing it in tanks at the MW-20 bench location. The stored groundwater is transported off-site in trucks (See Section 2.0).

PG&E is requesting approval of BLM to operate a batch treatment system for groundwater extracted from extraction wells TW-2S and TW-2D at the MW-20 bench north of the PG&E Topock Compressor Station in Needles, California. Such treatment will be part of the interim measures now being conducted at the property owned by the Bureau of Reclamation and managed by BLM. PG&E believes that performing such treatment as a component of the interim measures offers significant advantages from logistical and technical perspectives and may help expedite the installation and operation of critical remedial facilities. This treatment system upgrade will cause no significant change in the traffic or the system footprint, a minor visual change, and greater than a 99 percent reduction in the volume of hazardous waste generated at the BLM groundwater extraction site.

Treatment of extracted groundwater at the MW-20 bench location in existing tanks, and the transport of that water from this location in trucks, will continue until adequate facilities, such as pipelines, are in place to allow the direct conveyance of extracted groundwater to holding and/or treatment facilities. The construction and operation of such facilities on BLM land will require the review and approval of BLM. Approval for such facilities will be requested in a separate application at a future time.

PG&E proposed using a batch treatment process as outlined in the *Interim Measures Work Plan No. 2,* dated March 3, 2004 (CH2M HILL 2004a). The goal of batch treatment is to substantially reduce the volume of concentrated hexavalent chromium-bearing groundwater. Batch treatment will increase water disposal options to nearby treatment facilities and reduce risk during transport to the treatment facilities. The remainder of this document describes the regulatory framework, batch treatment process, modifications to the groundwater extraction system, waste management practices, schedule, and mitigation measures.

2.0 Description of Batch Treatment Process

The current interim measures system is sited on a flat bench of land at the MW-20 cluster and consists of six 19,500-gallon storage tanks, piping, secondary containment, operations crew storage and work facilities, and security fencing. PG&E began extracting groundwater into the tanks on March 8, 2004. Groundwater is pumped from the tanks into trucks, which haul the water to the US Filter's licensed hazardous waste treatment and disposal facility in Los Angeles, California. Extracted groundwater contains hexavalent concentrations exceeding the toxicity characteristic threshold concentration for hazardous waste, requiring that the waste be treated and disposed of at a licensed hazardous waste treatment facility. At current pumping rates, five to six trucks are required to make daily trips to the treatment facility to remove the accumulated groundwater from the tanks. These trucks log more than 8,000 miles per week in hazardous waste transport.

Integrating batch treatment with the interim measures would result in greater than a 99 percent reduction in the volume of hazardous waste generated at the extraction site. The batch treatment activities involves:

- Developing a planning and approval process for system modifications to incorporate batch treatment within the existing holding tanks.
- Modifying the existing system.
- Extracting groundwater from extraction wells TW-2S and TW-2D.
- Treating the extracted groundwater on site.
- Transporting and disposing the treated groundwater.
- Transporting and disposing sludge from the clarifier.

Figure 1 shows the MW-20 bench location with the existing tank system and the batch treatment equipment. Figure 2 schematically shows the components of the batch treatment process.

2.1 Regulatory Framework for On-site Treatment

In California, hazardous waste treatment falls under both California and federal law. Because PG&E will be treating the extracted groundwater in tanks, and the groundwater is hazardous solely due to the presence of inorganic constituents at concentrations above the toxicity characteristic threshold, the statute (Section 25200.3 of the California Heath and Safety Code) allows hexavalent chromium treatment (reduction to trivalent chromium) to be conducted pursuant to a grant of conditional authorization (without obtaining a hazardous waste facilities permit), provided that certain conditions exist. The conditional authorization for reduction of hexavalent chromium in solution requires that the pre-treatment concentration of hexavalent chromium be less than 750 milligrams per liter (mg/L) and that treatment be conducted using one of a specified list of reagents (including ferrous chloride).

California has delegated permitting authority to a local agency referred to as the Certified Unified Program Agency (CUPA). The CUPA for the Topock site is the San Bernardino County Fire Department. Notice of intent to treat waste under a conditional authorization must be made to DTSC and the applicable CUPA not less than 60 days before undertaking such treatment. The statue provide that DTSC may allow treatment to begin within a shorter time period, upon showing of good cause by the generator (and provided that all other permits and authorizations have been obtained).

PG&E provided notice of its intention to treat under a conditional authorization by letter to the San Bernardino County Fire Department dated April 13, 2004. The Fire Department acknowledged receipt of the notification by letter to PG&E dated April 14, 2004. The conditional authorization forms were submitted to the CUPA (Attachment A), and the CUPA verbally authorized the project on April 14, 2004. Appendix B contains a copy of the approval letter sent by the CUPA. PG&E's understanding is that DTSC has no objection to a reduction in the 60-day notice period pursuant to California Health and Safety Code Section 25200.3(e)(2), provided that the CUPA concurs with such a reduction, given the significant environmental benefits associated with batch treatment at this site, including a need to protect the Colorado River.

Activities at the BLM Groundwater Extraction Site are being conducted in compliance with various federal, state, and local requirements for environmental protection. Because groundwater extracted at the site exceeds the hazardous waste regulatory threshold for hexavalent chromium, management of site groundwater accumulated in on-site tanks (for less than 90 days) is in compliance with hazardous waste generator standards, including the preparing an emergency preparedness and contingency plan, implementing a training program, conducting regular inspections, and performing various record-keeping and reporting practices. Each of these plans and control measures will be updated, as appropriate, upon implementation of the batch treatment process.

2.2 Benefits of Batch Treatment

There are several benefits to batch treatment of extracted groundwater at this site, including risk reduction and flexibility in reuse or discharge.

- **Risk reduction—** Federal and state agency guidance encourages generators including federal facilities to reduce the volume of hazardous waste generated for disposal. By treating groundwater in the tank system, PG&E can reduce the hexavalent chromium concentration below toxicity characteristic threshold concentrations, rendering it non-hazardous. This results in a reduction in volume of hazardous waste produced by over 99 percent and there is an immediate reduction in risk at the MW-20 bench area from spills and leaks. Transporting non-hazardous groundwater also offers less risk of environmental damage in the event of releases during transport from the site to the treatment facility.
- **Flexibility of discharge and reuse options—**Batch treatment is very flexible; it can accommodate a relatively wide range of pumping rates, and the length of treatment can be varied to accommodate reuse or discharge limitations. This allows for evaluation of potentially viable reuse of the treated water.

In summary, operating a batch treatment process significantly reduces environmental risks during trucking and storage, reduces the volume of hazardous waste generated, and requires only minimal modifications to existing facilities.

2.3 Modifications to the Existing Tank System

As outlined in the IMWP No. 2 (CH2M HILL 2004a), batch treatment would take place in the tanks in use at the MW-20 bench. The tanks would be retrofitted with internal piping and devices (venturi eductors) to ensure proper mixing of the groundwater with reducing and precipitating agents. Equipment to be procured includes a clarifier, or settling vessel, with the following dimensions: approximately 21 feet high, 7.5 feet wide, and 15 feet long. Within the clarifier there are two components; the settling chamber where the solids begin to settle and the thickener where the sludge forms. A filter may be used as an optional step to further remove particulates from the treated water. The clarifier and all other associated system piping, instrumentation, and controls would be installed within the footprint of the existing fenced extraction facilities. PG&E proposes to store the reducing agents (25 to 40 percent solution of ferrous chloride) and pH control chemicals (35 percent solution of sulfuric acid and 25 percent solution of sodium hydroxide) at the compressor station. If necessary, hydrogen peroxide (28 to 35 percent solution) may be stored on site for use in iron removal. Only one 55-gallon drum of each of the three reagents used in the treatment process would be stored at the treatment system location within the area protected by the containment berms. When the drums of reagents are empty, they would be removed and replaced with full drums brought from the compressor station. Re-circulation pumps on each of the two batch treatment tanks would be used to ensure sufficient mixing of the chemicals and groundwater to complete the treatment reaction.

2.4 Treatment of Extracted Groundwater

2.4.1 Process Chemistry Details

The treatment involves reducing the hexavalent chromium to the less soluble trivalent form by reaction with ferrous chloride in a solution made slightly acidic through the addition of sulfuric acid. Following that reaction, the addition of sodium hydroxide precipitates iron and trivalent chromium. The water and precipitated solids then are pumped from the tanks into a clarifier, where the majority of precipitated solids would be removed by gravity separation. Solids separated from the water stream in the clarifier will be contained in 400-gallon tote-style containers (up to four totes will be sited). Additional solids removal may be provided by passing the clarified water through an additional filtration step, such as a sand filter or microfilter. The treatment goal for the effluent is less than 1 mg/L for total chromium.

The reaction between hexavalent chromium and ferrous iron is:

$$H_xCrO_4^{x-2}(aq) + 3Fe^{2+}(aq) + iH_2O \leftrightarrow Cr(OH)_y^{3-y}(aq) + 3Fe(OH)_z^{3-z}(aq) + jH^+ \quad (1)$$

(Cr^{+6}) (Fe^{+2}) (Cr^{+3}) (Fe^{+3})

where $i = (y + 3z)$ and $j = (x + y + 3z)$.

The reaction proceeds quickly, and the reaction kinetics or rate of reaction comes from the following relationship (*Environ. Sci. & Technol.*, Volume 30, No. 5, 1996, pp. 1614 – 1617):

$$\frac{d[Cr(VI)_t]}{dt} = -k_{Cr}[Fe(II)]^{0.6}[Cr(VI)_i]^{1.0} \quad (2)$$

Where:

k_{Cr} = 56.3 millimole$^{-0.6}$ minute^{-1} L$^{0.6}$.

[Cr(VI)] = hexavalent chromium, millimole/L.

[Fe(II)] = initial Fe(II), millimole/L.

i and t = subscripts indicating **i**nitial and elapsed reaction **t**ime, respectively.

Tables C-1 and C-2 of Appendix C show influent and effluent water quality concentrations for nominal and maximum cases, respectively.

2.4.2 Operational Details

The treatment of extracted groundwater will be performed in batch mode. Two of the existing holding tanks will be used as batch treatment tanks. The batch treatment cycle is conducted as follows: groundwater is pumped into an existing holding tank used as a receiving tank and is then pumped into one of the two treatment tanks. When the treatment tank is full, the operator starts the treatment process. The pH of the tank is lowered by the addition of sulfuric acid. Ferrous chloride is pumped into the treatment tank, and the tank mixing pumps circulate the water throughout the tank.

Sodium hydroxide then is pumped into the treatment tank at a rate sufficient to raise the pH to a target range of 7.5 to 8.2. Increasing the pH precipitates the iron and chromium as hydrous iron oxide and chromium hydroxide, respectively.

The treatment tank contents are field screened to ensure that treatment has been effective. Upon confirmation that the treatment goal has been met using a HACH kit (colorimetric testing to measure chromium concentrations), the water and precipitated solids are pumped to a clarifier for settling. At the end of the treatment cycle, the water that is pumped through the clarifier is conveyed to the treated water storage tank. The treated water is then pumped from this holding tank into trucks for transport to an off-site treatment or disposal facility.

Periodically, the tote (sludge container) will be removed, and the contents will be disposed of in a licensed off-site treatment and disposal facility. Calculated sludge generation rates are about 625 pounds per week, assuming an influent concentration of 7.5 mg/L of hexavalent chromium at 17 gallons per minute of flow. Up to four totes will be present on site to ensure continuous system operation.

2.4.3 Operators

Site operators will be responsible for daily operation of the system. Each operator will be trained on proper operation of system equipment, field instruments and monitoring equipment, appropriate documentation, and will be familiar with the normal operating ranges of system components. The operator will also have the necessary training for hazardous waste operations. The pumping and storage system will be equipped with automatic shutoffs to prevent tank overflow and pipe failures. The automatic shutoffs combined with site inspection will provide operational reliability and safety.

System operations and maintenance (O&M) will be completed by the site operators. The site operator will record O&M activities in designated field log books, daily logs, and inspection forms, in the same manner outlined in IMWP No. 2 (CH2M HILL 2004a).

2.4.4 Site Security

The current system offers security to safeguard against vandalism and injury. During setup of the batch treatment equipment, all appropriate security measures will be implemented for the express purpose of providing safety to operators and the public. These measures include:

- Maintaining appropriate staffing during operations until security measures can be installed.
- Maintaining a visitor log to document person(s) accessing the property.
- Maintaining site security fencing consisting of 6-foot-high, steel chain-link fabric and post-construction enclosing all extraction, storage, and treatment facilities and appurtenances. Access is through locked truck and personnel gates in the fencing. Access for trucks is available 24 hours per day, although every effort will be made to schedule all truck loading and shipments to occur during daylight hours.
- Posting warning signs (e.g., no trespassing, safety hazard signs) at several locations on each leg of the security fence.

The Environmental Compliance Plan, submitted as an addendum to the IMWP No. 2 (CH2M HILL 2004b), contains details on the language of warning signs, their number, and specific placement on the fence, as well as the types, locations, and sizes of gates and locks to be used. The site security measures will be inspected and maintained as necessary during system operation.

2.4.5 Emergency Response

Spill containment equipment (e.g., sorbent materials, shovels, etc.) will be maintained on site at all times. As a contingency in the event of a leak from the storage tank or equipment (vacuum trucks, pumps, etc.), trained spill response personnel will be on call 24 hours per day. PG&E will retain the services of a spill response contractor who will have the capability to mobilize to the site within 2 hours, if needed. As an added contingency, the Topock Compressor Station is manned 24 hours per day. Emergency response procedures, including the identification of the on-call spill response contractor, are provided in the Environmental Compliance Plan.

2.5 Documentation and Reporting

The following documentation and reporting activities are proposed to effectively communicate the batch treatment system operation and effectiveness. This is consistent with the proposed documentation described in the IMWP No. 2 (CH2M HILL 2004a).

- **System operations documentation:** Logs and forms will be used to record information on the operational status of the system, including system runtime(s), flow data, sampling/waste characterization data (as available), transportation and disposal information, system troubleshooting, site security, and maintenance activities. System operations notes and forms will be compiled and summaries made available monthly to DTSC as part of the performance monitoring reports (see below).
- **Performance monitoring reports:** Bi-monthly performance reports will be expanded to include batch treatment system operational and performance data.

2.6 Indemnity

PG&E agrees to indemnify and hold harmless BLM, its agents, and employees from any and all claims or causes of action arising from or on account of acts or omissions of PG&E, its employees, successors, agents, contractors, subcontractors, or other persons, in carrying out activities under this Batch Treatment Work Plan. PG&E further agrees that the United States, and its agencies and employees, shall not be held as a party to any contract entered into by PG&E in carrying out activities under this work plan.

3.0 Project Schedule

The table below shows the proposed project schedule with estimated duration of many critical activities. System operations reports will be submitted as discussed in Section 2.5. Performance monitoring reports are being submitted on the 1st and 15th of each month. Future modifications of the groundwater extraction system for the comprehensive interim measure are not shown in this schedule. PG&E's ability to meet this schedule is dependent upon BLM's authorization of the interim measure through the issuance of an Action Memorandum as a time-critical removal action under CERCLA. Without this authorization, PG&E does not have permission to install any batch treatment system equipment.

Activity	Duration	Start	Finish
Batch Treatment Work Plan and Agency Review	**20 days**	**4/21/04**	**5/11/04**
Prepare Draft	10 days	4/21/04	4/30/04
DTSC Review	5 days	4/30/04	5/5/04
BLM Review	5 days	4/30/04	5/5/04
Final to DTSC and BLM	5 days	5/6/04	5/11/04
Agency Authorization	**3 days**	**5/11/04**	**5/14/04**
BLM Authorization	3 days	5/11/04	5/14/04
DTSC Authorization/CEQA Exemption	3 days	5/11/04	5/14/04
System Installation	**14 days**	**5/14/04**	**5/28/04**
System Modification	11 days	5/14/04	5/25/04
System Startup and Testing	3 day	5/25/04	5/28/04

4.0 Waste Management Practices

This section describes the waste management practices for the waste streams anticipated for batch treatment operations. The primary waste streams generated from batch treatment are treated groundwater and sludge.

Based on the current pumping rates, up to 25,000 gallons of water are expected to be generated daily. Extracted groundwater will be pumped from the wells to the receiving tank. The holding tanks and associated piping will meet state and federal requirements for storage of hazardous waste in tank systems (e.g., secondary containment).[1] Representative samples of the treated groundwater will be collected and analyzed at least weekly to determine chromium concentrations. As necessary, additional analyses will be performed to fine-tune the batch treatment system and/or meet requirements of the treated water and/or sludge disposal facilities.

Following treatment, the water will no longer be considered hazardous. The treated water will be pumped to vacuum trucks for transportation off site. It is anticipated that the treated water storage tank will be emptied daily. The hazardous waste generated on site, including the precipitated chromium sludge, will be periodically removed for disposal and will not exceed 30 days of generation (in compliance with the hazardous waste generator standard of less than 90 days).

Additional hazardous waste management practices include:

- Labeling tanks to include the tank number, contents, designation as hazardous waste (if appropriate), and the National Fire Protection Association hazard warning "fire diamond."
- Performing daily inspections of the tank systems,[2] which includes tanks, piping, and pumps.
- Performing periodic inspections of emergency equipment.[3]
- Training personnel in hazardous waste management, commensurate with their responsibilities.[4]
- Preparing procedures for responding to unplanned releases, etc.[5]

The Environmental Compliance Plan describes the practices listed above, and copies of the plan are maintained on site. The plan will be updated to address batch treatment of chromium and storage of associated chemical reagents. This plan will include copies of permits, forms, and procedures for environmental practices at the site ensuring compliance

[1] 22 CCR Section 66262.34 and Section 66265.190 et seq.
[2] 22 CCR Section 66262.34 and 66265.195
[3] 22 CCR Section 66262.34 and 66265.33
[4] 22 CCR Section 66262.34 and 66265.16
[5] 22 CCR Section 66262.34 and 66265.30-37

with federal, state, and local requirements. The primary focus of the Environmental Compliance Plan is hazardous materials and waste management. It addresses the requirements of the CUPA (San Bernardino County Fire Department) for a Business Plan, including spill prevention and response measures and manifesting of hazardous waste.

A United States Environmental Protection Agency Spill Prevention, Control and Countermeasure Plan is not required because the oil storage capacity will not exceed 1,320 gallons. Fuel used in the diesel generator is the only petroleum product present on site. Spill prevention and control measures for the fuel is addressed in the (Hazardous Materials) Business Plan, prepared in accordance with the requirements of the local CUPA.

Personal protective equipment and disposable sampling equipment designated as non-hazardous waste will be double-bagged and disposed of in dumpsters at the station. In the unlikely event that such equipment is ever designated as hazardous waste, it will be disposed of at a permitted facility in compliance with all hazardous waste regulatory requirements.

5.0 Mitigation Measures

At a minimum, the following restrictions and controls related to protection of biological and cultural resources will be complied with in implementing batch treatment. These measures were initially presented in the IMWP No. 2 (CH2M HILL 2004a) and are reproduced here.

1. The Mojave population of the desert tortoise is federally protected as a threatened species under the Endangered Species Act of 1973 and is protected by California law. Prohibited actions include capture, handling, harassing, collecting, injuring, or destroying animals or their burrows. Any sightings of desert tortoise must be reported immediately to the BLM Lake Havasu Field Office Wildlife Biologist.

2. All personnel are to report any sightings of desert tortoise, bighorn sheep, other wildlife species and federally listed migratory birds (such as bald eagle, brown pelican, etc.) to the BLM Lake Havasu Field Office, Wildlife Biologist.

3. If a desert tortoise is endangered by any activity, that activity will cease until the desert tortoise moves out of harm's way on its own accord. A desert tortoise that needs to be handled, to prevent injury or death, must be handled by a certified/qualified handler only.

4. The area within the fence will be inspected at least every four hours during periods when the gates are open for desert tortoise that may become trapped inadvertently within the enclosure. All vehicles stationary for 15 minutes or longer will be inspected underneath for desert tortoise prior to moving. In the event that a tortoise is found within the fenced area or under a vehicle, that tortoise will be handled only by a certified handler.

5. All native riparian species (e.g., cactus, ocotillo, mesquite, Palo Verde, etc.) will be avoided at all times. California-listed sensitive species of plants can be trimmed but not removed.

6. All construction trash and/or debris will be removed.

7. All vehicles must stay on the existing and approved routes. No vehicles are authorized to drive in the existing washes.

8. PG&E will notify immediately the BLM Lake Havasu Field Manager (or his designated representative) of any cultural resources (prehistoric/historic sites or objects) and/or paleontological resources (fossils) encountered during permitted operations and will maintain the integrity of such resources pending subsequent investigation. All operations in the immediate area of the discovery must be suspended until written authorization from BLM to proceed is issued. An evaluation of the discovery shall be made by a qualified archaeologist or paleontologist to determine appropriate actions to prevent the loss of significant cultural or scientifically important paleontological values.

9. No permanent improvements that affect the integrity of the bridge/culvert over Bat Cave Wash on historic Route 66 will be implemented. This feature has been analyzed by

a structural engineer to determine if there will be any adverse effects as a result of transporting the pumped water from the MW-20 bench via truck. Caltrans maintenance records indicate that the structure has an operation rating that exceeds the anticipated load of the haul trucks.

10. Actions that result in impacts to archaeological or historical resources are subject to the provisions of the Archaeological Resources Protection Act of 1979, as amended, and the Federal Land Policy and Management Act of 1976.

6.0 References

CH2M HILL. 2004a. *Interim Measures Work Plan Number 2, Topock Compressor Station, Needles, California.* March 3.

_____. 2004b. *Addenda to Interim Measures Work Plan Number 2, Topock Compressor Station, Needles, California.* March 3.

Figures

LEGEND

- Evacuation Route
- ERE — Emergency Response Equipment
- FE — Fire Extinguisher
- Gate
- MSDS BEP — Material Safety Data Sheets & Business Emergency Plan
- Valve
- Fence
- ① Receiving Tank
- ② Batch Treatment Tank #1
- ③ Batch Treatment Tank #2
- ④ Treated Water Storage Tank
- ⑤⑥ Receiving or Treated Water Storage Tank
- Ⓐ 55-Gallon Drum of Sulfuric Acid Solution
- Ⓕ 55-Gallon Drum of Ferrous Chloride Solution
- Ⓒ 55-Gallon Drum of Sodium Hydroxide Solution

NOTES

1. EXACT LOCATION OF CLARIFIER, 55-GALLON DRUMS, FILTER AND TOTE CONTAINERS WITHIN THE CONTAINMENT AREA WILL BE DETERMINED IN THE FIELD.

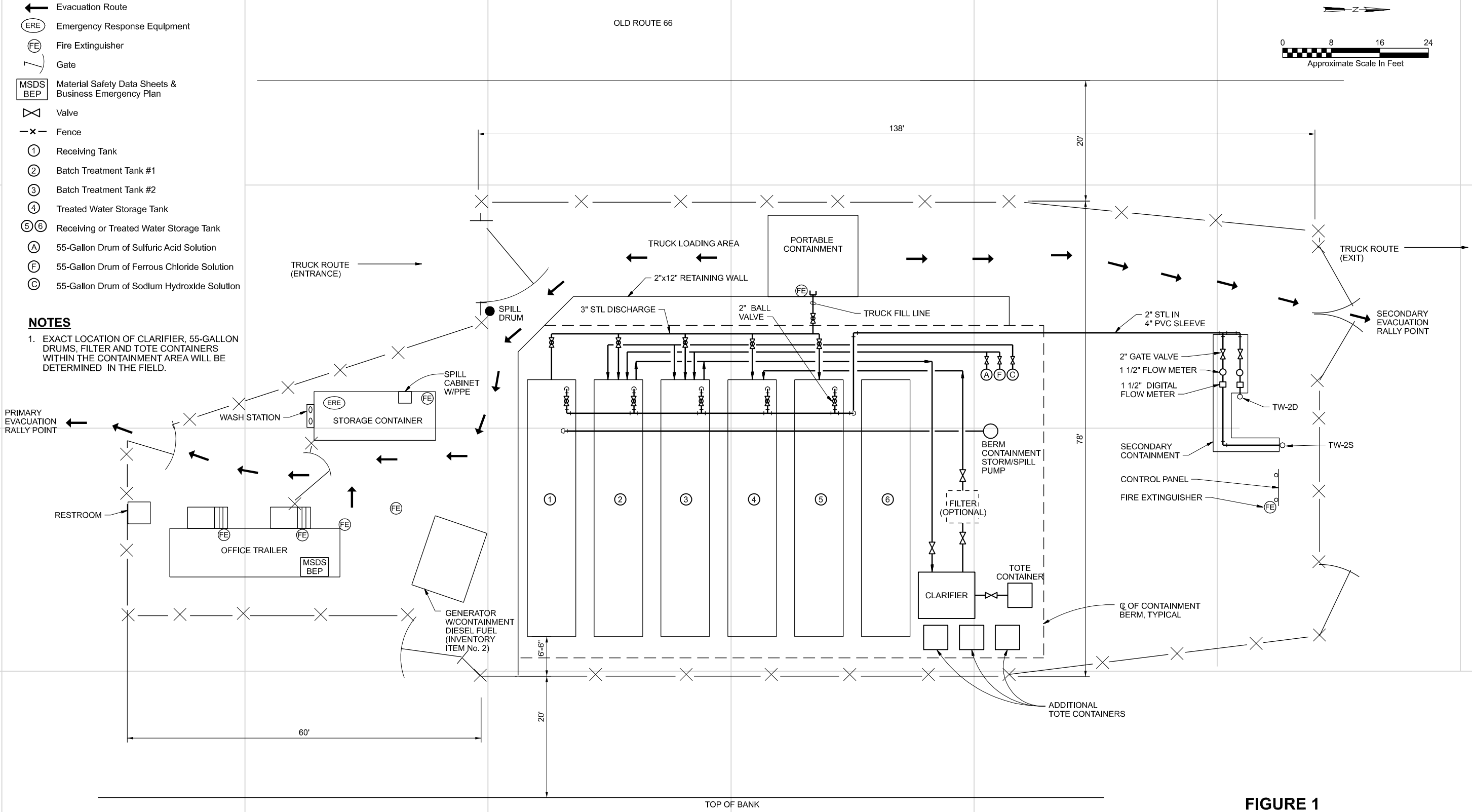
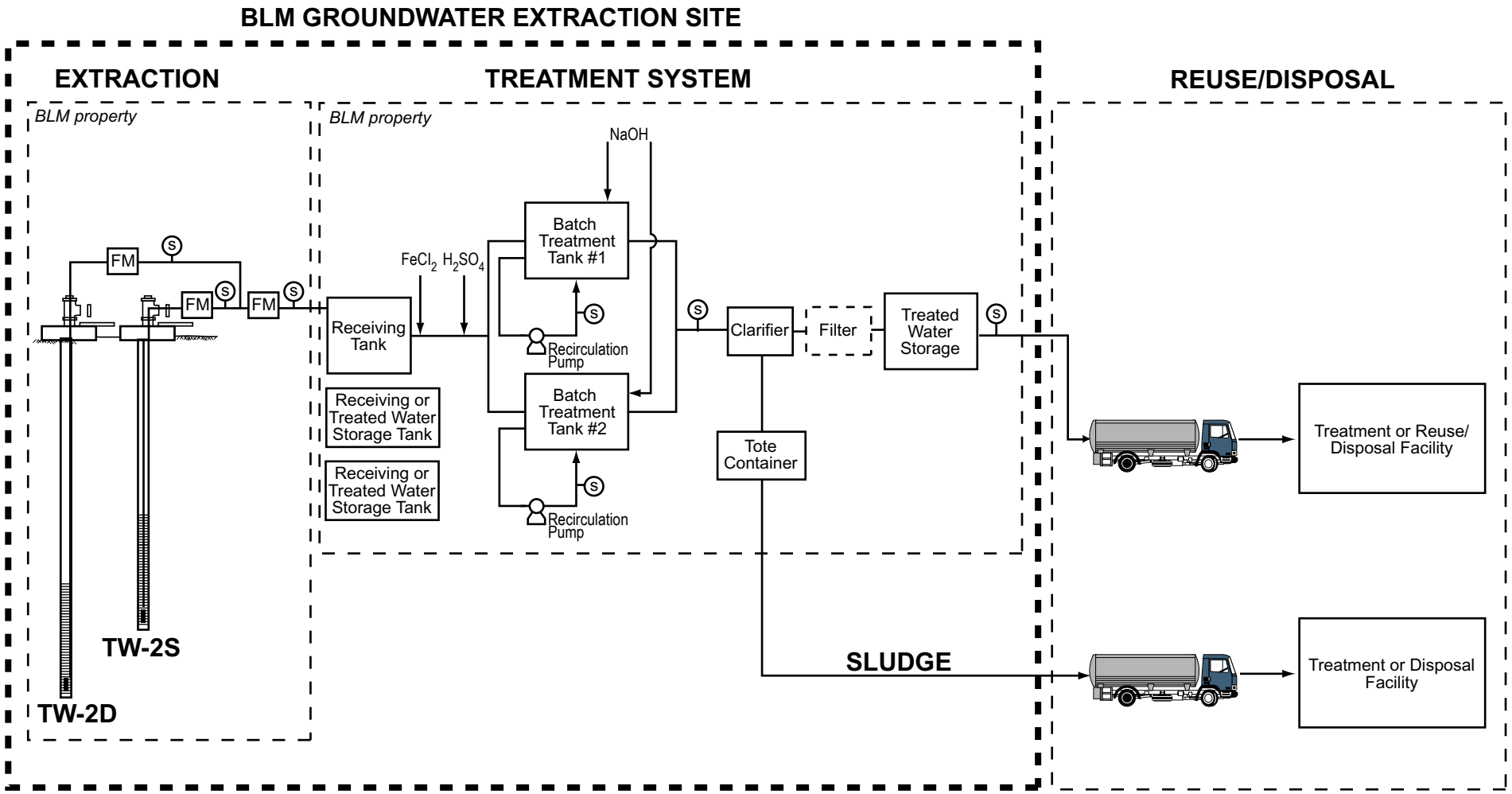


FIGURE 1
FACILITY MAP
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

NDM:PGE SITE REMED\DELIV\TOPOCK SITE02.DGN 29-APR-2004



LEGEND

FM FLOW METER

S SAMPLE PORT

Notes:

1. Assumes current pumping rate of 16-17 gpm from TW-2S and TW-2D.
2. $FeCl_2$ - Ferrous chloride, reducing agent
   NaOH - Sodium hydroxide, precipitating agent
   H_2SO_4 - Sulfuric acid, pH control
3. A filter (sand or microfilter type) may be installed for additional particulate removal.
4. Two additional storage tanks at the existing extraction will be used as receiving water tanks or for treated water storage as required.

FIGURE 2
BATCH TREATMENT SCHEMATIC DIAGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

315024.IM.01_Batch Treatment_4/29/04_ccc

Appendix A
Conditional Authorization Submittal to San Bernardino County Fire Department (separate volume)

Appendix B
Notification of Conditional Authorization from San Bernardino County Fire Department (separate volume)

Appendix C
Influent and Effluent Water Quality Concentrations

TABLE C-1
Nominal Influent and Effluent Stream Compositions
Batch Treatment Work Plan, Topock Compressor Station

	Influent	**Effluent**
Cr(VI), mg/L	7.5	<1
Cr(T), mg/L	8.5	<1
Ca, mg/L	282	282
Mg, mg/L	44	44
Na, mg/L	933	933
K, mg/L	21.4	21.4
Sr, mg/L	5.65	5.65
Ba, mg/L	0.05	0.05
CO_3, mg/L	3.6	0.05
HCO_3, mg/L	161	101.5
SO_4, mg/L	808	836
Cl, mg/L	1,277	1,293
NO_3, mg/L	58.9	58.9
F, mg/L	0.95	0.95
SiO_2, mg/L	18.8	18.8
CO_2, mg/L	4	32.9
∑(ions), mg/L	3,420	3,516
pH	7.8	6.7

TABLE C-2
Maximum Influent and Effluent Stream Compositions
Batch Treatment Work Plan, Topock Compressor Station

	Influent	**Effluent**
Cr(VI), mg/L	19	<1
Cr(T), mg/L	19	<1
Ca, mg/L	851	851
Mg, mg/L	801	801
Na, mg/L	7316	7316
K, mg/L	85.2	85.2
Sr, mg/L	[3.0][a]	[3.0]
Ba, mg/L	[0.05]	[0.05]
CO_3, mg/L	-	[0.05]
HCO_3, mg/L	612.9	223.1
SO_4, mg/L	2,800	3,107
Cl, mg/L	12,233	12,233
NO_3, mg/L	-	-
F, mg/L	-	-
SiO_2, mg/L	[20]	[20]
CO_2, mg/L	6.3	287.6
∑(ions), mg/L	24,722	24,739
pH	7.06	6.1

[a][ ] denotes data unavailable, assumed or estimated concentration.

Appendix B4:
IM No. 2 BLM Action Memo

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Lake Havasu Field Office
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406-9071
www.az.blm.gov

TAKE PRIDE IN AMERICA

In Reply Refer To:
CAAZCA 43660 (070)
2640

May 20, 2004

ACTION MEMORANDUM

RECEIVED LAKE HAVASU FIELD OFFICE
2004 MAY 24 A 11:09
LAKE HAVASU CITY, AZ

To: State Director

From: Field Manager, Lake Havasu Field Office

Subject: Time Critical Removal Action,
Pacific Gas and Electric Topock Compressor Facility

I. PURPOSE

This Action Memorandum documents the basis for authorizing a time critical removal action to respond to the release of hazardous substances from the Pacific Gas and Electric (PG&E) Compressor Station near Topock, Arizona (hereafter PG&E facility). Hazardous substances released from the PG&E facility have migrated onto or under land managed by the Bureau of Land Management (BLM). Specifically, hazardous substances including, without limitation, hexavalent chromium released from the PG&E facility have been detected in groundwater under BLM-managed land. This plume of contaminated groundwater has been detected in groundwater samples collected within 100 feet of the Colorado River and is or may be migrating toward the Colorado River.

This time critical removal action is authorized pursuant to the response action authority of Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA), 42 U.S.C. §9604. Pursuant to Executive Order 12580, as amended, and Department of the Interior (DOI) Departmental Manual, Section 104, response action authority has been delegated to BLM to address the release or threatened release of hazardous substances on or from land under BLM's jurisdiction, custody, or control. The purpose of the proposed time critical removal action is to reduce the volume of hazardous waste transported off site from the MW20 well cluster. Hazardous waste is being generated as a result of the extraction of groundwater contaminated with hexavalent chromium from extraction wells TW-2S and TW-2D at the MW20 well cluster as previously authorized by Action Memorandum dated March 3, 2004.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The PG&E facility comprises approximately 265 acres located 15 miles southeast of Needles, California, south of Interstate 40, in the north end of the Chemehuevi Mountains. The facility is on private land adjacent to the Havasu National Wildlife Refuge (Refuge) and BLM-managed land and is less than one mile from the Colorado River.

PG&E has been the owner and operator of the PG&E facility since 1951 and has owned the property on which the facility is located since 1965. Beginning in 1951 and continuing to approximately 1989, PG&E used hexavalent chromium as a corrosion inhibitor and algaecide in the cooling towers at the facility. The cooling tower water was dumped directly into Bat Cave Wash, an ephemeral stream that flows north from the facility, across the Wildlife refuge, and directly into the Colorado River. According to PG&E's estimates, from 1951 to 1969, PG&E disposed annually at least six million gallons of untreated chromium-contaminated wastewater. From 1970 until approximately 1989, PG&E also disposed of wastewater in evaporation ponds on the Refuge adjacent to BLM-managed property. In addition to these evaporation ponds, PG&E disposed of wastewater and/or other waste containing hazardous substances in a percolation bed and an unlicensed injection well at or near the facility.

B. Other Actions to Date

In 1988, PG&E completed a soil investigation in the Bat Cave Wash area at the request of the California Department of Health Services (now known as the Department of Toxic Substances Control (DTSC) and the U.S. Environmental Protection Agency (EPA). The soil investigation documented chromium contamination in the environment around the former percolation bed. A 1989 "Comprehensive Ground Water Monitoring Evaluation," prepared by the California Regional Water Quality Control Board (CRWQCB), identified chromium contamination associated with the injection well.

On May 29, 1995, PG&E reported the presence of chromium in groundwater samples taken on the east side of Bat Cave Wash near the north boundary of the PG&E facility.
On February 26, 1996, DTSC and PG&E executed a Corrective Action Consent Agreement pursuant to State law under which DTSC directed PG&E to perform a "Facility Investigation" as well as any "Interim Measures" determined to be necessary to address immediate or potential threats to human health and/or the environment.

In the course of implementing groundwater monitoring required under the Corrective Action Consent Agreement, PG&E has documented an extensive plume of groundwater contaminated with hexavalent chromium that stretches from the PG&E facility under the Refuge and BLM-managed property toward the Colorado River. On February 3, 2004, PG&E reported concentrations of hexavalent chromium of 111 parts per billion (ppb) in groundwater taken from monitoring well MW34-80. This monitoring well is located on BLM-managed property

approximately 100 feet from the Colorado River. Based on this finding, DTSC ordered PG&E to prepare and submit Interim Measures (IM) Workplan No. 2 "to immediately begin pumping, transport and disposal of groundwater from existing monitoring wells at the MW20 cluster." These monitoring wells are located on BLM-managed property. To facilitate the coordination of BLM and

DTSC authorities for responding to groundwater contamination from the PG&E facility, by Action Memorandum dated March 3, 2004, BLM authorized PG&E to perform the activities described in IM Workplan No. 2.

III. THREATS TO PUBLIC HEALTH, OR WELFARE, OR THE ENVIRONMENT

As documented by recent groundwater sampling results, hexavalent chromium has been detected in significant concentrations in wells within 100 feet of the Colorado River. The Colorado River is an important drinking water source utilized by the Metropolitan Water District of Southern California, which provides drinking water to approximately 18 million people. While investigation to date has not confirmed that contaminated groundwater has reached the Colorado River, the proximity of the groundwater plume to the River constitutes an actual or potential threat of contamination of a significant drinking water supply. In addition, the proximity of the groundwater plume to the Colorado River constitutes an actual or potential threat to the environment.

As a result of the extraction of contaminated groundwater authorized by Action Memo and described in IM Workplan No.2, PG&E is generating approximately 25,000 gallons of contaminated water per day that is currently being hauled to a hazardous waste disposal facility approximately 250 miles away. The transportation of this volume of hazardous waste over this distance poses an actual or potential threat to public health or welfare or the environment.

IV. ENDANGERMENT DETERMINATION

The long distance transportation of hazardous waste generated from the MW20 cluster poses a risk of release of hazardous substances. This time critical removal action is necessary to mitigate or abate this risk of release. BLM has determined, in accordance with Section 300.415(b) (2) of the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan or NCP), 42 U.S.C. §300.415(b) (2), that a time critical response is necessary.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

PG&E is requesting approval of BLM to operate, for a limited period of time a batch treatment system for groundwater extracted from extraction well TW-2S and TW-2D at the MW-20 bench north of the PG&E Topock Compressor Station, Needles, California. The proposed batch treatment system is described in detail in the "*Batch Treatment Work Plan, Topock Compressor Station, Needles, California*" (Workplan), which was submitted by PG&E to BLM on April 30, 2004, and is incorporated herein as Attachment 1. As described in the Workplan, the proposed batch treatment system will be located entirely within the enclosed footprint of the existing groundwater excavation site on the MW20 bench and will achieve a 99 percent reduction in the volume of hazardous waste transported from the site.

The proposed batch treatment system authorized by this Action Memorandum is hereby authorized for a period not to exceed 180 days from the date this Action Memorandum is signed. In the event that BLM determines it is necessary and appropriate to extend the time period for which this batch treatment system is authorized, BLM will notify PG&E and DTSC in writing of such determination.

Because the proposed batch treatment system will be operated and financed by PG&E, BLM has not determined the estimated costs to implement this time critical removal action.

VI. EXPECTED CHANGE IN SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

In the event response action is delayed or not taken, the potential risk of release of hazardous substances in transit to the disposal facility at which the hazardous substances are being disposed will not be mitigated or abated.

VII. OUTSTANDING POLICY ISSUES

BLM is coordinating this time critical removal action with work required of PG&E pursuant to the Corrective Action Consent Agreement issued by DTSC. This coordination of BLM CERCLA authorities and State RCRA authorities is intended to facilitate and streamline PG&E's performance of work necessary to protect the Colorado River. BLM must ensure, however, that such work is performed in a manner consistent with CERCLA, the National Contingency Plan (42 U.S.C. Part 300), and other applicable Federal requirements. In the event that Federal requirements are not satisfied through this coordination effort, BLM may be required to initiate, or require PG&E to perform, activities independent of State law.

VIII. ENFORCEMENT

BLM and DOI have determined that PG&E is a responsible party pursuant to Section 107 of CERCLA, 42 U.S.C. § 9607. As defined by CERCLA, PG&E is the owner and operator of the PG&E facility from which hexavalent chromium has been released into the environment. Hexavalent chromium is a hazardous substance under CERCLA.

In a February 12, 2004, letter, DOI notified PG&E of its potential liability under CERCLA and has requested that PG&E enter into an administrative order on consent (AOC) by which PG&E would agree to reimburse DOI, BLM, and other DOI bureaus for response costs incurred in overseeing PG&E's performance of response action on Federal property. In the event that DOI is unable to reach an agreement with PG&E over the terms of this AOC, DOI may decide to take response action unilaterally, may initiate enforcement action or take any other measures necessary to direct or require PG&E to perform response action, and seek to recover all response costs incurred from PG&E.

IX. RECOMMENDATION

This decision document identifies the use of a batch treatment system at the MW20 cluster to substantially reduce the volume of hazardous waste that must be transported from the site. The substantial reduction in waste is consistent with Department policy, and will provide significant environmental and public health benefits by reducing the risk of potential future spills or accidents during the handling, transportation and disposal of hazardous waste generated as a result of the groundwater extraction remediation process.

BLM has determined that PG&E is capable of performing this short term batch treatment action in a manner consistent with the NCP, contingent on PG&E's full compliance with the requirements of this Action Memorandum including Attachment 1. Conditions at the site meet the criteria for undertaking the proposed time critical removal action through the implementation of a batch treatment plant, as specified by Section 300.415 (b)(2) of the NCP, 40 CFR § 300.415(b)(2). We recommend your approval of the proposed batch treatment plant at the MW20 well cluster.

Elaine Y. Zielinski
Approval

5/21/04
Date

Disapproval

Date

Donald Ellsworth

Attachment
1-Batch Treatment Work Plan,
Topock Compressor Station, Needles, California
(27 pp.)

Appendix C
IM No. 3

Appendix C1:
IM No. 3 Work Plan

Pacific Gas and Electric Company

Yvonne J. Meeks
Site Remediation - Portfolio Manager
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August 27, 2004

Casey Padgett
Office of the Solicitor
U.S. Department of the Interior
755 Parfet Street, Suite 151
Lakewood, CO 80215

Subject: Interim Measures No. 3 Work Plan, Revision 1
Request for BLM Authorization
Pacific Gas and Electric Company, Topock Project

Dear Mr. Padgett:

This letter transmits the Interim Measures Number 3 (No. 3) Work Plan, Revision 1 for the Topock project. The enclosed document addresses the United States Department of Interior, Office of the Solicitor letter of comments dated July 21, 2004. The Work Plan describes those aspects of the project insofar as they impact BLM lands and will be the subject of a new Action Memorandum. PG&E appreciates your expedited review to enable PG&E to meet the accelerated Interim Measures No. 3 schedule. PG&E is seeking authorization by September 10, 2004.

If you have any questions, please do not hesitate to call me. I can be reached at (805) 546-5243.

Sincerely,

Teri Hesson
for Yvonne Meeks

Cc: Mark Howell/U.S. BLM
Norman Shopay/DTSC

Enclosure

Interim Measures No. 3 Work Plan Revision 1

In Support of PG&E'S Request for BLM Authorization By Action Memorandum

Topock Compressor Station Needles, California

Prepared for

United States Bureau of Land Management

California Department of Toxic Substances Control

On behalf of

Pacific Gas and Electric Company

August 2004

CH2MHILL

Interim Measures No. 3 Work Plan, Revision 1
PG&E Topock Compressor Station

Prepared for
Pacific Gas and Electric Company

This work plan was prepared under supervision of a
California Professional Engineer,

Julie Eakins, PE
No. C47243

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Acronyms and Abbreviations

BLM	U. S. Bureau of Land Management
CACA	Corrective Action Consent Agreement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CMS	Corrective Measures Study
CRBRWQCB	Colorado River Basin Regional Water Quality Control Board
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
CWG	Consultative Work Group
DTSC	Department of Toxic Substances Control
IM	Interim measures
MWD	Metropolitan Water District of Southern California
PG&E	Pacific Gas and Electric Company
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). In a letter dated June 30, 2004, DTSC directed PG&E to implement Interim Measures Number 3 (IM No. 3) to expand existing groundwater extraction and management facilities to address hydraulic control of the chromium plume at the Topock site. The IM No. 3 project requires PG&E to conduct additional groundwater investigations for further plume delineation, to characterize groundwater conditions for the design of IM No. 3 facilities, and to proceed with the design and installation of the piping and conveyance of extracted water to a treatment system, the treatment of extracted groundwater using reduction-precipitation-filtration and reverse osmosis, and management of treated water. Pursuant to Section IV.A. of the Corrective Action Consent Agreement (CACA) between DTSC and PG&E (DTSC 1996), DTSC determined that immediate action is required to continue to prevent and/or mitigate potential impacts to the Colorado River. Recognizing the time-critical nature of its directive, DTSC prepared a California Environmental Quality Act Notice of Exemption pursuant to §21080(b)(4) of the Public Resources Code for the IM No. 3 project.

By two Action Memoranda issued pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. §§9601 et seq., and dated March 3, 2004 and May 20, 2004, the Arizona State Director, United States Bureau of Land Management (BLM), authorized PG&E to conduct a time-critical removal action to prevent or abate the release of hexavalent chromium into the Colorado River, and to reduce the volume of hazardous waste transported off site from the MW-20 cluster, respectively. By this work plan, PG&E is seeking authorization to conduct a third time-critical removal action on public lands in coordination with new activities required by IM No. 3.

This work plan (IMWP No. 3) describes the components to implement the *Summary of Proposed Project for Interim Measures No. 3* (submitted to the DTSC on July 8, 2004 [CH2M HILL 2004]) and specific actions/conditions prescribed by the DTSC in its June 30 letter to PG&E. This work plan includes descriptions of: (1) project background and objectives of IM No. 3; (2) project activities of the time-critical removal action; (3) startup conditions; (4) project management and schedule; and (5) related activities, including waste management and required authorizations.

1.1 Project Background

The Topock Compressor Station is located in San Bernardino County, approximately 15 miles southeast of Needles, California. In February 1996, PG&E and DTSC entered into a CACA pursuant to Section 25187 of the California Health and Safety Code. Under the terms of the CACA, PG&E was directed to conduct a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and to implement corrective measures to address constituents of concern released in the Bat Cave Wash Area near the PG&E Topock Compressor Station. The primary constituents of concern at Topock are hexavalent

chromium [Cr(VI)] and total chromium [Cr(T)]. The source was Cr(VI) salts used historically as a corrosion inhibitor in the station's cooling towers. DTSC is the lead administering agency for the project.

PG&E is currently proceeding with the corrective measures process by which a long-term remedy for the site will be selected under State law. PG&E submitted the Corrective Measures Study (CMS) work plan in December 2002, pursuant to the RCRA corrective action process and in accordance with the DTSC CACA. The DTSC approved the CMS work plan in June 2003. PG&E and the Department of the Interior anticipate entering into an agreement by which PG&E will perform a remedial investigation and feasibility study (RI/FS) pursuant to CERCLA that is integrated fully with the State-directed CMS process.

Beginning in August 2003, DTSC and PG&E began working in a collaborative process with affected and interested agencies through the Topock Consultative Work Group (CWG), constituted under California's site designation process. CWG members include:

- DTSC.
- Colorado River Basin Regional Water Quality Control Board (CRBRWQCB).
- United States Fish and Wildlife Service.
- BLM.
- Representatives from local Indian Tribes.
- United States Bureau of Reclamation.
- Metropolitan Water District of Southern California (MWD).
- United States Geological Survey.

Concurrently with the CMS, and in compliance with the DTSC directive of February 9, 2004 (to implement actions referred to as Interim Measures No. 2), PG&E commenced pumping, transport, and disposal of groundwater from existing wells at the MW-20 cluster. The Interim Measures No. 2 (IM No. 2) is part of the overall corrective measures process for the site. It is a step in establishing a long-term approach for site remediation. The interim measures, proposed additional measures, and the results of the groundwater investigation will be integrated into the long-term corrective measure for the site.

DTSC has determined that the objective of the interim measures is defined as follows:

> ***Initiate hydraulic control of the plume boundaries near the Colorado River to achieve a net reversal of gradient away from the Colorado River.***

In March, PG&E began extracting groundwater at the MW-20 bench location, on property owned by the United States Bureau of Reclamation and managed by the BLM. At the direction of DTSC and upon approval of BLM, PG&E installed two extraction wells on the MW-20 bench and is currently pumping at rate of approximately 30 gallons per minute from this location (Well TW-2D).

These measures have contributed to the prevention of groundwater containing chromium from reaching the Colorado River. However, due to the influence of the Colorado River stage on groundwater levels (as described below), extracting groundwater at higher rates is likely to be needed to maintain the stated goal of hydraulic control.

The daily fluctuations in river stage cause the surface water-groundwater interaction at this site to be dynamic. As the river levels begin to decline, the pumping rate must increase to overcome the natural tendency of the groundwater to flow toward the river. Space limitations and constraints on treatment and disposal alternatives make necessary the installation of additional facilities to extract, treat, and manage the significantly higher groundwater flows required to maintain hydraulic control of the plume near the Colorado River. Treatment facilities will be built on MWD property (San Bernardino County Assessor's Parcel No. 650-151-06), which PG&E is in the final stages of purchasing from MWD. (MWD is providing PG&E with access to undertake required work in the property prior to the formal transfer of title of the property.)

1.2 Description of the Interim Measure No. 3

In accordance with the IM No. 3 directive from DTSC dated June 30, 2004, PG&E needs to move forward on an expedited basis with the design and installation of the following IM No. 3 project components:

- Installation and operation of new extraction wells and associated pipelines;
- Construction and operation of a new treatment facility on Parcel 650-151-06 (hereinafter the "PG&E treatment facility");
- Installation of pipelines for conveyance of extracted groundwater from the MW-20 bench to the PG&E treatment facility, and for conveyance of treated water products (reverse osmosis [RO] brine, and potentially, treated water) back to the MW-20 bench;
- Installation of injection wells and observation wells on Parcel 650-151-06 for the disposal of the treated water, and pipelines for conveyance of treated water to the injection well fields;
- Potential installation of a direct discharge pipeline that would convey treated water to the Colorado River;
- Potential trucking and/or installation of a pipeline that would convey treated water for reuse in the cooling towers, and/or brine for disposal in the existing evaporation ponds, at the PG&E Compressor Station;
- Improvement/grading of existing access roads; and
- Other activities including the installation of additional monitoring wells to further delineate chromium in groundwater, and additional data collection to support evaluation of remedial technologies, including *in-situ* treatment or a slurry wall.

PG&E is designing all project facilities to avoid or minimize impacts to cultural and natural resources. PG&E has surveyed the site and conducted resource-related evaluations. A Cultural Resource Investigations Report has been submitted for review and approval by the BLM and the State Historic Preservation Office, pursuant to the National Historic Preservation Act Section 106 consultation process. Also, a Biological Resource Investigations Report has been submitted for review by BLM for consultation with the U.S. Fish and Wildlife Service and California Department of Fish and Game.

1.3 Description of Time Critical Removal Action No. 3

PG&E has requested that BLM issue an Action Memorandum No. 3 that will cover the new activities required by DTSC (Latham and Watkins 2004); the aspects of the project insofar as they affect BLM lands will be the subject of a new Action Memorandum. PG&E is working in parallel with the DTSC to obtain approvals to construct the treatment and water management facilities on Parcel 650-151-06.

PG&E proposes to undertake the following activities on BLM land under Action Memorandum No. 3:

- Installation of influent piping and electrical conduit for the conveyance of groundwater from the MW-20 bench to the PG&E treatment facility;
- Installation of effluent piping for the conveyance of RO brine wastewater from the PG&E treatment facility back to the MW-20 bench; effluent piping would also be used for the conveyance of treated water back to the MW-20 bench for disposal by trucking, until alternative disposal methods are permitted and in place;
- Installation of piping for the conveyance of treated water over BLM-managed land from the PG&E treatment facility to proposed injection wells on Parcel 650-151-06;
- Improvements/grading of existing access roads on BLM-managed land;
- Potential installation of monitoring wells on BLM-managed land near Parcel 650-151-06 to support the evaluation of treated water disposal by injection;
- Expansion of the existing facilities on the MW-20 bench to accommodate the storage for trucking of RO brine (and potentially treated water) from the PG&E treatment facility; and
- Transportation by truck of RO brine and/or treated water from the MW-20 bench to the PG&E Topock Compressor Station, a licensed waste disposal facility, or other appropriate facility.

These components are described in more detail in Section 2. For clarity, the discussion of activities for each component has been arranged as follows: (1) a description of activities already authorized under a previous Action Memorandum, (2) a description of the activities for which PG&E is seeking authorization under Action Memorandum No. 3, and (3) a description of potential future activities in support of IM No. 3 that will require authorization under a future Action Memorandum.

2.0 Project Activities – Request for Authorization

2.1 Drilling and Investigation Activities

2.1.1 Previously Authorized Activities

The IM No. 3 project will include drilling and well installation on BLM-managed property. Activities include the installation of new extraction wells to support the existing pumping operations, and monitoring wells for further characterization of chromium concentrations in groundwater. BLM has authorized this activity under a previous Action Memorandum, dated March 3, 2004. The siting, installation and pumping of these potential wells will be subject to review and approval by BLM, USFWS, and DTSC.

Currently, one existing extraction well (TW-2D) is being pumped to extract contaminated groundwater. Two wells (of the seven additional well locations previously authorized by Action Memorandum) are planned initially to supplement pumping from extraction well TW-2D. Both of these wells (PE-1 and PE-2) are in the western portion of the site (Figure 1).

The proposed well installations would result in negligible impacts to the surface environment. Submersible pumps would be placed down-hole, and subsurface concrete vaults equipped with instrumentation, valves, and other pipe appurtenances would complete the well head construction. Underground piping and electrical conduits would be connected to the well heads to convey water and provide power.

Groundwater monitoring wells on BLM-managed property to be installed for further characterization of chromium concentrations in groundwater are not addressed in this work plan as BLM has authorized this activity by previous Action Memorandum.

2.1.2 Activities Requiring Authorization under Time Critical Action Memorandum No. 3

Other drilling, well installation, and testing activities on BLM-managed property to be conducted as part of the IM No. 3 and subject to a new Action Memorandum are described below.

At the direction of DTSC, PG&E submitted a separate work plan on July 19, 2004 to summarize the drilling activities on Parcel 650-151-06 (Conceptual Work Plan for Hydrogeologic Characterization and Well Installation on Parcel 650-151-06). These field activities, in support of IM No. 3, involve drilling potential injection wells and conducting hydrogeologic testing. Data collected will be used to evaluate injection into the aquifer as a discharge option to manage the treated water. The conceptual plan includes the drilling and installation of up to ten injection wells and eight observation/monitoring well clusters (to assess water levels) to be installed on Parcel 650-151-06. The approximate locations of the injection well fields are shown in Figure 2. Because the proposed injection fields are close to

BLM property, it is possible that PG&E may be required to drill observation wells on BLM land in the vicinity of the injection well system to collect additional data and to monitor changes in water levels. DTSC may make a determination in September as to the need for additional drilling to support the siting of facilities for the IM. The siting, installation and pumping of these potential wells on BLM property will be subject to review and approval by BLM and DTSC.

2.1.3 Potential Activities to Support IM No. 3 That May Require Future Authorization

Additional sampling or characterization may be conducted, as directed by DTSC. These measures may include additional data collection to support evaluation of remedial technologies, including the potential installation of a slurry wall and/or the use of *in-situ* treatment techniques to augment remediation activity.

In-situ treatment techniques have the potential to enhance the effectiveness of existing and planned groundwater extraction and above-ground treatment by providing additional treatment in the subsurface. *In-situ* field pilot testing at existing and/or new wells on land managed by BLM will be considered by DTSC. *In-situ* pilot testing is proposed to obtain information for design of future supplemental remediation measures. PG&E will describe the methodology and location of the *in situ* pilot test wells and piping in a future work plan, and such activities will be subject to approval by DTSC and BLM for those wells located on BLM-managed land. Figure 1 shows the proposed location for the potential *in-situ* testing wells.

Also, in furtherance of the site conceptual model, a seismic evaluation in the floodplain may be necessary to supplement the drilling activities, and to obtain additional data to evaluate the potential feasibility of additional remediation approaches, including the potential installation of a barrier wall. DTSC has recommended that PG&E undertake a seismic refraction survey over the Colorado River, involving water-borne transducer technology, and thereby avoiding physical impacts to the floodplain. A water-borne survey could provide valuable information to complete the conceptual site model of the area beneath the river, and thereby complementing the data collected on land. It is not anticipated that the water-borne survey requires BLM authorization. However, contingent upon the results of a seismic refraction survey over the Colorado River, another investigation may be required by DTSC on the floodplain if additional geophysical and geotechnical evaluations are necessary to define the floodplain's subsurface. This may include the installation of test borings. PG&E would describe the details of such a scope of work, if required by DTSC, in a future submittal to BLM.

2.2 Piping and Conveyance System

2.2.1 Previously Authorized Activities

Conveyance pipelines connecting new extraction wells to the MW-20 bench have been authorized by previous action memoranda.

2.2.2 Activities Requiring Authorization under Time Critical Action Memorandum No. 3

The piping and conveyance system for IM No. 3 will consist of the following:

- Influent and effluent piping and electrical conduit between the MW-20 bench and the PG&E treatment facility. Influent piping will convey extracted groundwater to Parcel 650-151-06. Effluent piping will convey RO brine back to the MW-20 bench. Effluent piping will also convey treated water back to the MW-20 bench until more permanent disposal methods are permitted and in place to accommodate peak extraction rates.
- Piping to convey treated water from the PG&E treatment facility to the disposal facilities (injection well fields on Parcel 650-151-06, direct discharge to the Colorado River, or reuse at the PG&E Compressor Station).

Currently, PG&E is discussing the design and layout of the project facilities with DTSC and the CWG during on-board CWG review sessions. An on-board review process enables interested stakeholders to be involved in the early stages of an expedited design-build project while meeting the accelerated project schedule. A Draft Design Basis Report for Interim Measures Number 3 and accompanying drawings representing a 30 percent design were submitted to DTSC and members of the Topock Consultative Workgroup on July 30, 2004. Engineering design and construction planning are ongoing to meet the accelerated project schedule. The following description of conveyance pipelines is based on the current design and on-board review sessions conducted to date.

The proposed main piping and conveyance alignment for the project follows existing access roads and is designed to avoid impacts to the Topock Maze, former U.S. Highway 66 (Route 66) and other cultural sites. The proposed route is set forth in Figure 2. PG&E is designing all project facilities to avoid or minimize impacts to cultural and natural resources. PG&E has surveyed the site and conducted resource related evaluations. PG&E has drafted a Cultural Resource Investigations report for review and approval by the BLM and the State Historic Preservation Office (SHPO), pursuant to the National Historic Preservation Act Section 106 consultation process. Mitigation measures will be implemented as required by the BLM and SHPO as a result of the consultation process.

PG&E will offset the piping from existing utilities in accordance with applicable requirements and will work with the BLM, SHPO, and appropriate resource agencies to avoid cultural and natural resources.

Double wall high-density polyethylene (HDPE) piping will convey extracted groundwater to prevent releases of untreated groundwater. Piping and appurtenances will be sized to accommodate the anticipated system flow rates. Appurtenances to monitor system operations will include:

- Flow meter/totalizers to measure flow rate and cumulative flow from each extraction well;
- In-line sample ports for each extraction well; and
- Electrical or visual indication of pipe leakage within the containment piping. Visual leak indication would be facilitated by underground vaults placed at selected points along

the alignment. Electrical leak detection methods include, at a minimum, level detection sensors in the underground vaults.

Given the design, a leak or catastrophic pipe failure is not expected. In the event of any release or other event necessitating an emergency response, PG&E will notify immediately the BLM Lake Havasu Field Office and the United States Bureau of Reclamation Lower Colorado Regional Office as well as other agencies, such as the National Response Center, as required by law.

2.2.2.1 Piping between the MW-20 Bench and Parcel 650-151-06

The water conveyance system delivers (1) untreated water from the extraction wells on the MW-20 bench to the treatment facilities; and (2) RO brine and treated water from the treatment facility back to the MW-20 bench. To minimize and avoid impacts to cultural resources, a combination of subsurface and aboveground alignments are proposed.

From the MW-20 bench to the PG&E treatment facility, piping will be constructed in an excavated trench approximately 7 feet wide to accommodate manual assembly of pipeline. Upon completion of the construction, the piping alignment will be within an existing 10-foot-wide graded gravel access road with 2-foot-wide shoulders. Two subsurface influent (untreated water) pipelines and two subsurface effluent pipelines (treated water and RO brine stream) would be placed in a common trench running to and from the MW-20 bench and Parcel 650-151-06, as shown in Figure 2. The trench will be excavated from the MW-20 bench approximately 700 feet north on the east shoulder of Route 66 (Park Moabi Road). At this point, the pipes will be directionally drilled west beneath Route 66 to the existing access road, where the road starts to run in a southerly direction. By following this existing access road, the alignment of the conveyance system avoids an abandoned segment of Route 66 (old Route 66). The trench will be constructed approximately 1,700 feet on BLM land following this existing access road. The trench will cross onto Parcel 650-151-06, and will be routed to the treatment facility location. Trenching along the roadway will minimize the disturbance to the hill slopes around the MW-20 bench. Directional drilling or other similar techniques (*e.g.*, boring and jacking) will be used to install segments of the piping to avoid impacts to cultural and natural resources.

Influent lines will be double-contained high-density polyethylene, and effluent lines will be single-contained polyvinyl chloride or high-density polyethylene. For the influent line conveying untreated groundwater, it is estimated that the inner pipe will be 4 inches in diameter and the outside pipe will be 8 inches in diameter. Electrical conduit also will be placed in the trench.

2.2.2.2 Piping between the Treatment Facility and the Injection Well Fields

Piping would be installed to deliver treated water from the PG&E treatment facility to the proposed injection wells on the Parcel 650-151-06. A portion of the route for this pipeline will traverse BLM land, as shown on Figure 2. PG&E has conducted resource related evaluations for these project activities; mitigation measures will be implemented as required by the BLM and SHPO as a result of the National Historic Preservation Act Section 106 consultation process.

From the PG&E treatment facility, treated water will be pumped through a single wall pipeline, approximately 4 inches in diameter, to be directionally drilled beneath old Route 66 from the south to the north shoulder. Along the north shoulder of old Route 66, the pipe will be constructed in an aboveground alignment on BLM land to the proposed injection well fields at the west side of Parcel 650-151-06. The aboveground alignment minimizes disturbance to old Route 66.

2.2.3 Potential Activities to Support IM No. 3 That May Require Future Authorization

At the direction of DTSC, PG&E is evaluating three options to manage the treated water: injection into the aquifer on Parcel 650-151-06, discharge to the Colorado River under a National Pollutant Discharge Elimination System (NPDES) permit, and re-use of the treated water at the Topock Compressor Station. DSTC further directed PG&E to prepare applications to the Colorado River Basin Regional Water Quality Control Board (CRBRWQCB) for consideration at the Board's September 15, 2004 meeting (applications were submitted to the CRBRWQCB on July 28, 2004). No decision has been made regarding which of these alternatives will be used; each alternative remains a potentially viable option for treated water disposal. Of the three disposal alternatives under evaluation, PG&E has performed the detailed engineering design for the injection well disposal method on the basis that it represents the alternative most likely to be permitted and constructed in time to meet the demands of anticipated future pumping in October and November of 2004. The details of piping alignment for the extraction well disposal alternative are described in the preceding section, and they are the subject of approvals requested under Action Memorandum No. 3. In the event that one of the other two options for treated water disposal is chosen instead of, or in addition to, disposal by injection, PG&E will perform the necessary engineering design to implement that option, and will seek BLM approval for activities on BLM property through a future Action Memorandum process.

2.2.3.1 Potential Piping to a River Discharge Point

PG&E is evaluating piping alignments to accommodate the potential discharge of treated water into the Colorado River under a NPDES permit. Under the NPDES scenario, a pipeline would convey the treated water from the PG&E treatment facility across BLM property to the potential point of outfall, which may be directly into the Colorado River or to a drainage course within Bat Cave Wash. The alignment of any potential NPDES discharge pipeline would be determined following the decision by DTSC to implement this disposal option.

2.2.3.2 Potential Piping to the Topock Compressor Station

PG&E is also evaluating the potential reuse of the treated water in the cooling towers at the PG&E Topock Compressor Station. Under this scenario, the treated water from the PG&E treatment facility would be either transported by truck or conveyed in a pipeline across both BLM-managed land and the Havasu National Wildlife Refuge (HNWR). The truck route or the alignment of any potential pipeline would be determined following the decision by DTSC to implement this disposal option.

2.3 Grading and Construction-Related Activities

In support of the IM No. 3 drilling, well installation, and pipeline construction activities, PG&E will perform grading and other construction-related activities on BLM-managed land.

2.3.1 Previously Authorized Activities

As described in Section 2.1.1, the installation of new extraction wells, and the trenching and piping installation associated with those wells, has been authorized under a previous Action Memorandum. Trenches from new extraction wells to the MW-20 bench will be approximately 3-feet wide and will be installed using backhoes or trenching machines.

2.3.2 Activities Requiring Authorization Under Time Critical Action Memorandum No. 3

Interim Measure No. 3 grading and construction-related activities to be authorized under Action Memorandum No. 3 include the following:

- Inspect the BLM property along which conveyance pipeline alignments or road improvements are planned to evaluate the placement of equipment and the suitability of construction methods.
- Perform grading to level ground as required for staging equipment and to provide easy access for construction vehicles (*e.g.*, trucks, drill rigs) at the MW-20 bench and on the access roads. Temporary road crossings in areas where water has washed out roads may be constructed of materials such as soil and road base.
- Improve existing roads and create all-weather roads by filling in any washed out areas, carving/cutting as necessary to build roadway, and placing road base materials to finish the surface.
- Place temporary rip-rap to control erosion at up to four locations along portions of old Route 66, between the PG&E treatment facility and the potential injection well fields.
- Site and install temporary power supply (portable diesel-generator equipped with an auxiliary fuel tank), and auxiliary lighting.
- Trench for pipelines and electrical conduit. Trenches will be constructed with backhoes or trenching machines and will be approximately 3 feet deep and 7 feet wide.

Currently, PG&E is designing the project facilities; technical drawings and grading plans will continue to be discussed with DTSC and interested stakeholders during on-board review sessions.

2.3.3 Potential Activities to Support IM No. 3 That May Require Future Authorization

Grading and construction-related activities associated with (1) construction of an NPDES discharge pipeline across BLM property, and (2) construction of a pipeline conveyance to the PG&E Topock Compressor Station (for reuse of treated water and/or disposal of RO brine) will require authorization under a future Action Memorandum. The design and

engineering of such facilities, if required, will commence in the event that DTSC directs PG&E to proceed with those disposal alternatives.

2.4 Temporary Increased Storage of Effluent on, and Trucking From, MW-20 Bench

2.4.1 Previously Authorized Activities

Activities to increase temporarily the storage capacity on the MW-20 bench, and to dispose of the additional stored water, associated with the IM No. 3 activities have not been authorized under previous Action Memoranda.

2.4.2 Activities Requiring Authorization Under Time Critical Action Memorandum No. 3

As discussed in Section 2.2.2, effluent piping will be installed to bring waste streams from the PG&E treatment facility products back to the MW-20 bench. The treatment process presently being designed (treatment to be performed on Parcel 650-151-06) is addition of ferrous chloride or ferrous sulfate to achieve chromium reduction, followed by removal through precipitation and filtration, and final polishing for total dissolved solids separation through RO. The process will produce three waste streams – RO concentrate (i.e., brine), RO permeate (i.e., treated water), and dewatered process sludge. The sludge will be stored at the PG&E treatment facility for transport and disposal to a licensed facility. The RO brine and treated water will be piped back to the MW-20 bench for temporary storage before being transported to an off-site facility by truck. When adequate disposal methods (injection, discharge into the river, or reuse at the PG&E Topock Compressor Station) are permitted and in place to accommodate expected peak extraction rates, PG&E will reduce or discontinue the conveyance of treated water to the MW-20 bench.

With a peak expected groundwater extraction rate of 135 gallons per minute (gpm), contingency storage of treated water and RO brine may be necessary. During the peak flow, a total of twelve or thirteen holding tanks (of 17,500-gallon capacity each) would be needed on the MW-20 bench to provide sufficient holding capacity for the RO brine and the treated water from the PG&E treatment facility. Assuming that 3 of the existing treated water tanks on the MW-20 bench are available for such use, 9 to 10 additional holding tanks may need to be added to the existing facilities. The existing operations would be expanded to accommodate the additional tanks within a lined containment area, although full secondary containment will not be necessary (the RO brine and the treated water will be nonhazardous). Approximately 25 percent of the holding capacity will be used for the RO brine, and approximately 75 percent of the holding capacity will be used for the treated water. Once a sufficient water management/on-site disposal option is in place, the extra tanks will be decommissioned and removed from the bench.

At peak groundwater extraction, up to 42 truck loads per day would be required. The site's comprehensive transportation plan will be updated to address the increase in truck traffic along Park Moabi Road. The transportation plan would include measures to protect the roadway where needed, and to limit the effects of project traffic to designated areas.

Site operators at the MW-20 bench will continue to be responsible for daily trucking operation. The facility operational procedures will be updated to address the expanded operations. Each operator will be trained on proper operation of system equipment, field instruments, and monitoring equipment, and will be familiar with the normal operating ranges of system components. The pumping and storage system will be equipped with automatic shutoffs to prevent tank overflow and pipe failures. The automatic shutoffs combined with site inspection will provide operational reliability and safety.

Site security is provided to safeguard against vandalism and injury. During implementation of this IM, appropriate security measures will be implemented for the express purpose of providing safety to operators and the public, consistent with current operations.

2.4.3 Potential Activities to Support IM No. 3 That May Require Future Authorization

The use of the MW-20 bench for the storage and shipping of treated water is anticipated to be a temporary measure, to be implemented following startup of the treatment facilities and until a direct disposal method (injection, NPDES discharge, reuse at the Topock Compressor Station) is implemented. As such, PG&E does not foresee a need to request future authorization to conduct such work, beyond the authorization requested to be contained within Action Memorandum No. 3.

2.5 Indemnity

PG&E agrees to indemnify and hold harmless BLM, its agents, and employees from any and all claims or causes of action arising from or on account of acts or omissions of PG&E, its employees, successors, agents, contractors, subcontractors, or other persons, in carrying out activities under this Interim Measures No. 3 Work Plan. PG&E further agrees that the United States, and its agencies and employees, shall not be held as a party to any contract entered into by PG&E in carrying out activities under this Interim Measures No. 3 Work Plan.

3.0 Project Management

CH2M HILL will manage the IM No. 3 activities. The proposed project management approach is intended to:

- Ensure a direct, continuous line of communication among DTSC, the PG&E project team, and all stakeholders in the CWG.
- Facilitate effective and efficient coordination and management of the various tasks.
- Implement IM No. 3 on time and in compliance with the requirements of the DTSC.

The progress and performance of the project will be monitored through:

- Monthly performance monitoring reports.
- Regular meetings with DTSC representatives.
- Regular meetings and conference calls with the CWG.
- Meetings specially convened by DTSC to resolve project issues and concerns, as applicable.

4.0 Project Schedule

The project schedule is accelerated. In response to the Department of Interior Office of the Solicitor letter dated August 2, 2004, this Work Plan has been revised for approval to commence time-critical CERCLA removal activities under an Action Memorandum No. 3. PG&E's ability to meet the expedited schedule is dependent upon, among other factors, BLM's authorization of this interim measure. Upon receipt of all regulatory approvals, PG&E anticipates conducting site preparation and mobilization activities in mid-September, 2004. Construction activities are expected to be completed by early November (7 to 8 weeks duration).

5.0 Waste Management Practices

Following is a description of the waste management practices for the waste streams anticipated to be generated or stored on BLM-managed land for IM No. 3, and for which PG&E is seeking authorization under Action Memorandum No. 3.

Several types of waste materials will be generated during the construction of the IM No. 3 project (drilling, well installation, pipeline construction activities), as well as during the IM No. 3 operations of treating chromium-containing groundwater. Wastes from well installation will include drill cuttings and groundwater from development activities. Drill cuttings also will be generated during subsurface pipeline installation activities. Soils will be excavated during trenching and grading activities. In addition, as described in Section 2.4, waste streams generated from the PG&E treatment facility will be stored temporarily on the MW-20 bench on BLM-managed land before being transported to an off-site disposal or treatment facility by truck.

5.1 Investigation-Derived Wastes Generated During Drilling

Drill cuttings potentially may contain chromium, although during previous drilling operations at the Topock site these materials had non-detectable concentrations of chromium. The cuttings will be contained in lined roll-off bins at the drill sites during the drilling and sampling activities. After sampling and characterization, all cuttings bins will be removed from the drill sites for ultimate disposition by PG&E at an appropriate licensed facility. The cuttings will be screened for chromium, the main chemical of concern for the site. If the cuttings are characterized as a hazardous waste, they will be transported off site for disposal at a permitted hazardous waste disposal facility. It is estimated that the soil investigation-derived waste bins temporarily staged on BLM property will not remain on site in excess of 45 days.

Other soils generated during construction of IM No. 3 facilities (e.g., trenching, grading) will be placed in temporary stockpiles nearby and will be used as backfill. If soil is excavated from areas known or suspected to contain Cr(VI), then soil will be sampled and analyzed for Cr(VI) and will be disposed of according to the results of that analysis.

Water generated during well drilling and development activity will be contained in storage tanks on the drilling support truck and will be transferred to storage tanks in PG&E's operations area for characterization, treatment, or disposal at a permitted waste disposal facility.

Incidental trash (empty paper and plastic bags, cardboard boxes, wooden pallets, and miscellaneous debris) will be collected at the end of each drilling shift and hauled off the drill site to an appropriate licensed disposal facility. Personal protective equipment and disposable sampling equipment designated as non-hazardous waste will be double-bagged and disposed of in dumpsters at the Topock Compressor Station. In the unlikely event that

such equipment is designated as hazardous waste, it will be disposed of at a permitted facility in compliance with all applicable regulatory requirements.

5.2 Treatment Effluent

Treatment effluent, consisting of RO brine and treated water, will be conveyed to and stored on the MW-20 bench. These streams will be stored in above-ground tanks in a lined containment area.

The RO brine stream is not anticipated to be a hazardous waste under California regulations (Title 22 CCR 66261.22). The RO brine will have a total dissolved solids (TDS) concentration lower than that of seawater, and will have a near-neutral pH, typically falling into the range 5.0 to 6.5. The pH would be more neutral than that of seawater; therefore, the stream would not be hazardous by virtue of the corrosivity characteristic. The RO process will concentrate the dissolved solids, including metal constituents listed in 22 CCR 66261.22, four-fold, except for chromium, which will be reduced to below 25 µg/L. The concentration of metal constituents in the RO brine stream is expected to be at least one order of magnitude lower than the regulatory threshold for hazardous waste; several constituent concentrations are anticipated to be in the range of two or three orders of magnitude below the regulatory criteria. Sampling and analysis of the RO brine will occur initially to confirm classification of this waste, and will continue as necessary for waste characterization and disposal.

The treated water also will be non-hazardous. TDS concentrations will be reduced to below 1,000 mg/L. Common constituents, including sodium, calcium, chloride, and sulfate will be reduced by between 90 and 99.5 percent from initial concentrations in extracted groundwater. The expected characteristics of the treated water are shown in Table 1.

The RO brine and treated water will be pumped to vacuum trucks for transportation off-site to a licensed disposal or treatment facility.

TABLE 1
Expected Treated Water Characteristics
Interim Measures No. 3 Work Plan

Constituent/ Parameter	Units	Average Monthly	Maximum Daily
Aluminum	µg/L	65	130
Ammonia (Ammonium)	µg/L	1500	3000
Barium	µg/L	100	200
Boron	µg/L	1.9	3.6
Chromium (VI)	µg/L	8.0	16.0
Chromium (total)	µg/L	25	50
Color	units	15	30
Copper	µg/L	10	20

TABLE 1
Expected Treated Water Characteristics
Interim Measures No. 3 Work Plan

Constituent/ Parameter	Units	Average Monthly	Maximum Daily
Fluoride	µg/L	300	600
Lead	µg/L	2	4
Manganese	µg/L	50	100
Molybdenum	µg/L	8	16
Nickel	µg/L	12	24
Nitrate (expressed as nitrogen)	µg/L	10,000	20,000
pH	units	6.5	8.4
Sulfate	mg/L	250	500
Total Dissolved Solids (TDS)	mg/L	2,700	5,400
Total Iron	µg/L	300	600
Turbudity	units	5	10
Zinc	µg/L	80	160

Note: Average monthly and maximum daily levels are expected CRBRWQCB effluent limits

6.0 Required Filings and Authorizations

The primary required filings and authorizations to implement the IM No. 3 activities are listed in the table below. This listing includes required filings and authorizations for IM No. 3 activities both on and off BLM-managed property.

Agency	Filings and Authorizations
United States Bureau of Land Management	Action Memorandum authorizing Interim Measures No. 3 activities on BLM land
State Water Resources Control Board (SWRCB)/Colorado River Basin Regional Water Quality Control Board (RWQCB)	Notice of Intent (NOI) and Storm Water Pollution Prevention Plan for Construction Activities (SWPPP), coverage under statewide general permit
Certified Unified Program Agency, San Bernardino County Fire Department (CUPA)	Hazardous Materials Business Plan
CUPA	Conditional Authorization Notification for hazardous waste treatment
Mojave Desert Air Quality Management District (MDAQMD)	Authority to Construct (ATC) and Permit to Operate (PTO)
US Environmental Protection Agency, Region 9 (EPA)	Issuance of EPA Hazardous Waste Facility Identification Number
US Army Corps of Engineers (USACE)	Federal Water Pollution Control Act (FWPCA) Section404 Permit, if required for grading of stream crossings on access road
RWQCB	FWPCA Section 401 Certification
US Fish & Wildlife Service (USFWS)	Endangered Species Act Section 7 Consultation
US Fish & Wildlife Service (USFWS)	Authorization to install additional extraction wells and associated piping, and additional or monitoring wells
California Department of Fish and Game (CDFG)	California Fish and Game Code Section 1602 Agreement
State Historic Preservation Office (SHPO)	National Historic Preservation Act Section 106 Consultation
San Bernardino County, Planning Department	Grading Permits and Well Permits
San Bernardino County, Planning Department	Building Permits
San Bernardino County	Enterprise Permit for work within right of way of county roads
CRBRWQCB	Waste Discharge Requirements (WDRs) for reuse of treated water at Topock Compressor Station
CRBRWQCB	WDRs for underground injection of treated water on Parcel 650-151-06
CRBRWQCB	NPDES Permit for discharge of treated water to Colorado River

7.0 Mitigation Measures

The following restrictions and controls, at minimum, related to protection of biological and cultural resources, will be complied with in implementing this IM.

1. The Mojave population of the desert tortoise is federally protected as a threatened species under the Endangered Species Act of 1973 and is protected by California law. Prohibited actions include capture, handling, harassing, collecting, injuring, or destroying animals or their burrows. Any sightings of desert tortoise must be reported immediately to the BLM Lake Havasu Field Office Wildlife Biologist.

2. All personnel are to report any sightings of desert tortoise, bighorn sheep, other wildlife species, and federally-listed migratory birds (such as bald eagle, brown pelican, etc.) to the BLM Lake Havasu Field Office, Wildlife Biologist.

3. If a desert tortoise is endangered by any activity, that activity will cease until the desert tortoise moves out of harm's way on its own accord. A desert tortoise that needs to be handled to prevent injury or death must be handled by a certified/qualified handler only.

4. The construction zones and MW-20 bench area will be inspected at least every 4 hours during periods when the gates are open for desert tortoise that may become trapped inadvertently within the enclosure. All vehicles stationary for 15 minutes or longer will be inspected underneath for desert tortoise prior to moving. In the event that a tortoise is sited or is found under a vehicle, that tortoise will be handled only by a certified handler.

5. All native riparian species (*e.g.*, cactus, ocotillo, mesquite, Palo Verde, etc.) will be avoided at all times. California-listed sensitive species of plants can be trimmed but not removed.

6. All construction trash and/or debris will be removed.

7. All vehicles must stay on the existing and approved routes. No vehicles are authorized to drive in the existing washes.

8. PG&E will notify immediately the BLM Lake Havasu Field Manager (or his designated representative) of any cultural resources (prehistoric/historic sites or objects) and/or paleontological resources (fossils) encountered during permitted operations and will maintain the integrity of such resources pending subsequent investigation. All operations in the immediate area of the discovery must be suspended until written authorization from BLM to proceed is issued. An evaluation of the discovery shall be made by a qualified archaeologist or paleontologist to determine appropriate actions to prevent the loss of significant cultural or scientifically-important paleontological values.

9. No permanent improvements that affect the integrity of the bridge/culvert over Bat Cave Wash on historic Route 66 will be implemented.

10. Actions that result in impacts to archaeological or historical resources are subject to the provisions of the Archaeological Resources Protection Act of 1979, as amended, and the Federal Land Policy and Management Act of 1976.

8.0 References

CH2M HILL. 2004. *Summary of Proposed Project for Interim Measures No. 3.* July 8.

Department of Toxic Substances Control (DTSC). 1996. Corrective Action Consent Agreement, Docket HWCA 95/96-027. February 2.

Latham and Watkins. 2004. Letter to Casey Padgett, Esq., Office of the Solicitor, U.S. Department of the Interior from Mr. David Hayes, Re: Topock. July 8.

Figures

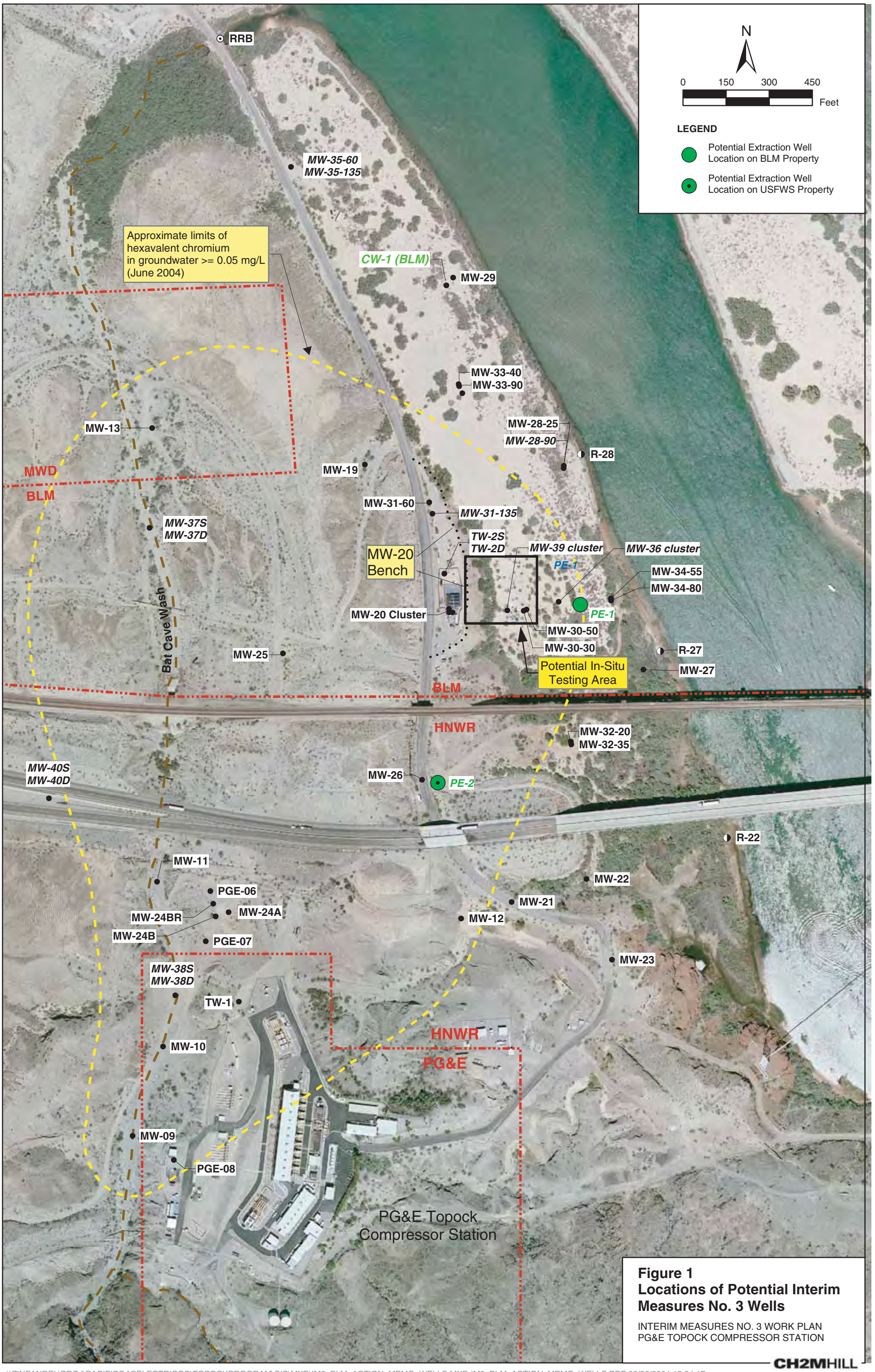

Figure 1
Locations of Potential Interim Measures No. 3 Wells

INTERIM MEASURES NO. 3 WORK PLAN
PG&E TOPOCK COMPRESSOR STATION

CH2MHILL

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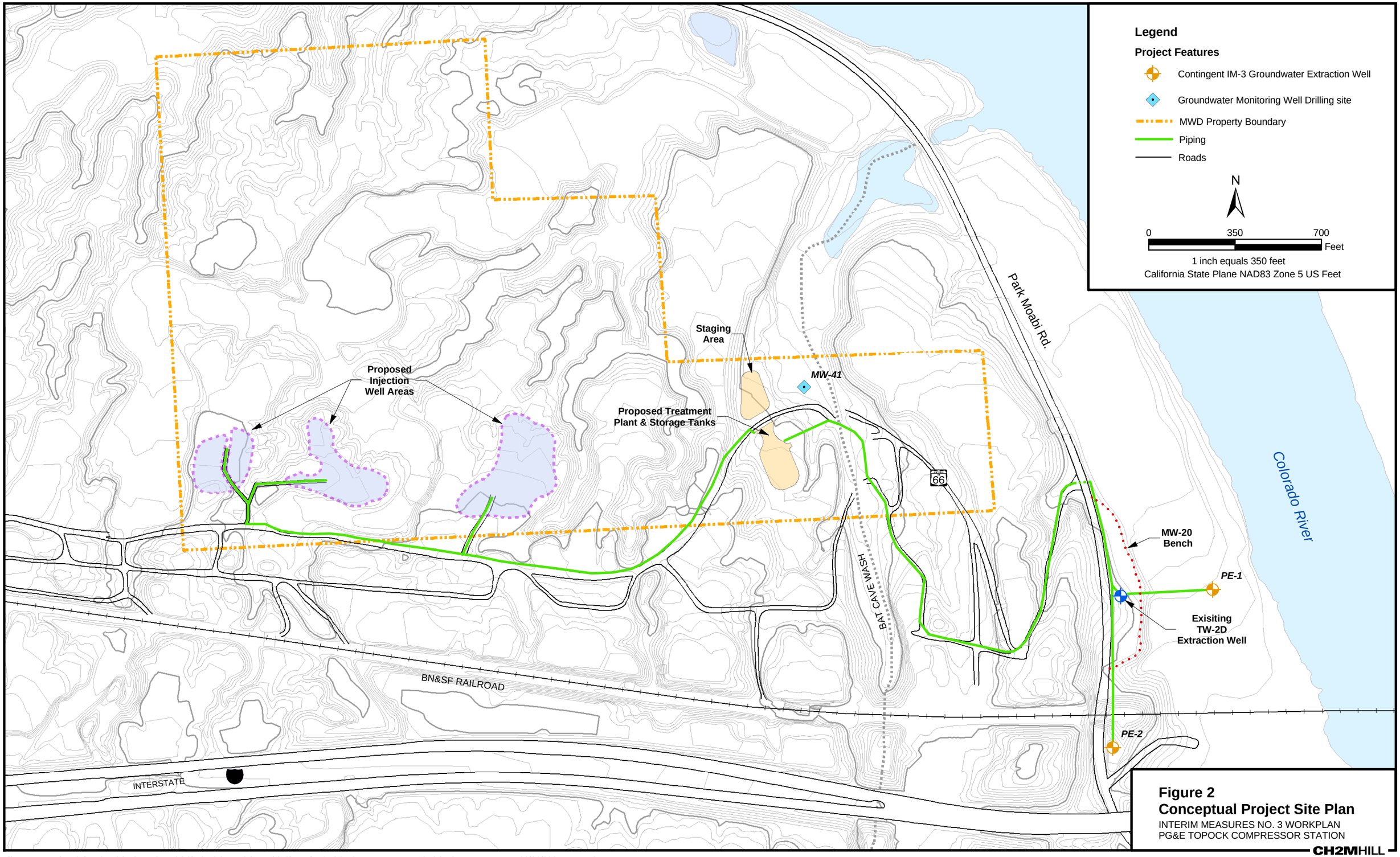

Figure 2
Conceptual Project Site Plan
INTERIM MEASURES NO. 3 WORKPLAN
PG&E TOPOCK COMPRESSOR STATION

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Appendix C2:
PMP Draft Work Plan

Pacific Gas and Electric Company®

Yvonne J. Meeks
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April 15, 2005

Mr. Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

Subject: Draft Performance Monitoring Plan for Interim Measures in the Floodplain Area
Pacific Gas and Electric Company, Topock Project

Dear Mr. Shopay:

This letter transmits the *Draft Performance Monitoring Plan for Interim Measures in the Floodplain Area* for the Pacific Gas and Electric Company (PG&E) Topock site. This plan document has been prepared in compliance with Enclosure C, Action Item 1 (Interim Measures Floodplain Monitoring Plan submittal) in DTSC's February 14, 2005 letter. In the letter, DTSC established the performance standards, performance criteria, and reporting and response action requirements for the Interim Measures activity in the floodplain area.

If you have any questions, please do not hesitate to contact me. I can be reached at (805) 546-5243.

Sincerely,

Terri Heron
for Yvonne Meeks

Cc: Kate Burger/DTSC

Draft

Performance Monitoring Plan for Interim Measures in the Floodplain Area

PG&E Topock Compressor Station
Needles, California

Prepared for

California Department of Toxic Substances Control

on behalf of

Pacific Gas and Electric Company

April 15, 2005

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, CA 94612

Draft

Performance Monitoring Plan for Interim Measures in the Floodplain Area PG&E Topock Compressor Station Needles, California

Prepared for
California Department of Toxic Substances Control

on behalf of
Pacific Gas and Electric Company

April 15, 2005

This work plan was prepared under supervision of a California Certified Engineering Geologist,

_____

Paul Bertucci, C.E.G.
Project Hydrogeologist

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Acronyms and Abbreviations

µg/L	micrograms per liter
bgs	below ground surface
BOR	United States Bureau of Reclamation
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
DTSC	Department of Toxic Substances Control
GMP	Groundwater Monitoring Program
IM	Interim Measures
PG&E	Pacific Gas and Electric Company
PMP	Performance Monitoring Program
psi	pounds per square inch
RFI	RCRA facility investigation
SOP	Standard Operating Procedure
TDS	total dissolved solids

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station in Needles, California under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). In February 2004, DTSC directed PG&E to initiate an Interim Measure (IM) in the floodplain area of the site to prevent movement of the chromium plume toward the Colorado River. As stated in a DTSC letter dated June 30, 2004, the goal of the Interim Measures is "hydraulic control of the plume boundaries near the Colorado River to achieve a net reversal of groundwater gradient from the Colorado River" (DTSC 2004).

The current IM involves the pumping, treatment, transport and disposal of extracted groundwater near the floodplain area. The Interim Measures activity has been operated continuously under DTSC oversight since March 2004. In a letter to PG&E dated February 14, 2005, DTSC established the performance standards, performance criteria, and reporting and response action requirements for the Interim Measures activity in the floodplain area.

This Performance Monitoring Plan for Interim Measures in the Floodplain Area has been prepared in compliance with Enclosure C, Action Item 1 (Interim Measures Floodplain Monitoring Plan submittal) in the February 14, 2005 DTSC letter. The site monitoring, data evaluation, reporting, and response actions required under this DTSC directive are collectively referred to as the IM Performance Monitoring Program (PMP) for the floodplain area.

The purposes of this monitoring plan are to:

- Describe the monitoring objectives of the PMP.
- Describe the well network and types of data and measurements collected.
- Present the proposed monitoring frequency and analytical program.
- Describe the data evaluation and monthly, quarterly, and annual performance evaluation reports.
- Describe the contingencies and response actions associated with the evaluation of the IM hydraulic control system.

As required by DTSC's February 14, 2005 directive, an associated IM *Extraction System Operation and Maintenance Plan* (in preparation) is being prepared to address the operational and contingency/response aspects of the IM extraction system.

1.1 Project Background

The Topock Compressor Station is located in eastern San Bernardino County, approximately 15 miles to the southeast of Needles, California (Figure 1-1). As directed by the DTSC under Interim Measures No. 2, PG&E is currently pumping groundwater from one deep extraction well (TW-2D) located on a bench along the station access road and above the Colorado River

floodplain. The bench, referred to as the monitoring well MW-20 bench, is owned by the United States Bureau of Reclamation (BOR) and is managed by the United States Bureau of Land Management. PG&E began pumping from this location in March 2004 and is currently pumping at a rate of approximately 70 gallons per minute. The current IM and batch treatment facilities at the MW-20 bench were constructed and have operated in accordance with the *Final Interim Measures Work Plan No. 2*, dated March 2, 2004 (CH2M HILL 2004a), *Addenda to Interim Measures Work Plan No. 2* (CH2M HILL 2004b), and related project approvals.

On June 30, 2004, DTSC issued to PG&E conditional approval to implement the IM No. 3 project to expand the existing groundwater extraction and management facilities to address hydraulic control of the chromium plume at the Topock site (DTSC 2004). Under requirements of IM No. 3, the IM facilities have been expanded to include construction of a groundwater treatment plant, installation of conveyance piping, and provisions for disposal of treated water by injection wells (CH2M HILL 2004c).

As specified in the Interim Measures Work Plan, the IM system operations and performance monitoring data are presented in performance monitoring reports. The first report was issued April 15, 2004 for the March 2005 startup operations period (CH2M HILL 2004d). Beginning with the July 2004 reporting period, the performance monitoring reports have been submitted monthly (CH2M HILL 2004f). As of April 15, 2005, a total of 16 performance monitoring reports have been submitted, documenting the operations, modifications, and monitoring data for the IM groundwater extraction facilities. Refer to the February 2005 *Performance Monitoring Report No. 15* (CH2M HILL 2005a) for the status and description of the current IM system and monitoring data.

1.2 Hydrogeologic Setting of the Floodplain Area

For background to this monitoring plan, the following hydrogeologic summary has been excerpted from the *Draft RCRA Facility Investigation/Remedial Investigation Report* (Draft RFI Report), dated February 31, 2005 (CH2M HILL 2005b).

Groundwater occurs under unconfined to semi-confined conditions within the alluvial fan and fluvial sediments beneath most of the Topock site. The saturated portion of the alluvial fan and fluvial sediments are collectively referred as the Alluvial Aquifer. In the floodplain area adjacent to the Colorado River, the fluvial deposits interfinger with, and are hydraulically connected to, the alluvial fan deposits. The unconsolidated alluvial and fluvial deposits are underlain by the Miocene conglomerate and pre-Tertiary metamorphic and igneous bedrock with very low permeability; therefore, groundwater movement occurs primarily in the overlying unconsolidated deposits.

The water table in the Alluvial Aquifer is very flat throughout the site and typically equilibrates to an elevation within 2 to 3 feet of the river level. Due to the variable topography at the site, the depth to groundwater ranges from as shallow as 5 feet below ground surface (bgs) in floodplain wells next to the river to approximately 170 feet bgs at the upland alluvial terrace areas. The saturated thickness of the Alluvial Aquifer is about 100 feet in the floodplain and thins to the south, pinching out along the Miocene conglomerate and bedrock outcrops. For the RFI site characterization and the IM

performance monitoring evaluation and reporting, the Alluvial Aquifer is subdivided into upper, middle, and lower zones.

The Colorado River has a strong influence on groundwater levels at the Topock site. The effects are most notable in the floodplain area, the IM extraction area, and adjacent inland area. The stage of the Colorado River varies both daily and seasonally in response to upstream dam discharges regulated for resource management and electricity production. The fluctuations in river stage cause the surface water-groundwater interaction in the floodplain to be very dynamic.

A more detailed discussion of the site hydrogeology and groundwater and surface water conditions is provided in Section 2.0 of the Draft RFI Report (CH2M HILL 2005b). Background on the groundwater geochemistry and water quality characterization for the IM performance monitoring area is provided in Section 13.0 of the Draft RFI Report.

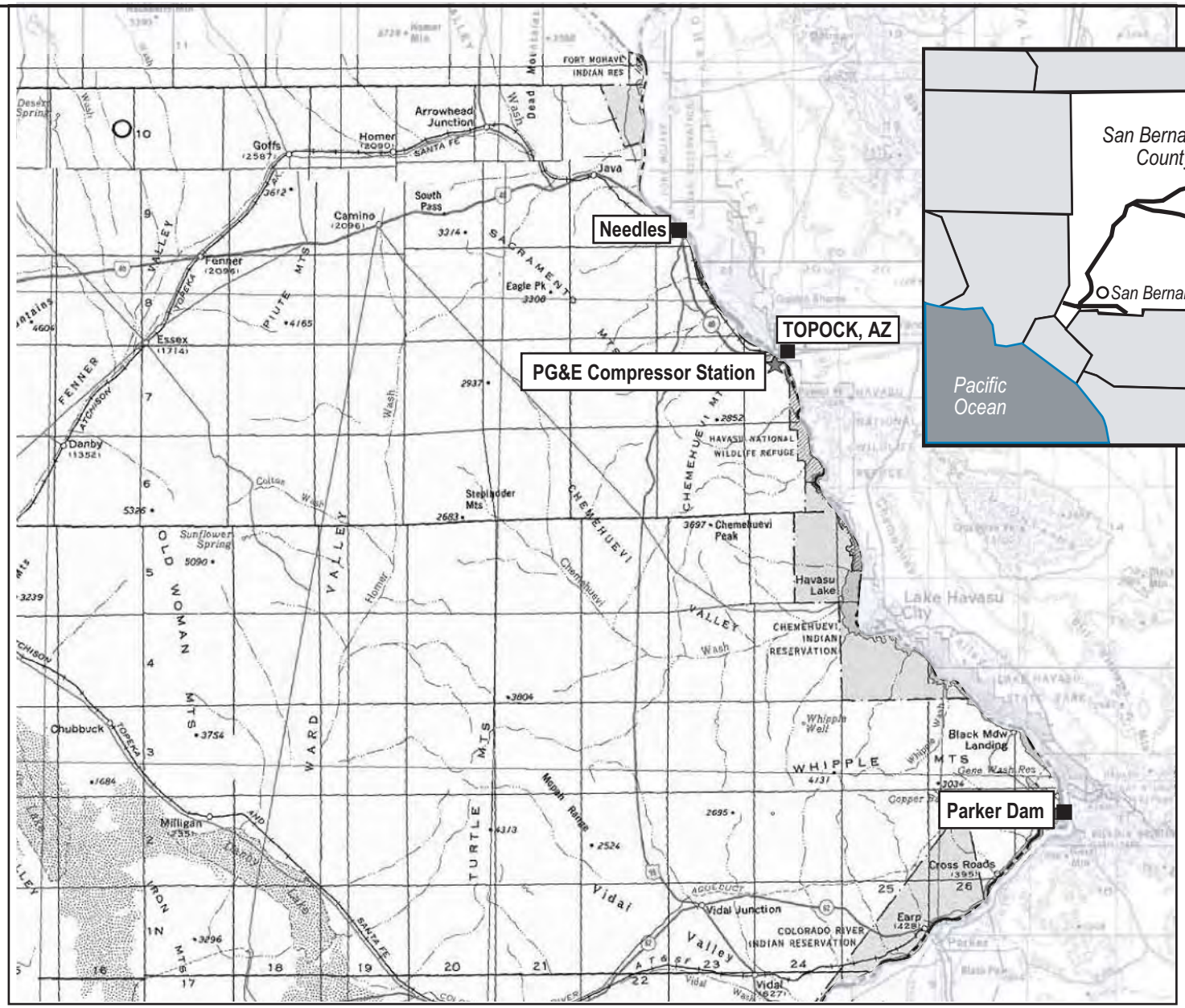

FIGURE 1-1
SITE LOCATION MAP
PERFORMANCE MONITORING PLAN FOR INTERIM MEASURES IN FLOODPLAIN AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

326128.01.07.IM_Figure 1-1 SiteLocMap_4/14/05_ccc

2.0 Performance Monitoring Objectives

The goal of the IM in the floodplain area is to hydraulically control the plume boundaries near the Colorado River to achieve a net landward groundwater gradient. This section summarizes the performance standard and terminology for the IM, and presents the objectives for the PMP.

2.1 Performance Standard

Per the February DTSC letter (DTSC 2005), groundwater pumping is required to hydraulically contain and control the plume margin in the floodplain area. The portion of the aquifer that is influenced and contained by groundwater pumping is referred to as the capture zone.

As defined by DTSC, the performance standard for this IM is to "establish and maintain a net landward hydraulic gradient, both horizontally and vertically, that ensures that hexavalent chromium concentrations at or greater than 20 micrograms per liter [µg/L] in the floodplain are contained for removal and treatment" (DTSC 2005).

2.2 Performance Monitoring Objectives

In accordance with DTSC directives, this monitoring program has been developed to measure, evaluate, and document the performance of the floodplain IM hydraulic containment system. The specific objectives of the PMP are to:

- Maintain and operate a network of pressure transducers to continuously monitor water levels and assess hydraulic gradients (horizontal and vertical) in the IM containment area.
- Continue ongoing groundwater monitoring in the floodplain wells to detect changes in the distribution of hexavalent chromium [Cr(VI)] and relevant water quality parameters.
- Establish standardized data collection, analysis, and evaluation processes for assessing hydraulic gradient and water quality conditions in the performance monitoring area.
- Document the status, operations, and performance data and evaluation of the IM.
- Define contingency and response actions in accordance with DTSC project requirements.

3.0 Interim Measures Extraction and Monitoring System

This section summarizes information on the current IM extraction and monitoring well network and the pressure transducer and groundwater sampling components of the PMP. This section also provides an introduction and overview of the monitoring and reporting program.

3.1 Description of Well Network

The network of groundwater wells used for performance monitoring include three extraction wells and 49 monitoring wells in the floodplain and adjoining site area. Figure 3-1 shows locations the IM extraction and batch treatment facilities (at MW-20 bench), the groundwater wells used for IM performance monitoring, and general sits features for the PMP area. Well completion and Cr(VI) sampling results for the extraction and monitoring wells are provided in Table 3-1. Supportive information on well elevations, well construction, and well pump installations are included in Appendix A1, Table A-1.

3.1.1 Extraction Wells

The IM groundwater extraction system consists of two extraction wells TW-2D and TW-2S located on the MW-20 bench and a third extraction well PE-1 located on the floodplain (Figure 3-1). Currently, TW-2D is the only active extraction well operated continuously (excepting temporary maintenance and operation shutdown). All three extraction wells are equipped with pressure transducers for collecting drawdown and observation hydraulic data.

Well TW-2D is completed in the lower zone of the aquifer and is currently pumping at an approximate rate of 70 gallons per minute. During the initial IM operations, three groundwater monitoring wells, located 140 feet south of the TW-2 wells (MW-20-70, MW-20-100, and MW-20-130), were equipped with pumps and used for groundwater extraction. Well TW-2S and the MW-20 monitoring wells are currently available to supplement or augment the pumping at TW-2D if needed. The MW-20 wells will not be tied into the piping of the new IM-3 treatment system. Once the IM-3 system is operational, supplemental pumping will be provided by extraction well PE-1, which was installed and tested in early March 2005. Installation of conveyance piping from PE-1 to the IM-3 system may be delayed during the spring-summer months due to endangered species constraints.

3.1.2 Groundwater Monitoring Wells

The current network of groundwater wells used for performance monitoring includes 36 monitoring wells in the floodplain, nine wells in the MW-20 bench/Park Moabi Road area, and two monitoring wells in the interior plume area (MW-10, MW-25) (Figure 3-1). The majority of the PMP wells used for hydraulic data and groundwater sampling are clusters consisting of two or three individual wells installed at one monitoring location. As noted in

Table 3-1, six individual wells were installed at the MW-36 and MW-39 clusters, and four individual wells were installed at the MW-33 cluster. Refer to Appendix A1, Table A-1 for well construction details for the groundwater monitoring wells.

3.1.3 Pressure Transducer Network

As of April 13, 2005, a total of 52 pressure transducers have been installed for hydraulic data collection for the PMP. The network of transducer locations includes:

- Thirty-six monitoring wells in the floodplain.
- Three extraction wells (TW-2D, TW-2S, PE-1).
- Nine wells in the MW-20 bench/Park Moabi Road area.
- Two river gauge stations (I-3, RRB).
- Two monitoring wells in the interior plume area (MW-10, MW-25).

The location of the PMP wells and stations equipped with transducers are shown on Figure 3-1. Table 3-1 provides a listing of the transducer-monitored wells by depth and monitoring zone in the aquifer. Refer to Appendix A1, Table A-1 for information on well elevations, typical water levels, and water columns for the wells in the transducer monitoring network.

3.2 Overview of Performance Monitoring Program

The PMP involves a variety of data collection, evaluation, and reporting activities. The types of data collected, the evaluation methods and techniques, and associated reporting and response actions conducted under the PMP are summarized in Figure 3-2.

The remainder of this monitoring plan describes the specific data collection, analysis, and evaluation of the hydraulic measurements (Section 4.0), the chemical and water quality data (Section 5.0), the reporting and notification activities (Section 6.0), and response and contingency actions.

TABLE 3-1
Extraction and Monitoring Wells in Interim Measures Area
Performance Monitoring Plan for Interim Measures in the Floodplain Area
PG&E Topock Compressor Station, Needles, California

Station ID	Well ID [1]	Monitored Zone of Alluvial Aquifer	Well / Monitoring Notes [2]		Cr(VI) Concentration [3] 2005 Sampling
					µg/L
Extraction Wells					
TW-2	TW-2S	Upper & Middle	Standby Extraction Well		5,080
	TW-2D	Lower	Active Extraction Well		6,280
PE-1	PE-1	Lower	available for pumping Fall 2005		393
Performance Monitoring Wells					
MW-20	MW-20-70	Upper			7,800
	MW-20-100	Middle			8,130
	MW-20-130	Lower		well for gradient calculation	8,600
MW-22	MW-22-10	Upper	Sentry Well		ND (< 1)
MW-27	MW-27-20	Upper	Sentry Well		ND (< 0.2)
	MW-27-60	Middle	Sentry Well		ND (< 1)
	MW-27-85	Lower	Sentry Well		ND (< 1)
MW-28	MW-28-25	Upper	Sentry Well		ND (< 0.2)
	MW-28-90	Lower	Sentry Well		ND (< 1)
MW-29	MW-29-40	Upper	Sentry Well		ND (< 2)
MW-30	MW-30-30	Upper	Sentry Well		ND (< 5)
	MW-30-50	Middle			ND (< 1)
MW-31	MW-31-60	Upper			2,910
	MW-31-135	Lower		well for gradient calculation	410
MW-32	MW-32-20	Upper	Sentry Well		ND (< 2)
	MW-32-35	Middle	Sentry Well		ND (< 1)
MW-33	MW-33-40	Upper	Sentry Well		ND (< 1)
	MW-33-90	Middle	Sentry Well	Cr(VI) trend well	20.2
	MW-33-150	Lower	Sentry Well	well for gradient calculation	ND (< 1)
	MW-33-210	Lower	sentry well		1.4
MW-34	MW-34-55	Middle	Sentry Well		ND (< 1)
	MW-34-80	Lower	Sentry Well	well for gradient calculation	ND (< 1)
	MW-34-100	Lower	Sentry Well		426
MW-35	MW-35-60	Upper			26.8
	MW-35-135	Lower			15.7

TABLE 3-1
Extraction and Monitoring Wells in Interim Measures Area
Performance Monitoring Plan for Interim Measures in the Floodplain Area
PG&E Topock Compressor Station, Needles, California

Station ID	Well ID [1]	Monitored Zone of Alluvial Aquifer	Well / Monitoring Notes [2]		Cr(VI) Concentration [3] 2005 Sampling
MW-36	MW-36-20	Upper	Sentry Well		ND (< 2)
	MW-36-40	Upper	Sentry Well		ND (< 1)
	MW-36-50	Middle	Sentry Well		ND (< 1)
	MW-36-70	Middle	Sentry Well		ND (< 1)
	MW-36-90	Lower			1,970
	MW-36-100	Lower		Cr(VI) trend well	1,380
MW-39	MW-39-40	Upper	Sentry Well		ND (< 1)
	MW-39-50	Middle			1,000
	MW-39-60	Middle			1,880
	MW-39-70	Middle			6,640
	MW-39-80	Lower			8,270
	MW-39-100	Lower			9,260
MW-42	MW-42-30	Upper	potential Sentry Well		ND (< 1)
	MW-42-55	Middle	potential Sentry Well		ND (< 1)
	MW-42-65	Middle	potential Sentry Well	well for gradient calculation	ND (< 1)
MW-43	MW-43-25	Upper	Sentry Well		ND (< 2)
	MW-43-75	Lower	Sentry Well		ND (< 1)
	MW-43-90	Lower	Sentry Well		ND (< 1)
Other Wells in Performance Monitoring Network					
MW-10	MW-10	Upper	hydraulic monitoring for interior area		1,210
MW-12	MW-10	Upper	chromium monitoring location		1,390
MW-19	MW-19	Upper			796
MW-21	MW-19	Upper	chromium monitoring location		ND (< 1)
MW-25	MW-25	Upper	hydraulic monitoring for interior area		1,970
MW-26	MW-26	Upper			3,790

NOTES:

[1] The last field in monitoring well ID indicates the approximate base depth of well screen (feet below ground surfac
Pressure transducers are installed in all wells listed (except MW-12 and MW-21)
and at river locations I-3 and RRB (see Figure 3-1)

[2] Sentry Well and Gradient Well Pair designations from DTSC 2/14/05 letter (DTSC 2005)
DTSC proposed Well Pairs: MW-20-130 & MW-34-80, MW-20-130 & MW-42-65, MW-31-135 & MW-33-150

[3] Cr(VI) results are maximum concentrations, in micrograms per liter (µg/L), detected in 2005 sampling.
Sampling results for wells outside of floodplain from Dec.and Sept. 2004 quarterly monitoring.

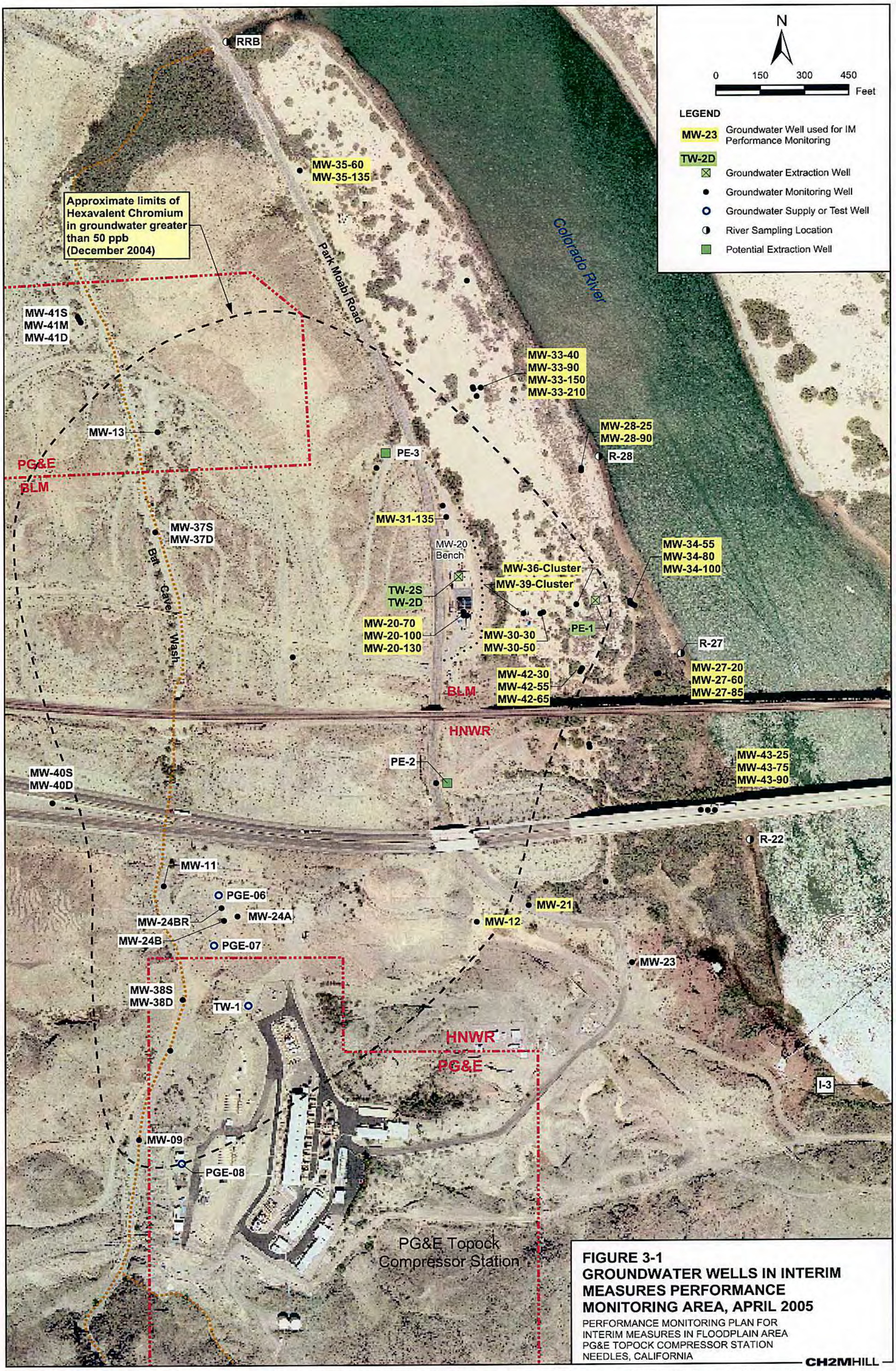

FIGURE 3-1
GROUNDWATER WELLS IN INTERIM MEASURES PERFORMANCE MONITORING AREA, APRIL 2005

PERFORMANCE MONITORING PLAN FOR
INTERIM MEASURES IN FLOODPLAIN AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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INTERIM MEASURES PERFORMANCE MONITORING PROGRAM

PG&E Topock Floodplain Area

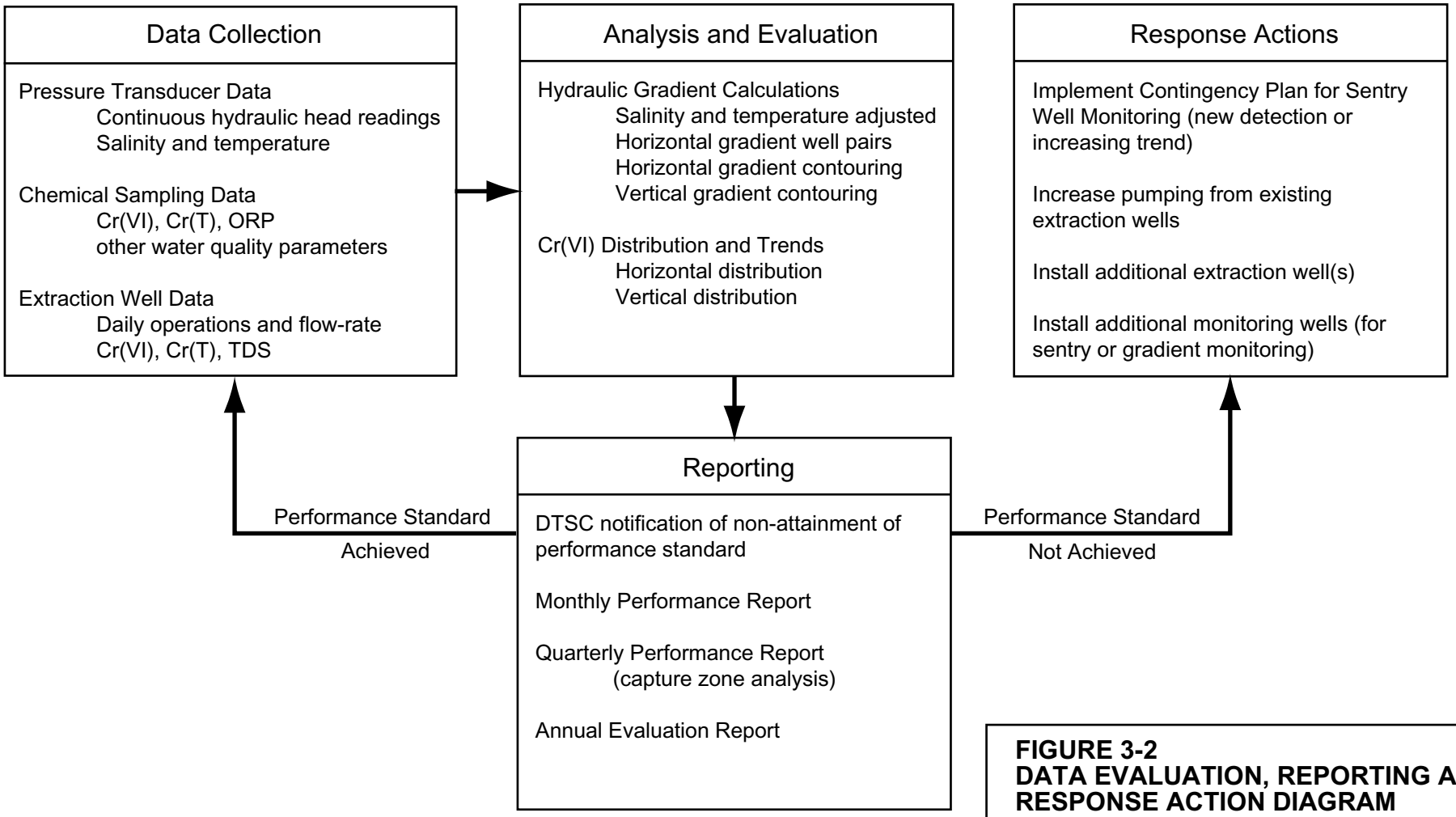


FIGURE 3-2
DATA EVALUATION, REPORTING AND RESPONSE ACTION DIAGRAM
PERFORMANCE MONITORING PLAN FOR INTERIM MEASURES IN FLOODPLAIN AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

326128.01.07.IM_Fig 3-2_4/8/05_ccc_sfo

4.0 Hydraulic Data Collection and Evaluation

This section describes the collection, analysis, and evaluation approach and procedures for the hydraulic measurements for PMP. All hydraulic data collection activities will be performed in accordance with the procedures, methods, and Standard Operating Procedures (SOPs) for the Topock program, as described in the *Sampling, Analysis, and Field Procedures Manual* (Procedures Manual) *(*CH2M HILL 2005c).

Groundwater levels at the Topock site fluctuate in response to changes in river level. Wells closer to the river generally exhibit larger fluctuations that are nearly in-sync with the rivers cycles. Wells further from the river exhibit smaller fluctuations which are lagged in time from the rivers cycles. Because of this complex and nearly continuous fluctuation in groundwater levels, it is not possible to accurately measure gradients at this site from a single round of water level measurements. In order to resolve accurate gradients at the Topock site it was necessary to equip wells with transducers and data loggers. The data loggers are synchronized to collect water level measurements at frequent (30 minute) intervals. The resulting set of water levels from each well is averaged over a period of time to determine the average gradient. A monthly averaging period has been established for performance monitoring.

The PMP hydraulic data collection and evaluation activities consist of:

- **Use of dedicated pressure transducers** in 47 monitoring wells, two river locations, and three extraction wells for continuous measurement of water levels and temperature.
- **Manual water level monitoring** at the monitoring wells, river locations, and extraction wells to calibrate and supplement the pressure transducer data.
- **Performing salinity adjustment** of the raw pressure transducer record to obtain water level elevation data that is normalized to a freshwater head.

4.1 Groundwater Elevations from Pressure Transducers

This section describes the field procedures for collecting data to calculate groundwater elevations.

4.1.1 Groundwater Level Measurements

Groundwater levels are monitored manually using water level sounding tapes and automatically with pressure transducers at all wells in the PMP. Manual water levels are measured at least biweekly during transducer downloads and by PG&E's Groundwater and Surface Water Monitoring Program (GMP) staff during sampling events. The pressure transducers currently measure and store a water level every 30 minutes. Data may be stored on more frequent intervals (e.g., 1- or 5-minute intervals) during hydraulic testing activities.

Standard operating procedures (SOP) for the transducers (e.g., installation, programming, downloads, maintenance, etc.) and manually measuring water levels have been submitted as Appendices A and C in the Procedures Manual (CH2M HILL 2005c).

4.1.2 Salinity and Temperature Measurements

Field instruments are used to measure specific conductance and temperature at all PMP wells during routine GMP sampling. The field instruments also provide readings of salinity and total dissolved solids based on the specific conductance measurement. Groundwater samples are also submitted for laboratory analyses including specific conductance. The routine GMP sampling occurs weekly to quarterly. The field and laboratory data are stored in the chemistry tables within the Topock project database.

Pressure transducers installed in all the PMP wells measure temperature at the same interval as water levels. Six wells have also been fitted with multi-parameter transducers that measure specific conductance along with pressure and temperature. The wells selected for the multi-parameter installations are the wells that will or may be used for hydraulic gradient evaluations are (including a temporary seventh multi-parameter transducer):

- MW-20-130
- MW-27-85
- MW-31-135
- MW-33-150
- MW-34-80
- MW-34-100
- MW-42-65

The location of the multi-parameter transducers will be evaluated on an ongoing basis and in response to gradient pair requirements.

Transducer data, including pressure (i.e., water level), temperature and salinity, if available, are stored within the transducer table within the Topock project database.

4.1.3 Groundwater Elevation Calculations and Adjustments

The temperatures and salinity of surface and groundwater are highly variable across the site. In general, the colder and lower salinity groundwater is found in shallow wells closest to the river and deep wells farther from the river are warmer with higher salinity. Historically, groundwater temperatures have ranged from 62°F to over 100°F. The salinity of groundwater ranges from <0.1 percent to 4 percent.

Groundwater levels are measured at each well and groundwater elevations are calculated. The groundwater elevations or hydraulic heads are interpreted to determine hydraulic gradients and groundwater flow directions. The typical calculation of hydraulic heads used at most groundwater investigation sites assumes that all groundwater has the same density, typically that of freshwater (1 g/cm^3 or 1 kg/L). Assuming freshwater, 1 foot of standing water in a well is equivalent to 2.309 pounds per square inch (psi). For example, a well with 23 feet of water above the screen has a pressure head of 53.1 psi at the screen (where the well is open to the aquifer). However, if a well contains saline water that is denser than freshwater, the pressure head at the screen may be more than 53.1 psi. These density

differences due to salinity and temperature are, at most sites, not significant. At Topock, however, the large range in salinity and temperature and the importance of accurately determining hydraulic gradients necessitate adjusting groundwater elevations for these density effects.

Density adjustments for temperature and salinity have been incorporated into the Topock project database for both manually measured and transducer water level data (both the unadjusted and density-corrected groundwater elevations are stored). The density adjustment for salinity and temperature has been implemented as follows:

- Prior to 2003, reported data were not corrected for salinity and temperature. In December 2002, all legacy data (prior to 2003) were retroactively adjusted for salinity and temperature using the best available data.
- From 2003 till August 2004, all reported groundwater elevations were adjusted for salinity using date-specific salinity data when ever possible (e.g., water level and salinity measured on same or similar dates). Subsequently, all groundwater elevations have also been retroactively adjusted for temperature using historical average well-specific temperatures.
- Following August 2004, well-specific average salinity and the best-available temperature data have been used to adjust the groundwater elevation data. The salinity data for each well are routinely evaluated to ensure no trends in salinity or changes in the average salinity have occurred. The best temperature data are daily average temperature from pressure transducers. If transducer temperature data are not available, then temperature data from groundwater sampling are used.

The methodology to adjust groundwater elevations for differences in density due to salinity and temperature are further described in Appendix B.

4.1.4 Transducer Operation and Maintenance

Transducer operations, including installation, programming, and downloads, are conducted by field staff specially trained in transducer operations. Transducer downloads typically occur biweekly to meet data evaluation and reporting requirements.

Maintenance of transducers consists of routine and periodic inspection and maintenance. Routine inspection and maintenance is conducted during all routine visits to a well by a transducer-trained staff. Periodic inspection and maintenance is conducted at specified intervals as outlined in the SOPs.

The transducer operation and maintenance is further described in the Procedures Manual (Section 6.0 and Appendix C SOPs, CH2M HILL 2005c).

4.2 Hydraulic Gradient Evaluation

Evaluation of the hydraulic data and calculation of hydraulic gradients are conducted monthly in fulfillment of the IM work plan (CH2M HILL 2004a) and the DTSC February 2005 directive (DTSC 2005). The natural vertical gradient at the site is upward but because pumping is occurring from a well screened in the lower portion of the aquifer, induced

gradients near the pumping well are downward. Because of this complex nature of the gradient at the site, it is necessary to consider both vertical and horizontal gradients when evaluating groundwater flow directions.

4.2.1 Horizontal Gradient Calculation and Presentation

Groundwater elevations (adjusted to equivalent fresh water heads with salinity and temperature) from transducer data are evaluated monthly. The daily minimum, daily maximum, and monthly average groundwater elevations are calculated at each monitoring location, and these data are posted on plan view maps. The three plan view maps contain the monitoring wells separated into Upper, Middle, and Lower zones of the Alluvial Aquifer. The monthly average groundwater elevation data posted onto each map are then contoured to assist with evaluation of the groundwater extraction and interpretation of the hydraulic gradient and inferred flow direction.

4.2.2 Vertical Gradient Calculation and Presentation

The monthly-average groundwater elevation data posted on the plan view maps is also posted and contoured on an east-west cross-section comprised of the MW-34, MW-36, MW-30, MW-39, and MW-20 well clusters. This is the most well-monitored section between the extraction area and the Colorado River, with an abundance of wells and screens at up to six different levels of the Alluvial Aquifer. The evaluation of these data in cross-section also assists with the evaluation of the groundwater extraction and interpretation of both vertical and horizontal components of the hydraulic gradient.

4.2.3 Horizontal Gradients Measured at Well Pairs

As mandated by DTSC (DTSC 2005), three well pairs have been selected to be monitored for horizontal gradient calculation: MW-33-150/MW-31-135, MW-34-80/MW-20-130, and MW-42-65/MW-20-130. The well pairs are highlighted on Figure 4-1. The wells were selected from approximately equivalent screened elevations in the Lower Aquifer. The objective behind selecting these well pairs is to provide a clear, quantitative metric for assessing the monthly success of IM extraction in the Lower Aquifer. The pairs represent southward, westward, and northward directions, respectively, of flow toward the MW-20 bench during extraction. DTSC has specified the average monthly gradients are to be at least 0.001 ft/ft in the direction of the MW-20 bench (i.e., towards wells MW-31-135 and MW-20-130) to account for uncertainty in gradient measurement (see Section 4.2.4).

Gradients between the wells in the pairs will be calculated each month on the basis of average monthly heads in each well. The average groundwater elevation in each well will be calculated as equivalent fresh water head using the methods described above. It is anticipated that gradients will vary throughout each month, and in fact will vary throughout each day.

4.2.4 Hydraulic Gradient Measurement Error Analysis

The process of measuring groundwater levels at the Topock site is complicated by the frequent fluctuations of groundwater levels in response to changes in river stage and by variations in salinity of the groundwater, particularly between wells completed at different depths. By recording groundwater levels every half hour using sensitive water level

transducers and data loggers in all floodplain wells, the problem of obtaining accurate measurements of groundwater level fluctuations due to frequent changes in river stage has been addressed. The precision of the transducers is less than a millimeter. Once calibrated to a measured water level in a well, the transducers provide a very accurate record of water level fluctuations in that well.

Because of salinity variations both horizontally and vertically in the floodplain aquifer, it is necessary to adjust the water levels from the different wells to "equivalent fresh water heads." The amount of the adjustment applied depends on the salinity and the depth of the water column in the well. Water density increases with salinity. The adjustment to an equivalent freshwater head accounts for the differences in density and provides what amounts to a common frame of reference in which to compare groundwater levels between wells of differing salinity. The salinity adjustment is the largest source of uncertainty in the water level measurements. Other sources of uncertainty include variations in temperature which, at the Topock site, has very minor effects on water density in comparison to salinity.

Salinity is currently measured in the field each time the wells are sampled. To avoid the influence of random fluctuations among individual salinity measurements, the salinity adjustment factor for each well is based on the average of salinity measurements in that well over the preceding year. Thus, the equivalent freshwater head for each well is calculated using the long-term average salinity in that well. This calculation is performed automatically in the database and applied to each transducer measurement.

An example of error analysis of salinity adjustment may be made with MW-34-80 and MW-20-130, one of the well pairs to be used for gradient evaluation. For the MW-34-80 salinity measurements made during 2004, the average is 0.870 percent with a standard deviation of 0.183 percent. A salinity change of 0.183 percent results in a change in equivalent freshwater head of about 0.10 foot in MW-34-80 and about 0.11 foot in MW-20-130. The distance between MW-34-80 and MW-20-130 is 565 feet. Thus, a one-standard deviation uncertainty (plus or minus) in the water level in either MW-34-80 or MW-20-130 results in a possible uncertainty in the gradient of 0.11/565 which is less than 2×10^{-4}. The DTSC-proposed minimum gradient of 1×10^{-3} is more than four times the expected level of uncertainty of the current water level measurement technique.

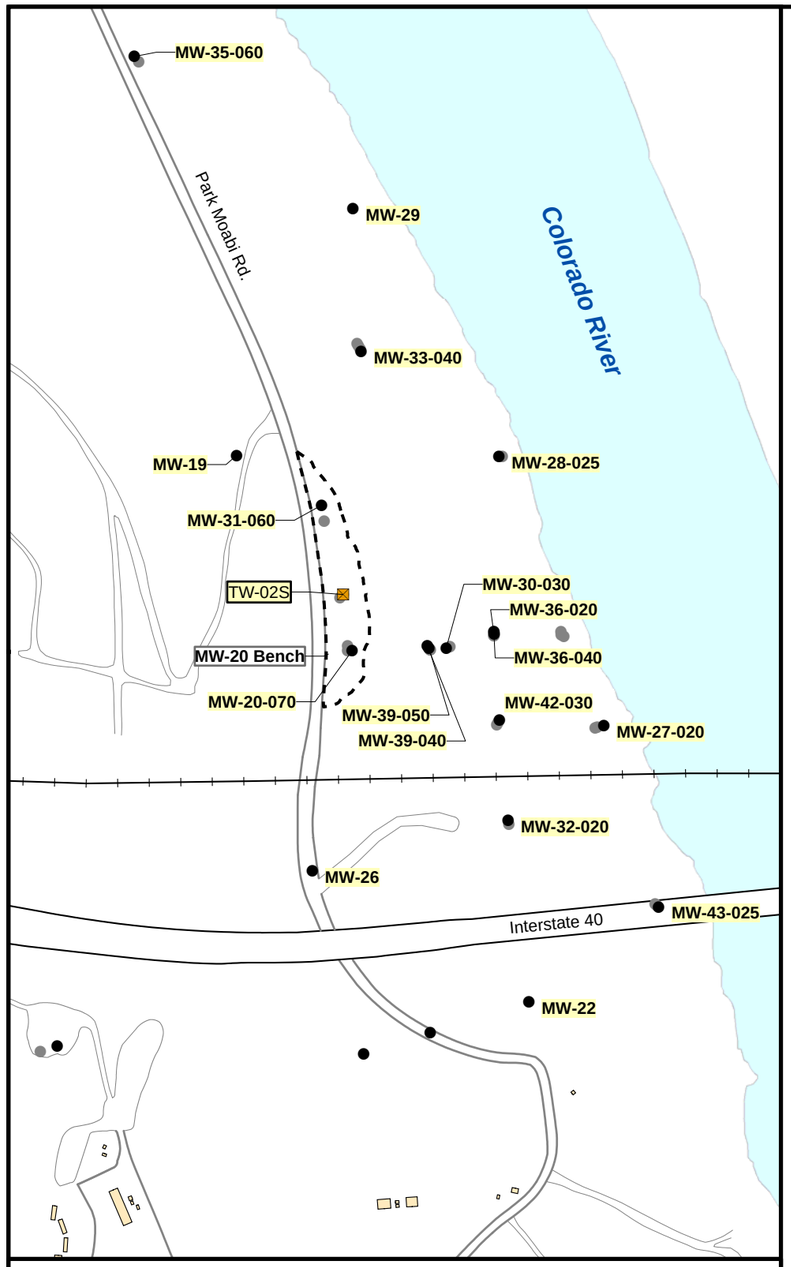
The level of uncertainty in average salinity and, therefore, in calculated water levels will be reduced by obtaining more frequent and more accurate measurements of salinity in the key well pairs. This will be accomplished by two actions. One is to install data loggers that measure salinity, temperature, and water levels simultaneously at regular intervals, currently set for every half hour, in each of the three key well pairs. The second action is to maintain vertical homogeneity in salinity and temperature by moving the sample pumps to the upper part of the water column. Pumping during sampling events will therefore pull water from the screened interval to near the top of the water column, eliminating stagnation and the formation of a significant salinity or temperature gradient. The combination of these two actions will allow more accurate calculation of equivalent freshwater heads for each water level measurement in the data set and will provide measurements that are sensitive to changes in salinity over the course of each month. PG&E is currently implementing these actions, and both should be completed in the current month.

Uncertainty analysis of gradient under the new system will be conducted by checking calibration of the data loggers each month for both water level and salinity. Any drift or offset will be recorded and used to calculate gradient uncertainty.

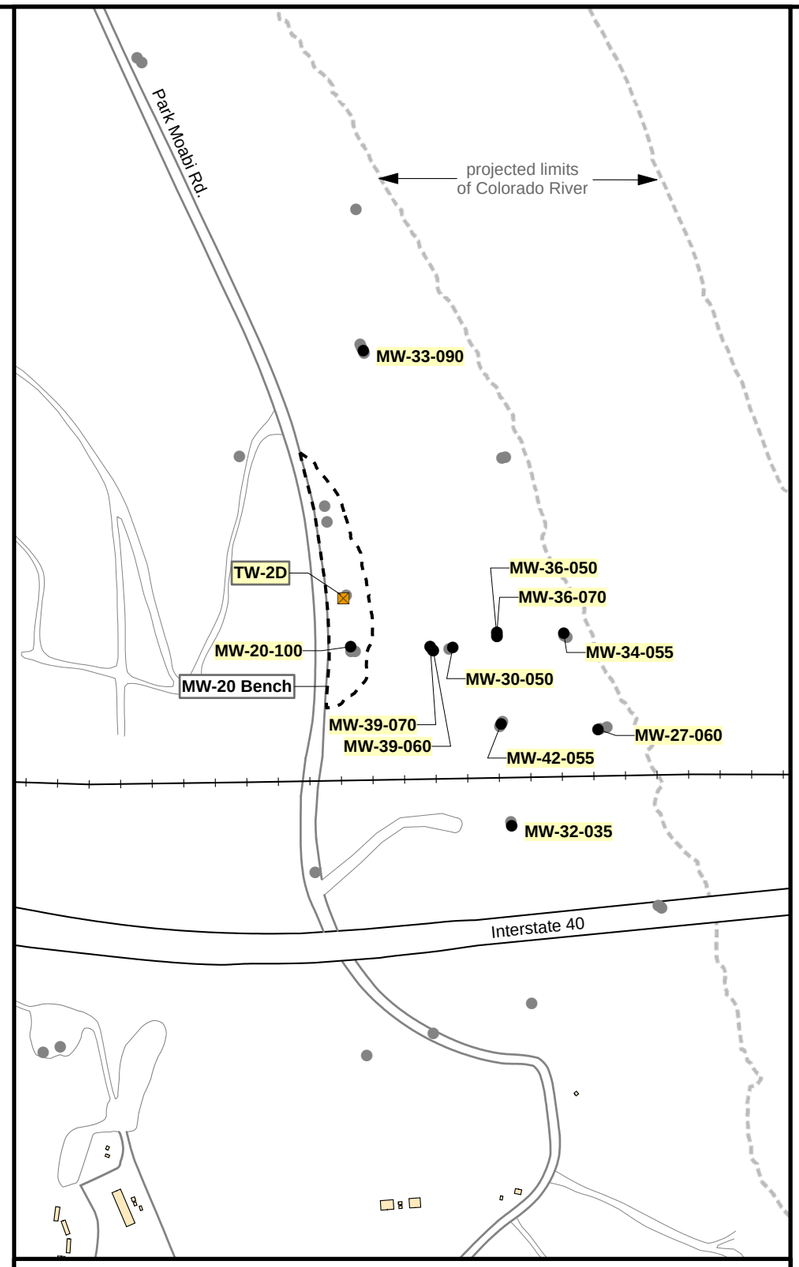
4.2.5 Groundwater Modeling to Support Interim Measures

The groundwater model is being used to help estimate pumping requirements at different times of the year based on the U.S. Bureau of Reclamation (BOR)-projected Davis Dam releases. The estimate is made by simulating groundwater flow conditions for each month of the year. Both river level and evapotranspiration rates are adjusted for each month in the simulations. Future river levels are estimated from the relationship between historic average monthly river levels at the I-3 river level monitoring station and the combination of: (1) historical average monthly Davis Dam release rates and (2) historical average Lake Havasu elevations. BOR projects future releases and lake elevations on a monthly basis for 2 years from the current month. The average slope of the river gradient at the site is calculated from transducer data from I-3 and Red Rock Bridge stations. Future I-3 levels are estimated from projected Davis Dam releases and Lake Havasu elevations, and the river slope is used to extrapolate river levels between the upstream and downstream boundaries of the model domain for each month's simulation.

The model is run to simulate a selected number of future months. Simulated flux of groundwater into the river from beneath the plume footprint is calculated for each future month. These simulations represent ambient conditions without IM No. 2 pumping. The amount of pumping required to reverse the groundwater flux is estimated as twice the calculated ambient flux. This multiplier is used for planning contingency, driven by factors including uncertainty in BOR estimates, river level estimates, model assumptions, and the fact that extraction well(s) will necessarily pump some water originating outside of the plume area.



UPPER ZONE ALLUVIAL AQUIFER



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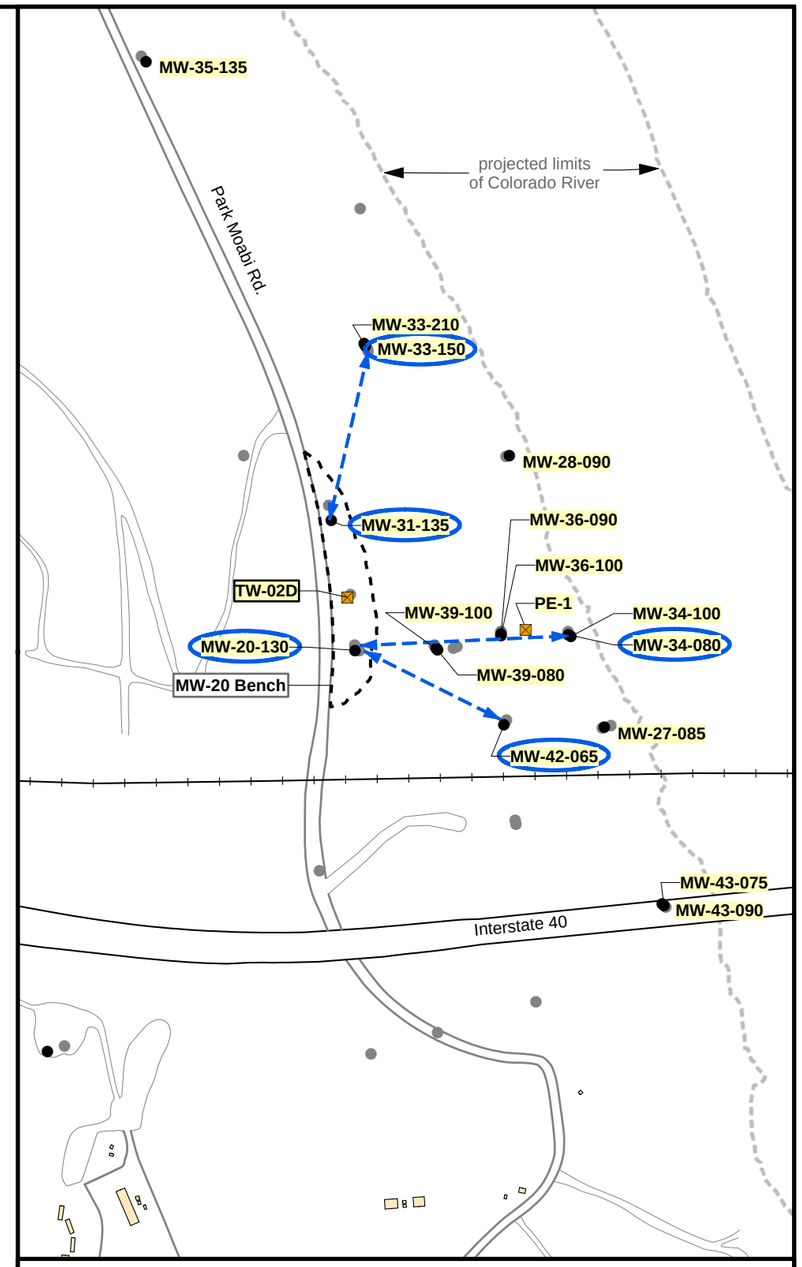

LOWER ZONE ALLUVIAL AQUIFER

LEGEND

- IM Extraction Well
- Monitoring Well

Notes:
See Section 4 text for pressure transducer network and gradient calculation descriptions.

MW-20-70 Well with pressure transducer for hydraulic gradient evaluation

MW-39-80 Well pair for calculating hydraulic gradients in Lower Zone of Alluvial Aquifer for performance demonstration

N

0 400 800 Feet

1 inch equals 400 feet

FIGURE 4-1
LOCATIONS OF WELLS USED FOR HYDRAULIC GRADIENT CALCULATION

PERFORMANCE MONITORNG PLAN FOR
INTERIM MEASURES IN FLOODPLAIN AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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5.0 Water Quality Data Collection and Evaluation

This section describes the collection, analysis, and evaluation procedures for the groundwater chemical monitoring data used for the PMP. All groundwater sampling and analysis activities will be performed as part of the GMP in accordance with the procedures, methods, and SOPs for the Topock program, as described in the Procedures Manual (CH2M HILL 2005c).

The groundwater chemical monitoring data to be collected and evaluated for the PMP include:

- **Monthly and biweekly Cr(VI) and dissolved total chromium [Cr(T)] groundwater analyses** collected under the GMP floodplain well sampling programs.
- **Quarterly Cr(VI), Cr(T), and specific conductance and pH groundwater analyses** collected in the floodplain wells and other site areas under the GMP quarterly monitoring activity.
- **Quarterly general chemistry parameter analyses** from selected wells in the PMP area for evaluating potential water changes in the PMP area under pumping conditions.
- **Measurement of field water quality parameters** during quarterly, monthly, and biweekly groundwater sampling activities.
- **Biweekly Cr(VI), Cr(T), and TDS groundwater analyses** collected from the active extraction well(s) for IM operations reporting.

Additionally, Cr(VI) and Cr(T) sampling may be performed at selected sentry wells in the floodplain under contingency sampling plans, as directed by DTSC.

5.1 Water Quality Monitoring and Analyses

Groundwater samples collected from the PMP monitoring network will be analyzed for field and laboratory parameters, as described below.

5.1.1 Field Water Quality Parameters

A flow-through cell will be used to measure water quality parameters during well purging and sampling of all groundwater monitoring wells. The field parameters to be measured include specific conductance, temperature, pH, turbidity, oxidation-reduction potential, and dissolved oxygen. These parameters are used to assess the geochemical conditions of groundwater and to evaluate potential changes in water chemistry due to IM pumping. Procedures for measurement of field water quality parameter are provided in the Procedures Manual (CH2M HILL 2005c).

5.1.2 Laboratory Analytical Parameters

Per the Procedures Manual and the GMP Sampling and Analysis Plan (CH2M HILL 2004e), Cr(VI) and Cr(T) are analyzed in groundwater samples collected in the quarterly, monthly, and biweekly sampling programs using the following analytical methods:

- Method SW 7196A is used for samples collected from monitoring wells where prior monitoring has detected Cr(VI) concentrations above 50 µg/L. The minimum reporting limit for Method 7196A for undiluted samples is 10 µg/L.
- Method SW 7199 is used for all surface water samples and all groundwater samples collected from monitoring wells where prior monitoring has not detected Cr(VI) concentrations above 50 µg/L. The minimum reporting limit for Cr(VI) using Method SW 7199 is 0.2 µg/L for undiluted samples.
- Dissolved Cr(T) is analyzed using Method SW 6010B (reporting limit of 1 µg/L for undiluted samples).

The suite of general chemistry and stable isotope parameters used for chemical performance evaluation in the floodplain area include:

- TDS
- Chloride, sulfate, and nitrate
- Dissolved calcium, magnesium, potassium, sodium, bromide, and boron
- Alkalinity
- Oxygen 18 and deuterium (stable isotopes)

Analytical methods, sample volumes and containers, sample preservation requirements, and quality control sample requirements are provided in the Procedures Manual (CH2M HILL 2005c). Data validation and management will be conducted in accordance with the Quality Assurance Project Plan, provided as Appendix D of the Procedures Manual.

5.2 Groundwater Monitoring Frequency

The proposed sampling frequency for the performance monitoring wells is based on the site hydrogeologic model and the extensive set of water quality data collected in the PMP area under the GMP since January 2004.

During the period February through August 2004, at the DTSC's request, PG&E conducted weekly sampling for Cr(VI) and Cr(T) in selected floodplain wells. Since August 2004, a biweekly sampling activity replaced the weekly well sampling. Since November 2003, monthly sampling has been conducted at 24 wells in the floodplain area. During January and February 2005, new groundwater monitoring wells were installed in the floodplain area of the site under the IM investigation program. In late February 2005, weekly sampling of selected floodplain monitoring wells and river sampling locations was resumed at DTSC direction.

The results of prior sampling data and new investigation were reviewed and evaluated as part preparation of a revised and updated Monitoring Plan for the GMP (CH2M HILL 2005d). Accordingly, the sampling frequency and analytical parameters proposed in the Draft Monitoring Plan for the GMP is incorporated into this Draft Monitoring Plan for the PMP.

Table 5-1 presents the proposed scope of analyses and sampling frequencies for all wells in the PMP. The Cr(VI) and Cr(T) monitoring program includes **biweekly sampling** of four selected sentry wells, **monthly sampling** of 30 floodplain wells, and **quarterly sampling** of 13 additional monitoring wells in adjoining areas. The emphasis of the PMP chemical monitoring is the monthly sampling activity which is considered an appropriate sampling frequency for sentry monitoring and the performance evaluations required for the IM floodplain area.

Table 5-1 also identifies the proposed sampling locations and frequency for the IM extraction wells and the selected wells to be sampled for the suite of chemical performance evaluation parameters. Figure 5-1 summarizes the locations where the quarterly, monthly, and biweekly Cr(VI) data will be collected for the wells in the performance monitoring area.

5.3 Cr(VI) Distribution and Water Quality Trends

The results of groundwater analyses collected in the floodplain area will be reviewed, validated, and evaluated as part of IM performance monitoring. The focus of evaluation will be the distribution of Cr(VI), both horizontal and vertical, in the Alluvial Aquifer in floodplain area. In addition, temporal data trends in Cr(VI) concentrations and other water quality parameters will be examined as part of the PMP.

5.3.1 Distribution of Cr(VI)

The horizontal and vertical distribution of Cr(VI) in the upper, middle and lower portions of the Alluvial Aquifer in the PMP area will be displayed for each monthly monitoring period. As required by DTSC, the sampling results will be contoured at 50 and 20 µg/L. The Cr(VI) distribution maps will also be depicted in the floodplain groundwater elevation maps as part of the capture zone analysis. Using sampling data from well clusters, the vertical distribution of Cr(VI) in the aquifer will be shown on the floodplain hydrogeologic cross-section. Examples of the Cr(VI) distribution maps and cross section to be generated for the PMP are included in previously submitted Performance Monitoring Reports (CH2M HILL 2005a).

5.3.2 Water Quality Concentration Trends

Graphs of Cr(VI) concentrations over time will be prepared for evaluating water quality data trends in the IM performance area. Time versus concentration graphs have been prepared and evaluated during the current IM performance review, and declining concentration trends have been observed and documented in a number of floodplain well locations. The graphical format developed for the chemical concentration displays include groundwater and river hydrographs. Examples of the Cr(VI) concentration graphs that will be used for the ongoing PMP are included in previously submitted Performance Monitoring Reports (CH2M HILL 2005a).

TABLE 5-1
Proposed Analyses and Sampling Frequency for Chemical Performance Monitoring
Performance Monitoring Plan for Interim Measures in the Floodplain Area
PG&E Topock Compressor Station, Needles, California

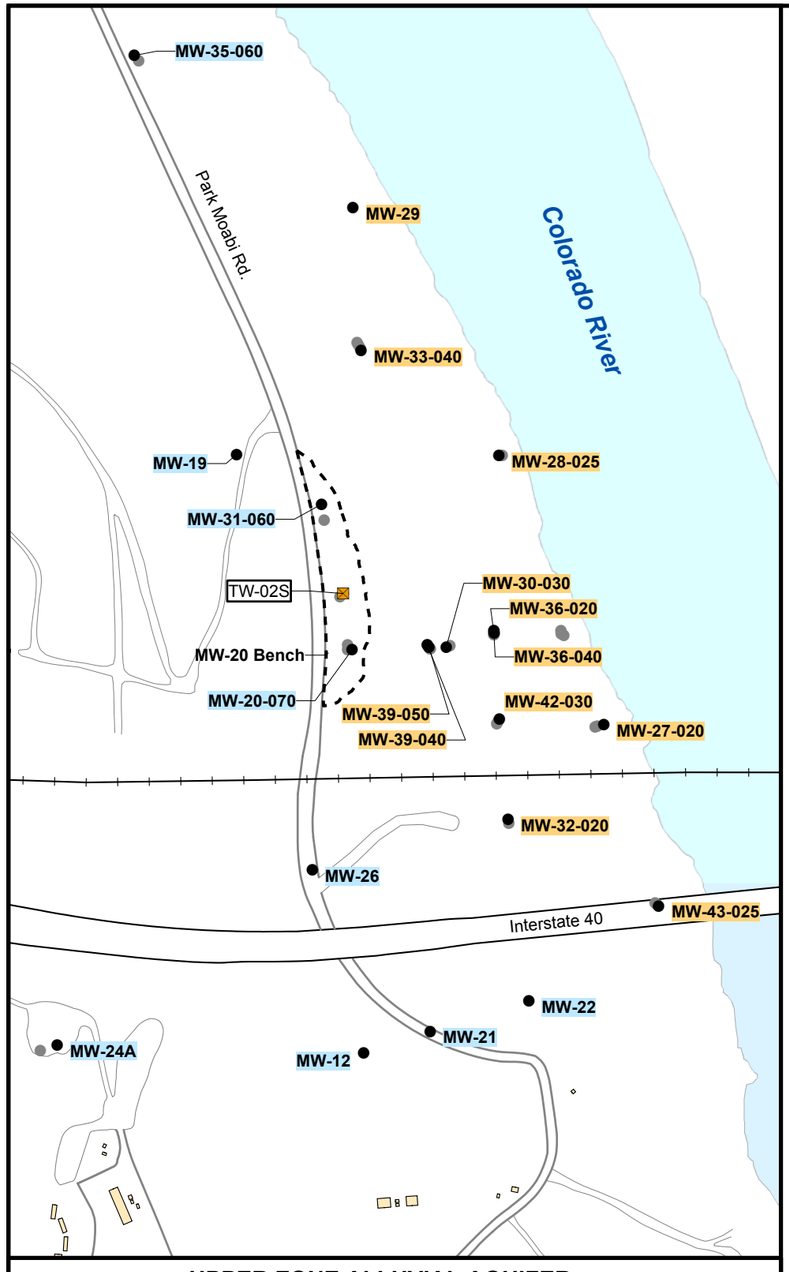
Well ID [1]		Proposed Analytical Parameters and Sampling Frequency [2] (start May 2005)					
		Cr(VI)	Cr(T)	Field Water Quality Parameters [3]	SC and pH laboratory	Chemical Evaluation Suite [4]	Remarks
Extraction Wells							
TW-2S		**Q**	**Q**	**Q**	**Q**	--	TW-2D scope applies if active
TW-2D		BW	BW	**Q**	**Q**	TDS only - BW	
PE-1		**Q**	**Q**	**Q**	**Q**	--	TW-2D scope applies if active
Performance Monitoring Wells							
MW-20-70		Q	Q	Q	Q	Q	
MW-20-100		Q	Q	Q	Q	Q	
MW-20-130		Q	Q	Q	Q	Q	
MW-22-10		Q	Q	Q	Q	--	secondary sentry well
MW-27-20		Q	Q	Q	Q	Q	secondary sentry well
MW-27-60	*	**M**	**M**	**M**	**Q**	--	primary sentry well
MW-27-85	*	**BW**	**BW**	**BW**	**Q**	--	primary sentry well
MW-28-25		M	M	M	Q	Q	secondary sentry well
MW-28-90		**M**	**M**	**M**	**Q**	--	primary sentry well water quality trend established; monthly sampling sufficient
MW-29-40		M	M	M	Q	--	secondary sentry well
MW-30-30		M	M	M	Q	Q	secondary sentry well
MW-30-50		M	M	M	Q	Q	
MW-31-60		Q	Q	Q	Q	--	
MW-31-135		Q	Q	Q	Q	--	
MW-32-20		M	M	M	Q	Q	secondary sentry well
MW-32-35		M	M	M	Q	Q	secondary sentry well
MW-33-40		M	M	M	Q	--	secondary sentry well
MW-33-90		**M**	**M**	**M**	**Q**	--	primary sentry well water quality trend established; monthly sampling sufficient
MW-33-150		**M**	**M**	**M**	**Q**	--	primary sentry well
MW-33-210		**M**	**M**	**M**	**Q**	--	secondary sentry well
MW-34-55		M	M	M	Q	Q	secondary sentry well
MW-34-80	*	BW	BW	BW	Q	Q	primary sentry well
MW-34-100	*	**BW**	**BW**	**BW**	**Q**	**Q**	primary sentry well add chemical evaluation suite
MW-35-60		Q	Q	Q	Q	--	
MW-35-135		Q	Q	Q	Q	--	

TABLE 5-1
Proposed Analyses and Sampling Frequency for Chemical Performance Monitoring
Performance Monitoring Plan for Interim Measures in the Floodplain Area
PG&E Topock Compressor Station, Needles, California

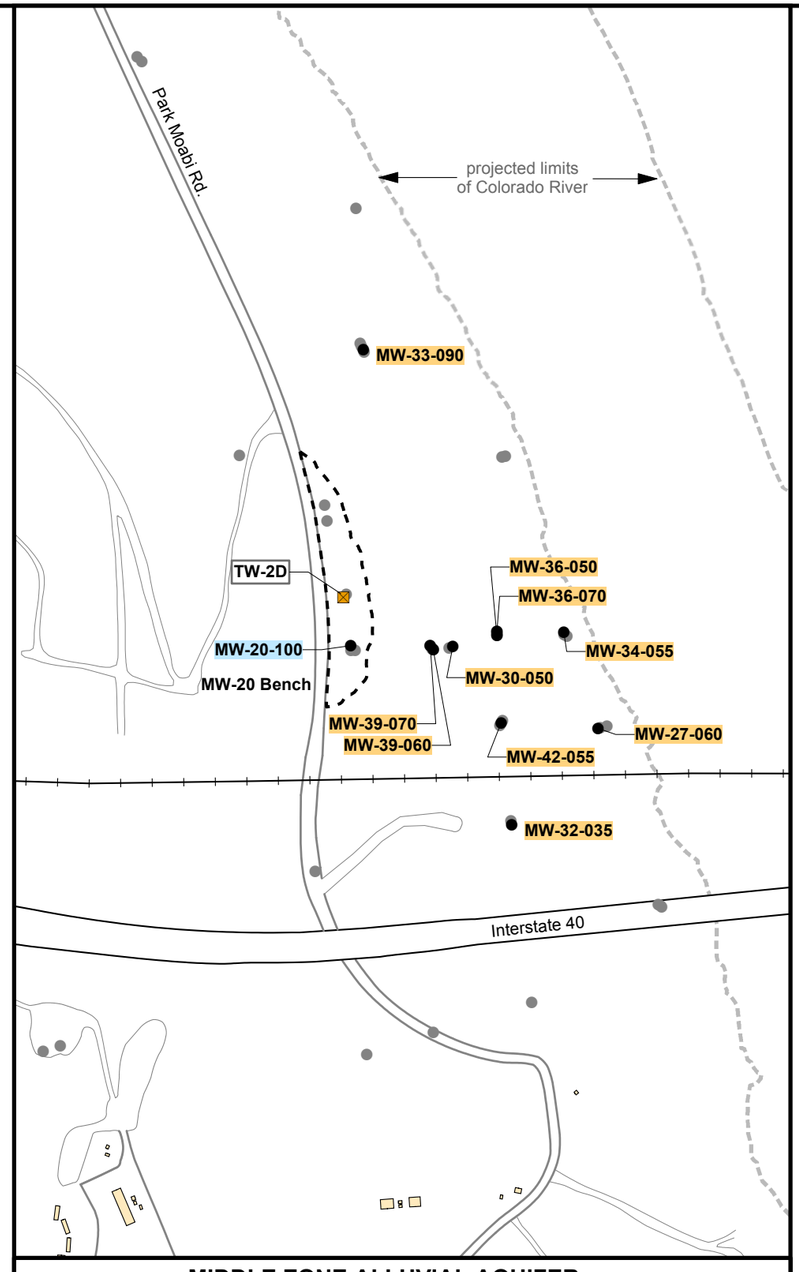
Well ID [1]	Proposed Analytical Parameters and Sampling Frequency [2] (start May 2005)					
	Cr(VI)	Cr(T)	Field Water Quality Parameters [3]	SC and pH laboratory	Chemical Evaluation Suite [4]	Remarks
MW-36-20	M	M	M	Q	--	secondary sentry well
MW-36-40	M	M	M	Q	--	secondary sentry well
MW-36-50	M	M	M	Q	--	secondary sentry well
MW-36-70	M	M	M	Q	--	secondary sentry well
MW-36-90	M	M	M	Q	--	
MW-36-100	BW	BW	BW	Q	--	Cr(VI) trend well
MW-39-40	M	M	M	Q	--	secondary sentry well
MW-39-50	M	M	M	Q	--	
MW-39-60	M	M	M	Q	--	
MW-39-70	M	M	M	Q	--	
MW-39-80	M	M	M	Q	--	
MW-39-100	M	M	M	Q	--	
MW-42-30	**M**	**M**	**M**	**Q**	--	secondary sentry well
MW-42-55	**M**	**M**	**M**	**Q**	--	secondary sentry well
MW-42-65	**M**	**M**	**M**	**Q**	--	secondary sentry well
MW-43-25	**M**	**M**	**M**	**Q**	--	secondary sentry well
MW-43-75	**M**	**M**	**M**	**Q**	--	secondary sentry well
MW-43-90	**M**	**M**	**M**	**Q**	--	secondary sentry well
Other Wells in Performance Monitoring Network						
MW-10	Q	Q	Q	Q	--	
MW-12	Q	Q	Q	Q	--	
MW-19	Q	Q	Q	Q	--	
MW-21	Q	Q	Q	Q	--	
MW-25	Q	Q	Q	Q	Q	
MW-26	Q	Q	Q	Q	Q	

NOTES:

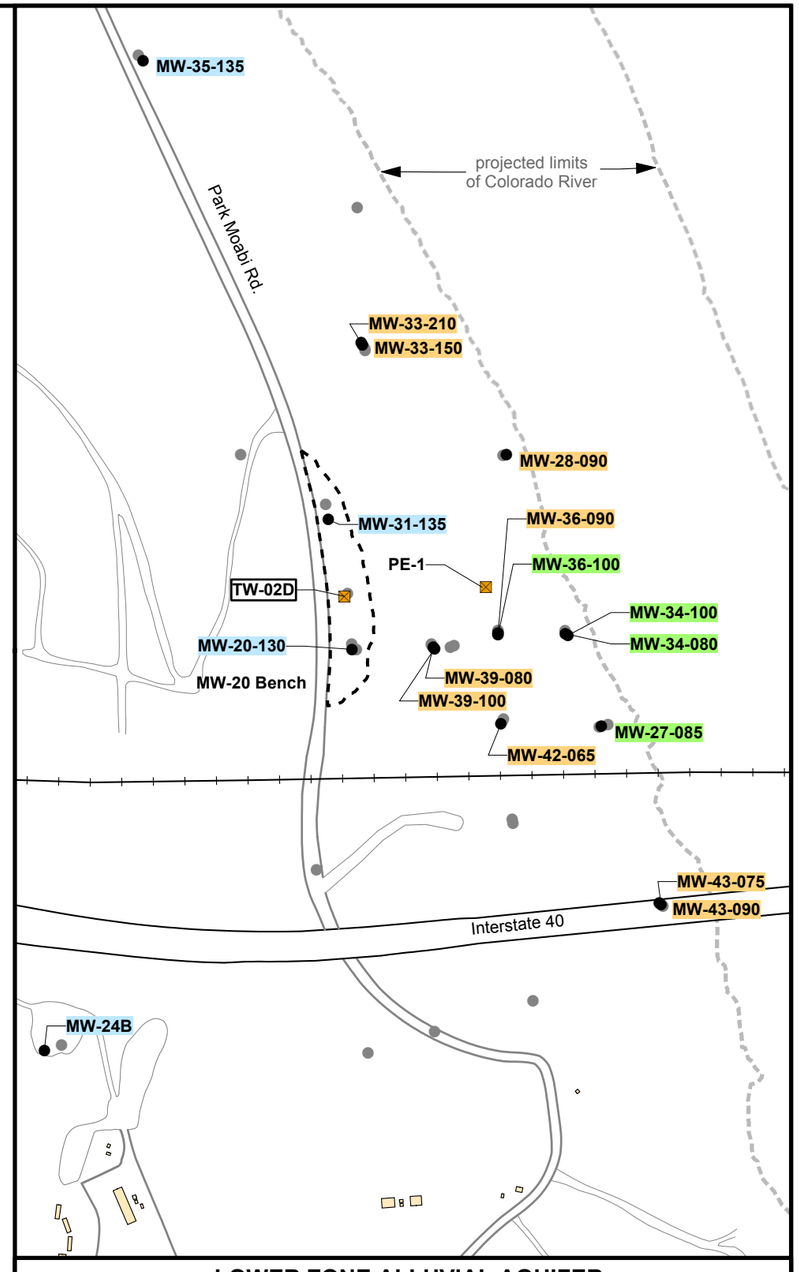
1. The last field in monitoring well ID indicates the approximate base depth of well screen (feet below ground surface)
2. Sampling frequency: quarterly (Q), monthly (M), biweekly (BW).
   Hexavalent chromium [Cr(VI)], dissolved total chromium [Cr(T)]
   Bold denotes changes or additions to the current GMP and IM monitoring programs
   * denotes wells sampled on Weekly schedule, starting Feb 22, 2005 under DTSC direction
3. Field water quality parameters: temperature, pH, specific conductance (SC), salinity, oxygen reduction potential (ORP), dissolved oxygen
4. Chemical evaluation parameters: total dissolved solids (TDS), chloride, sulfate, nitrate, alkalinity, stable isotopes (oxygen-18 & deuterium), calcium, potassium, magnesium, sodium, bromide, boron



UPPER ZONE ALLUVIAL AQUIFER



MIDDLE ZONE ALLUVIAL AQUIFER



LOWER ZONE ALLUVIAL AQUIFER

Legend

- IM Extraction Well
- Monitoring Well

Notes:
See Table 5-2 for chemical parameters monitored in Quarterly, Monthly and Biweekly sampling programs

Proposed Groundwater Monitoring Frequency - Starting May 1, 2005

MW-20-70	Quarterly only
MW-39-80	Monthly and Quarterly
MW-34-80	Bi-weekly and Quarterly

N

0 400 800 Feet

1 inch equals 400 feet

FIGURE 5-1
SAMPLING FREQUENCY FOR WELLS IN PERFOMANCE MONITORING AREA

PERFORMANCE MONITORNG PLAN FOR
INTERIM MEASURES IN FLOODPLAIN AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

6.0 Reporting

Item VI in the February 14, 2005 DTSC letter (DTSC 2005) outlines the following reporting requirements for the PMP:

- Notification to DTSC of any new Cr(VI) detection in a sentry well, or increasing trend in a sentry well.
- Notification to DTSC of the determination that the IM is not providing hydraulic containment of the Cr(VI) plume.
- Submittal of monthly reports, which evaluate the performance of the IM for monthly reporting periods.
- Submittal of quarterly reports, which evaluate the performance of the IM for quarterly reporting periods.
- Submittal of annual reports, which evaluate the performance of the IM for annual reporting periods.

The PMP has incorporated these reporting provisions for the continued operation of the IM in the floodplain area (Figure 3-2). Figure 6-1 presents a generalized schedule of the data collection activities, the performance evaluation periods, and monthly, quarterly, and annual reports required by DTSC for the PMP. The proposed format and content of the performance monitoring reports are described below.

6.1 Monthly Performance Reports

Monthly reports will document IM system operations and the performance monitoring data and evaluation completed for monthly reporting periods. The monthly reports will follow the general format used for IM performance monitoring conducted in 2004 to present, and will be submitted 15 days after the monthly reporting period. Eight monthly reports will be prepared each calendar year for the months of February, March, May, June, August, September, November and December. The proposed outline and content of the Monthly Performance Reports is included in Appendix C1.

6.2 Quarterly Performance Reports

Quarterly reports will document IM system operations and the performance monitoring data and evaluation completed for quarterly reporting periods. The quarterly performance demonstration periods for the IM are established by DTSC as February through April, May through July, August through October, and November through January. The quarterly performance reports will be submitted within 30 days after the quarterly reporting period. Three quarterly reports will be prepared each calendar year for the periods February through April, May through July, and August through October. Appendix C2 provides the proposed outline and content of the Quarterly Performance Reports.

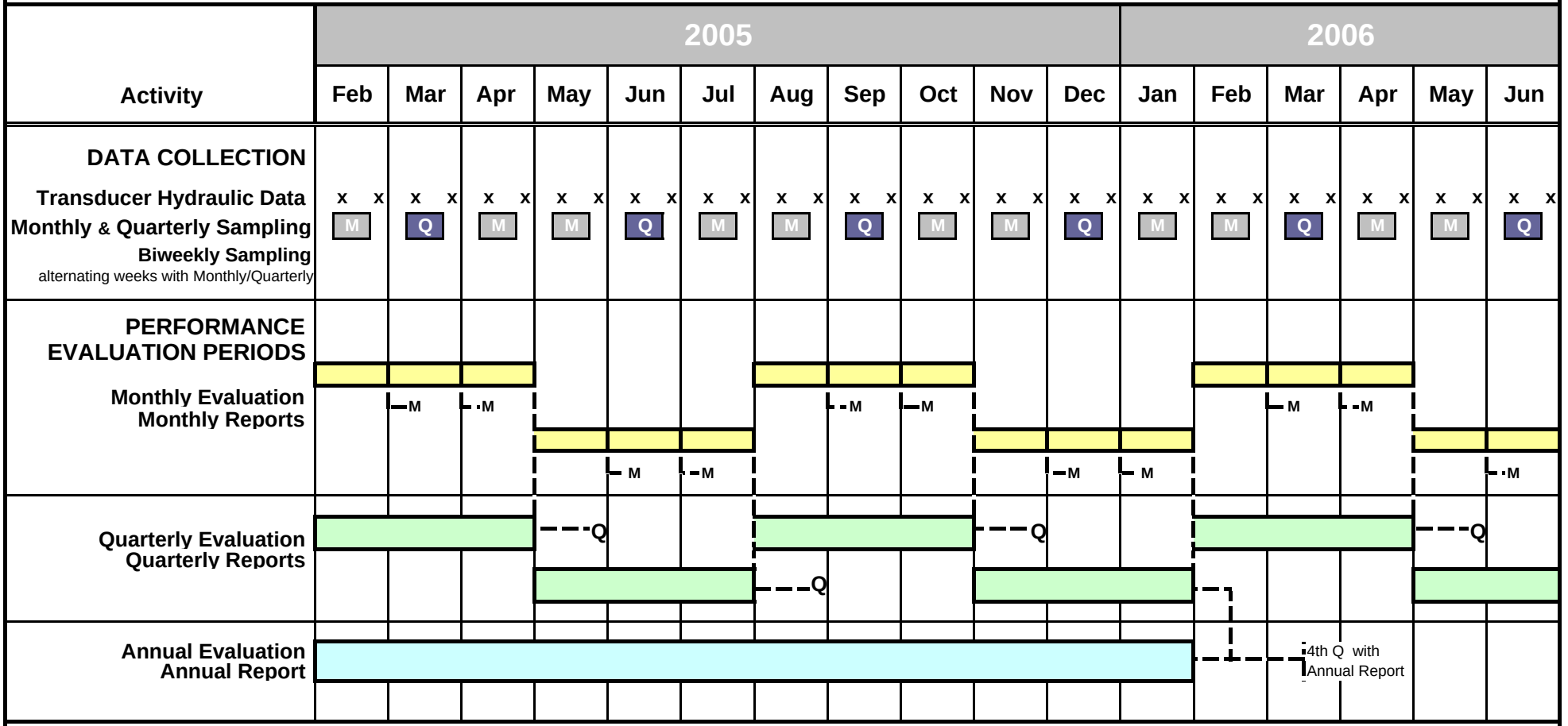
Prior to submitting the first quarterly report, PG&E will submit example graphical summaries to DTSC for review and approval at least 30 days prior to submittal.

6.3 Annual Performance Evaluation Report

Annual reports will document IM system operations and the performance monitoring data and evaluation completed for annual operations periods. Per DTSC, the annual reporting period for each year will begin on February 1 and end on January 31 of the following year (Figure 6-1). The annual performance evaluation reports will be submitted by March 15 (45 days after the annual reporting period). The proposed outline and content of the Annual Performance Evaluation Reports is included in Appendix C3.

Prior to submitting the first annual report, PG&E will submit example graphical summaries to DTSC for review and approval at least 30 days prior to submittal.

Topock Interim Measures Performance Monitoring Program



NOTE : The Quarterly report and 3rd Month reports are proposed to be combined into single submittals.
The Annual report and 4th Quarter report are proposed to be combined into a single submittal.

LEGEND
M Monthly Report
Q Quarterly Evaluation Report

FIGURE 6-1

SCHEDULE FOR PERFORMANCE EVALUATION AND REPORTING

PERFORMANCE MONITORING PLAN FOR INTERIM MEASURES IN THE FLOODPLAIN AREA
PG&E TOPOCK COMPRESSOR STATION
NEEEDLES, CALIFORNIA

7.0 Contingency Plan and Response Actions

The performance of the IM will be continuously monitored and evaluated to ensure that the hydraulic containment objective in the floodplain area is met and appropriate and timely adjustments can be made to the extraction system. DTSC's February 14, 2005 direction letter, Item V (DTSC 2005) identifies the following contingency plan and response action requirements for the PMP:

- Implement the approved contingency plan(s) if new Cr(VI) detections or increasing trends are observed in the sentry monitoring wells.
- Implement, with DTSC approval, increases to the pumping from existing extraction wells (TW-2D and TW-2S).
- Install one or both of the potential extraction wells (PE-2 or PE-3) if additional extraction capacity is needed.
- If additional extraction capacity is needed beyond what can be provided by PE-2 and PE-3, propose and submit work plans for the installation of additional extraction wells for the IM system.
- Install additional monitoring wells as necessary to define the chromium plume limits in the floodplain, monitor potential plume movement, and assess the extent of the capture zone.

The PMP has incorporated these contingency and response actions for the continued operation of the IM in the floodplain area (Figure 3-2).

7.1 Contingency Plan for Sentry Well Monitoring

Figure 7-1 presents the approved Contingency Planning for Sentry Well Groundwater Monitoring (DTSC 2005). This decision chart outlines the criteria and notification procedures when new Cr(VI) detections, or significant increasing concentrations, are observed in the floodplain sentry wells. The contingency plan includes provisions for verification sampling and initiating response actions for the IM extraction system.

7.2 Modifications and Improvements to the Extraction System

Per DTSC requirements, the first contingency response action will be to increase pumping from the existing extraction wells. The adjustments to extraction rates will be implemented, following DTSC approval, according to procedures described in the IM extraction system operation and maintenance plan (CH2M HILL, in preparation).

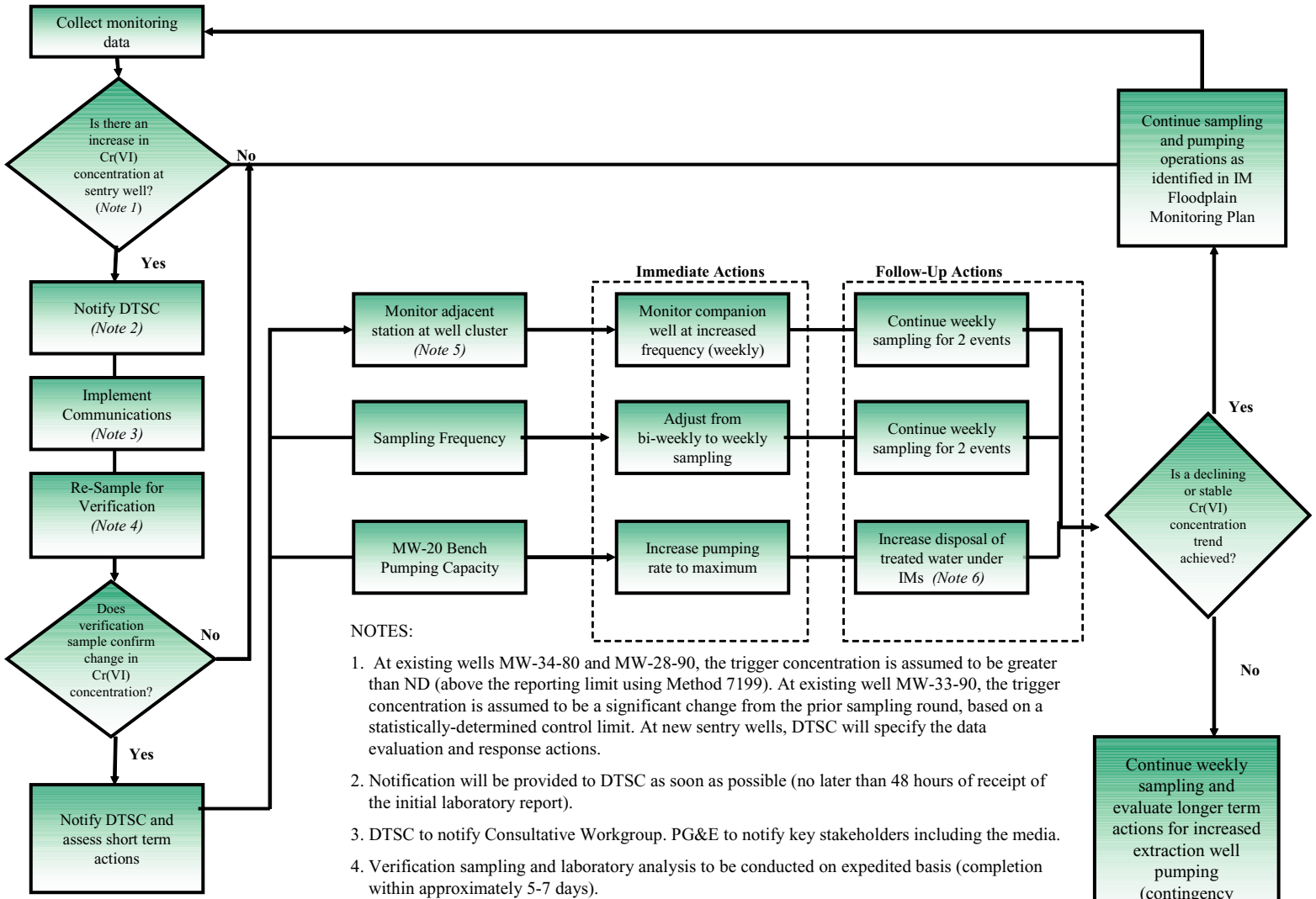
If it becomes apparent through water level monitoring or increasing concentrations of Cr(VI) in key wells that there are areas of the plume not being adequately captured by the higher pumping rates at existing wells, PG&E is prepared at the direction of DTSC to

quickly add one or more additional extraction wells. These response actions will be implemented according to procedures and schedules described in the IM extraction system operation and maintenance plan (CH2M HILL, in preparation).

7.3 Installation of Additional Monitoring Wells

If additional wells are needed for sentry monitoring or hydraulic measurement in the PMP area, drilling access permission and permits will be obtained and work plans will be prepared and submitted to DTSC. All drilling activities will be coordinated with state and federal agencies regarding cultural and biological resource surveys, site clearance, and approvals for installation of new monitoring wells in the floodplain area. The drilling and well installation will be conducted in accordance with approved work plans and all applicable permits.

The objectives, procedures, and specifications for the drilling and installation of additional monitoring wells for the IM will be addressed in project-specific work plans following the format used for the Phase 2 Monitoring Well Installation Work Plan (CH2M HILL 2005e). Drilling, hydrogeologic logging, monitoring well installation, and development procedures are described in detail in the Procedures Manual (Section 5 and Appendix B SOPs, CH2M HILL 2005c).



NOTES:

1. At existing wells MW-34-80 and MW-28-90, the trigger concentration is assumed to be greater than ND (above the reporting limit using Method 7199). At existing well MW-33-90, the trigger concentration is assumed to be a significant change from the prior sampling round, based on a statistically-determined control limit. At new sentry wells, DTSC will specify the data evaluation and response actions.
2. Notification will be provided to DTSC as soon as possible (no later than 48 hours of receipt of the initial laboratory report).
3. DTSC to notify Consultative Workgroup. PG&E to notify key stakeholders including the media.
4. Verification sampling and laboratory analysis to be conducted on expedited basis (completion within approximately 5-7 days).
5. Specifics to be determined based on well location and sampling history.
6. Disposal under the Interim Measures involves offsite trucking (IM2) and disposal by injection (IM3).

Source: Contingency Planning diagram (Final Rev-0), dated February 2005, approved for Interim Measures

FIGURE 7-1
CONTINGENCY PLANNING FOR SENTRY WELL GROUNDWATER MONITORING
PERFORMANCE MONITORING PLAN FOR INTERIM MEASURES IN FLOODPLAIN AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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Appendix A
Information for Extraction and Performance Monitoring Well Network

Appendix B
Procedures for Calculation of Freshwater Equivalent Heads, PG&E Topock Program

TABLE A-1

Updated : 4/15/05

Well Elevations and Construction Data for Extraction and Performance Monitoring Wells

Performance Monitoring Plan for Interim Measures in the Floodplain Area

PG&E Topock Compressor Station, Needles, California

Well ID	Monitored Zone of Alluvial Aquifer	Well Elevation		Well Depth	TOP of Screen		BASE of Screen		Screen Length	Well Casing & Sump Length	Dedicated Sampling Pump & Pump Setting	Date Installed
		Measure Pt. Elevation	Ground Elevation		Depth	Elevation	Depth	Elevation				
		feet MSL	feet MSL	feet BTOC	feet BGS	feet MSL	feet BGS	feet MSL	feet		feet BTOC	
Extraction Wells												
TW-2S	Upper & Middle	499.05	497	99	45	452	95	402	50	6" PVC - 5' sump	Production Pump	Apr-04
TW-2D	Lower	499.57	497	153	115	382	150	347	35	6" PVC - 5' sump	Production Pump	Mar-04
PE-1	Lower	469.66	497	110	79	418	89	408	10	6" SS - 10' sump	Production Pump	Mar-05
Performance Monitoring Wells												
MW-20-70	Upper	500.15	499	71	50	449	70	429	20	4" PVC	CD pump - 60'	Mar-98
MW-20-100	Middle	500.58	499	101	90	410	100	400	10	4" PVC	CD pump - 95'	Apr-99
MW-20-130	Lower	500.66	499	133	121	378	131	368	10	4" PVC	CD pump - 126'	Apr-99
MW-22-10	Upper	460.72	458	13	6	453	11	448	5	2" PVC	Peristaltic - 9'	Apr-98
MW-27-20	Upper	460.56	459	19	7	452	17	442	10	2" PVC	AR pump - 12'	Apr-99
MW-27-60	Middle	461.38	458	59	47	411	57	401	10	2" PVC	AR pump - 25'	Jan-05
MW-27-80	Lower	460.99	458	98	78	380	88	370	10	2" PVC - 10' sump	AR pump - 25'	Jan-05
MW-28-25	Upper	466.85	465	25	13	452	23	442	10	2" PVC	AR pump - 25'	Apr-99
MW-28-90	Lower	467.51	465	99	70	395	90	375	20	2" PVC - 5' sump	AR pump - 27'	Apr-04
MW-29-40	Upper	485.21	483	42	30	454	40	444	10	2" PVC	Battery Pump - 35'	Apr-99
MW-30-30	Upper	468.12	466	34	12	454	32	434	20	2" PVC	AR pump - 22'	Apr-99
MW-30-50	Middle	468.81	466	52	41	426	51	416	10	4" PVC	AR pump - 46'	Mar-03
MW-31-60	Upper	496.81	495	64	42	454	62	434	20	4" PVC	CD pump - 52'	Apr-99
MW-31-135	Lower	498.11	495	134	113	382	133	362	20	2" PVC	AR pump - 123'	Mar-04
MW-32-20	Upper	461.51	459	22	10	449	20	439	10	2" PVC	AR pump - 15'	Mar-03
MW-32-35	Middle	461.63	459	39	27.5	432	35	424	7.5	4" PVC	AR pump - 32'	Mar-03
MW-33-40	Upper	487.38	485	42	29	456	39	446	10	4" PVC	Battery Pump - 35'	Mar-03
MW-33-90	Middle	487.55	485	91	69	416	89	396	20	4" PVC	AR pump - 82'	Mar-03
MW-33-150	Lower	487.77	485	155	132	353	152	333	20	2" PVC	AR pump - 50'	Feb-05
MW-33-210	Lower	487.25	485	223	190	295	210	275	20	2" PVC - 10' sump	AR pump - 50'	Feb-05
MW-34-55	Middle	460.95	459	57	45	414	55	404	10	4" PVC	AR pump - 50'	Jun-03
MW-34-80	Lower	461.20	459	84	73	386	83	376	10	4" PVC	AR pump - 78'	Jun-03
MW-34-100	Lower	460.97	459	117	90	369	100	359	10	2" PVC - 5' sump	AR pump - 25'	Jan-05

Well ID	Monitored Zone of Alluvial Aquifer	Well Elevation		Well Depth	TOP of Screen		BASE of Screen		Screen Length	Well Casing & Sump Length	Dedicated Sampling Pump & Pump Setting	Date Installed
		Measure Pt. Elevation	Ground Elevation		Depth	Elevation	Depth	Elevation				
		feet MSL	feet MSL	feet BTOC	feet BGS	feet MSL	feet BGS	feet MSL	feet		feet BTOC	
MW-35-60	Upper	484.19	481	60	37	444	57	424	20	2" PVC	AR pump - 37'	Apr-04
MW-35-135	Lower	483.57	481	159	116	365	136	345	20	2" PVC	AR pump - 217'	Apr-04
MW-36-20	Upper	469.26	467	23	12	455	22	445	10	1" PVC	Peristaltic - 15'	May-04
MW-36-40	Upper	469.61	467	43	23	444	33	434	10	1" PVC	Peristaltic - 20'	May-04
MW-36-50	Middle	469.60	467	53	48	419	53	414	5	1" PVC	Peristaltic - 20'	May-04
MW-36-70	Middle	469.25	467	73	62	405	72	395	10	1" PVC	Peristaltic - 20'	May-04
MW-36-90	Lower	469.61	467	93	82	385	92	375	10	1" PVC	Peristaltic - 20'	May-04
MW-36-100	Lower	469.64	467	110	90	377	100	367	10	2" PVC - 10' sump	AR pump - 93'	May-04
MW-39-40	Upper	468.02	465	42	32	433	42	423	10	1" PVC	Peristaltic - 20'	Apr-04
MW-39-50	Middle	467.93	465	50	50	415	55	410	5	1" PVC	Peristaltic - 20'	Apr-04
MW-39-60	Middle	468.00	465	66	51	414	61	404	10	1" PVC	Peristaltic - 20'	Apr-04
MW-39-70	Middle	468.02	465	72	62	403	72	393	10	1" PVC	Peristaltic - 20'	Apr-04
MW-39-80	Lower	467.92	465	83	72	393	82	383	10	1" PVC	Peristaltic - 20'	Apr-04
MW-39-100	Lower	468.01	465	118	83	382	103	362	20	2" PVC - 15' sump	AR pump - 90'	Apr-04
MW-42-30	Upper	463.81	461	32	10	451	30	431	20	2" PVC	AR pump - 20'	Feb-05
MW-42-55	Middle	463.87	461	56	43	418	53	408	10	2" PVC	AR pump - 37'	Feb-05
MW-42-65	Middle	463.37	461	80	56	405	66	395	10	2" PVC - 15' sump	AR pump - 37'	Feb-05
MW-43-25	Upper	462.54	458	27	15	443	25	433	10	2" PVC	AR pump - 26'	Feb-05
MW-43-75	Lower	462.71	458	77	65	393	75	383	10	2" PVC	AR pump - 26'	Feb-05
MW-43-90	Lower	462.76	458	102	80	378	90	368	10	2" PVC - 10' sump	AR pump - 26'	Feb-05
Other Wells in Performance Monitoring Network												
MW-12	Upper	484.01	483	52	28	456	48	436	20	4" PVC	AR pump - 38'	Jul-97
MW-10	Upper	530.65	529	98	74	456	94	436	20	4" PVC	CD pump - 84'	Jun-97
MW-19	Upper	499.92	499	67	46	453	66	433	20	4" PVC	CD pump - 56'	Mar-98
MW-21	Upper	505.55	506	59	39	467	59	447	20	4" PVC	CD pump - 54'	May-98
MW-25	Upper	542.90	541	107	85	457	105	437	20	4" PVC	CD pump - 95'	Apr-99
MW-26	Upper	502.22	503	74	52	451	72	431	20	4" PVC	CD pump - 62'	Apr-99

NOTES:

1. Well elevations for existing wells in feet above mean sea level (MSL) from well surveys conducted Feb. & May 2004 (CH2M HILL) and Feb. Mar. 2005 (PG&E).
2. Ground surface elevations and all well/screen depth and elevations rounded-off to whole-foot values.
3. Static depth to water values are approximate depths in feet below top of well casing (BTOC) rounded off to whole-foot values.
   The static water levels listed are "typical" groundwater levels for general use in transducer and sampling field planning. Actual levels can vary 1 to 3 feet daily.
4. Well pumps: CD pump = constant discharge submersible pump, AR pump = adjustable-rate submersible pump (Redi-Flo2)

N

0 150 300 450

Feet

LEGEND

- Groundwater Supply or Test Well
- River Sampling Location
- Groundwater Extraction Well
- Exploration Boring
- Potential Extraction Well
- Hydrogeologic Section

RRB
MW-35-60
MW-35-135
MW-29
MW-41S
MW-41M
MW-41D
MW-33-40
MW-33-90
MW-33-210
MW-28-25
MW-28-90
R-28
MW-13
PE-3
MW-19
PG&E
BLM
MW-37S
MW-37D
MW-31-060
MW-31-135
MW-20 Bench
MW-34-55
MW-34-80
MW-34-100
MW-36-Cluster
MW-39-Cluster
TW-2S
TW-2D
Section A
MW-20 Cluster
PE-1
MW-25
MW-30-30
MW-30-50
R-27
MW-42-30
MW-42-55
MW-42-65
PE-1A
PE-1B
BLM
MW-27-20
MW-27-60
MW-27-85
HNWR
MW-32-020
MW-32-035
PE-2
MW-26
MW-43-25
MW-43-75
MW-43-90
MW-40S
MW-40D
R-22
MW-11
MW-22
PGE-06
MW-21
MW-24BR
MW-24A
MW-12
MW-24B
PGE-07
MW-23
MW-38S
MW-38D
TW-1
HNWR
PG&E
MW-10
I-3
MW-09
PGE-08
PG&E Topock
Compressor Station

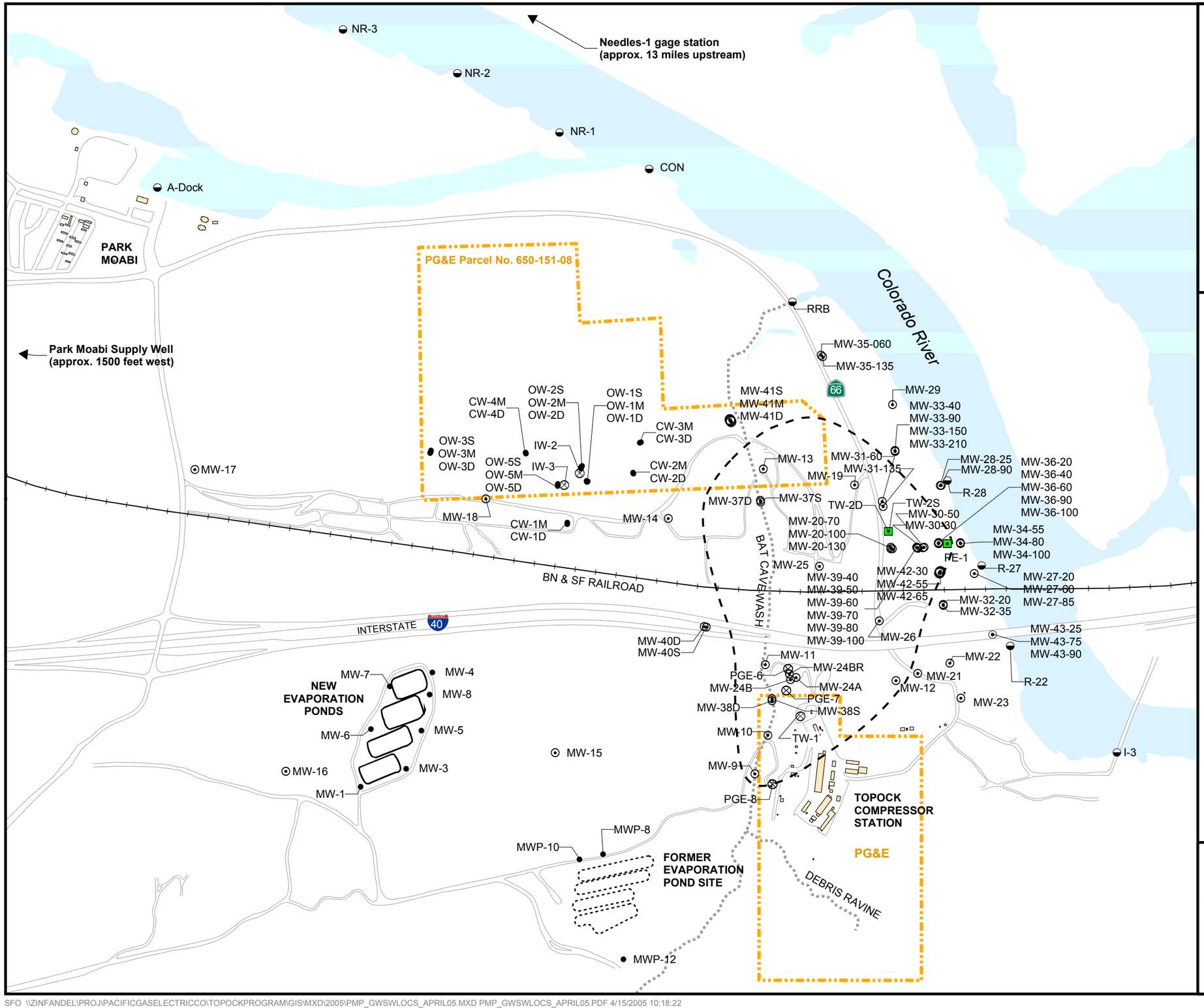
Park Moabi Road
Colorado River
Bat Cave Wash
BN & SF Railroad
Interstate 40

500
550
600

FIGURE A-1
LOCATIONS OF WELLS AND CROSS SECTION USED FOR PERFORMANCE MONITORING

INTERIM MEASURES FIELD PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



N

0 800 1,600

Feet

Legend

- Groundwater monitoring well
- Surface water sampling location
- Injection, test or supply well
- Interim Measure extraction well
- Groundwater monitoring well sampled in other monitoring program
- Approximate limits of hexavalent chromium greater than 50 ppb in Alluvial Aquifer, Dec. 2004

Proposed Groundwater and Surface Water Monitoring Program (GMP) Locations, April 2005

Quarterly Monitoring

70 wells (All 35 monthly wells and MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, MW-17, MW-18, MW-19, MW-20 cluster, MW-21, MW-22, MW-23, MW-24 cluster, MW-25, MW-26, MW-31-60, MW-31-135, MW-35-60, MW-35-135, MW-37D, MW-37S, MW-38D, MW-38S, MW-40D, MW-40S, MW-41 cluster, Park Moabi well)

9 Surface Water Locations (NR-1, NR-2, NR-3, CON, RRB, R-22, R-27, R-28, I-3)

Monthly Monitoring

35 Wells (All 4 biweekly wells and MW-27-20, MW-27-60, MW-28-25, MW-28-90, MW-29, MW-30-30, MW-30-50, MW-32-20, MW-32-35, MW-33 cluster, MW-34-55, MW-36 cluster, MW-39 cluster, MW-42 cluster, MW-43 cluster)

9 Surface Water Locations (NR-1, NR-2, NR-3, CON, RRB, R-22, R-27, R-28, I-3)

Bi-weekly Sampling

4 Wells (MW-27-85, MW-34-80, MW-34-100, MW-36-100)

Semiannual Sampling
4 Wells (MW-16, OW-3D, OW-3M, OW-3S)

Biennial Sampling
4 Wells (PGE-6, PGE-7, PGE-8, TW-1)

FIGURE A-2
PROPOSED MONITORING LOCATIONS & SAMPLING FREQUENCY FOR GMP, APRIL 2005

MONITORING PLAN FOR GROUNDWATER & SURFACE WATER MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Procedures for Calculation of Freshwater Equivalent Heads

PG&E Topock Program

This technical procedure details instructions for adjusting groundwater elevations to freshwater equivalent heads. As necessary, this document also identifies procedures for "legacy" data (data collected before current protocols were implemented).

FIELD MEASUREMENT OF SALINITY

The following parameters may be measured in the field or laboratory to determine the density of the water column:

Parameter	Units	Typical Range	Description
Specific Conductance (SC)	µS/cm @ 25°C	FW: 0-1,500 µS/cm BW: 1,500-15,000 µS/cm SW: 15,000-150,000 µS/cm BR: >150,000 µS/cm	The conductivity normalized to a temperature of 25°C. Note that a typical seawater SC is approximately 47,000 µS/cm. The term Electrical Conductivity (EC) is often used interchangeably, though this parameter is not corrected to 25°C.
Salinity	%	FW: 0-0.1% BW: 0.1-1% SW: 1-10% BR: >10%	A measure of the dissolved salts in water on a mass per mass basis. Note that a typical seawater salinity is approximately 3.5.
Total Dissolved Solids (TDS)	mg/L	FW: 0-1,000 mg/L BW: 1,000-10,000 mg/L SW: 10,000-100,000 mg/L BR: >100,000 mg/L	A measure of the mass of dissolved solids in water on a mass per volume basis. Note that a typical seawater TDS is approximately 35,000 mg/L.

Notes:
FW – Fresh Water; BW – Brackish Water; SW – Salt Water; BR – Brine

Field instruments typically report EC at 25°C, which is by definition specific conductance.

CALCULATION OF DENSITY

The density of water in a well is required to adjust hydraulic heads to freshwater equivalent heads. However, the density of water is rarely measured in the field. Rather, either the salinity or conductance of the water is measured in the field or the conductance or total dissolved solids is measured in the laboratory and a density is calculated from these values.

Salinity and TDS measure very similar properties and conversion between the two parameters can be done using the following formula:

$$Salinity\,(\%) = \frac{TDS\,(mg/L)}{10{,}051.1}$$

Salinity and TDS are typically laboratory-based measurements. If salinity or TDS are provided as field measurements, they are likely based upon a linear, non-site-specific conversion from a specific conductance measurement.

Specific conductance (electrical conductivity at 25°C), however, is often the most commonly available measurement in both field and laboratory data. Specific conductance is a measure of a water's ability to conduct electricity, but can used to estimate the density of the water. With site-specific information regarding the relationship between the specific conductance and the salinity, TDS, or density, the specific conductance measurements can be used to accurately make the freshwater head corrections. The following formula is used to convert specific conductance to TDS:

$$TDS\,(mg/L) = SC\,(\mu S/cm)\cdot K$$

where K is a dimensionless constant typically ranging between 0.55 to 0.8.

The dimensionless constant K is often assumed to be 0.65 for typical groundwater. However, K is dependent upon the type of groundwater. For example, water that contains predominantly sodium and chloride will have a different constant than water that contains predominantly sodium and bicarbonate. Where a high level of accuracy is required in calculating the density from specific conductance is required, site-specific constants can be obtained for calculating salinity or TDS from specific conductance. An evaluation of the site-specific constants at the Topock site is provided in Appendix A.

DATABASE SETUP

Within the Topock database, manual and transducer water level data are stored in the tables ***tblWaterLevel*** and ***tblPT***, respectively. Salinity and temperature data used to adjust the water levels are also stored for each measurement in these tables. The design of both tables is shown below.

tblWaterlevel : Table

Field Name	Data Type	Description
LocID	Text	Location ID (e.g., well, boring, station)
SampleDate	Date/Time	Date of measurement
SampleTime	Date/Time	Time of measurement
EventCode	Text	Monitoring event code
SrcCode	Text	Data source (e.g., CH2M HILL, PG&E, Legacy, etc.)
MeasPtElev	Number	Elevation (ft AMSL) from which depth to water was measured (e.g., top of PVC)
DTW	Number	Depth to water (ft)
RawSalinity	Number	Raw salinity measurement (e.g., salinity, field measured specific conductance, lab TDS, etc.)
RawSalinityDate	Date/Time	Date of salinity measurement, if applicable
CalcCode	Text	Code identifying the type of raw salinity and conversion used to convert to salinity
CalcComment	Text	Comment on salinity conversion
Salinity	Number	Final salinity of water column (%)
Temperature	Number	Temperature of water column (°F)
TemperatureComment	Text	Comment on temperature conversion
RawWElev	Number	Unadjusted groundwater elevation (ft AMSL)
CorrectWElev	Number	Final salinity and temperature adjusted groundwater elevation (ft AMSL)
Comments	Text	General comment
dbdate	Date/Time	db upload date

tblPT : Table

Field Name	Data Type	Description
LocID	Text	Location ID (e.g., well, boring, station)
Date	Date/Time	Date of measurement
Time	Date/Time	Time of measurement
ElapsedTime	Number	Elapsed time since transducer test began (minutes)
Temp	Number	Temperature (°C)
PressHead	Number	Raw pressure head (ft)
Offset_ft	Number	Offset or elevation of transducer above datum (ft)
Salinity	Number	Salinity of water columnn (%)
SalCorr	Number	Salinity correction to be applied (ft)
TempCorr	Number	Temperature correction to be applied (ft)
HydHead	Number	Final salinity and temperature adjusted hydraulic head (ft AMSL)
Comment	Text	Comment regarding measurement
DST	Number	True (-1) if PDT; FALSE (0) if standard PST
Exclude	Number	True (-1) if data point to be excluded; FALSE (0) if valid data

In tblWaterLevel, the field CalcCode identifies what value is stored in the *RawSalinity* field and how the final salinity value is determined. Possible conversions codes and the corresponding conversions to salinity (in %) include:

FEC2SAL field-measured EC[1] (uS/cm) converted to salinity (%) [SAL=EC*0.65/10051.1]

LEC2SAL laboratory-measured EC[1] (uS/cm) converted to salinity (%) [SAL=EC*0.65/10051.1]

FTDS2SAL field-measured TDS (mg/L) converted to salinity (%) [SAL=TDS/10051.1]

LTDS2SAL laboratory-measured TDS (mg/L) converted to salinity (%) [SAL=TDS/10051.1]

LSAL laboratory-measured salinity (%) [no conversion]

FSAL field-measured salinity (%) [no conversion]

PSAL salinity (%) measured during previous event [no conversion]

DETERMINATION OF DENSITY AS A FUNCTION OF SALINITY

Data collected and reported prior to 2002 was not adjusted to freshwater equivalent heads. In 2003, well and date-specific salinity data were used to adjust these legacy data to freshwater equivalent heads. The legacy data have numerous sources and field-measured salinity data were often not available. The following, in order of precedence, details the methodology to populate the salinity value for the legacy manual water level measurement.

1. Field salinity (%) available ±3 days of the water level measurement:
   - *RawSalinity* is the field salinity value in %
   - *RawSalinityDate* is the date of the field salinity measurement
   - *CalcCode* is FSAL for a direct field salinity measurement
   - *Salinity* is populated with *RawSalinity* x 1.00 (the *CalcConversion* for *FSAL*)

[1] The term "EC" as used here is actually SC, as Topock field meters already convert to conductance at 25°C.

2. Field (1st) or Lab (2nd) SC available at ±3 days of the water level measurement:

   - *RawSalinity* is the field or lab SC value
   - *RawSalinityDate* is the date of the field or lab SC measurement
   - *CalcCode* is FEC2SAL LEC2SAL indicates the field or lab SC value, respectively, is to be converted to salinity
   - *Salinity* is populated with *RawSalinity**0.75/10051.1 (or multiply 0.000074619)

3. Field (1st) or laboratory (2nd) TDS available at ±3 days of the water level measurement:

   - *RawSalinity* is the field or lab TDS value
   - *RawSalinityDate* is the date of the field or lab TDS measurement
   - *CalcCode* is FTDS2SAL or LTDS2SAL indicates the field or lab TDS value, respectively, is to be converted to salinity
   - *Salinity* is populated with *RawSalinity*/10051.1 (or multiply 0.000099492)

4. Salinity value from previous sampling/monitoring event:

   - *RawSalinity* is the salinity (%) from previous monitoring event
   - *RawSalinityDate* is the date of the measurement for the previous event
   - *CalcCode* is PSAL indicating salinity is from a previous event
   - *Salinity* is populated with *RawSalinity* (i.e., no conversion)

On 06/02/03, there were 506 manual water level measurements (data through 12/02/02) in the Topock db. As outlined in Steps 1 through 3, salinity values were populated into *tblWaterLevels* using date matches (±3 days) between water level and salinity (including EC or TDS) measurements. The results were as follows:

FSAL (measured field salinity):	74 records (15%)
FEC2SAL (field measured SC):	79 records (16%)
LEC2SAL (lab measured SC):	189 records (37%)
FTDS2SAL (field measured TDS):	0 records
LTDS2SAL (lab measured TDS):	0 records

Further evaluation was required for legacy manual water level data which did not have salinity measurements on the same date. Some older legacy data only had year and month, and in such cases salinity values from that month were used. Many others slightly exceeded the ±3 days search window, but had data ±10 days. Ultimately, reasonably close dates for legacy manual water level and salinity data were found, so that salinity adjusted groundwater elevations could be calculated.

Data collected between January 2003 and August 2004 were corrected for salinity using field measured salinity. If a field salinity measurement was not available, the same routine was used to populate the salinity field as shown above for the legacy data.

Beginning August 2004, an average salinity for the water column has been used to adjust groundwater elevations for salinity. The average salinity value is used because:

- the average salinity of the water column is more representative of the water column than the salinity obtained from sampling the aquifer

- an error during a single even can result in an erroneous groundwater elevation whereas the median salinity is not significantly affected

The average salinity value for each well is evaluated quarterly to ensure trends in salinity are not present. In addition, sampling protocols have been changed to ensure the entire well casing volume (blank and screened portions of a well) are purged during sampling events.

DETERMINATION OF DENSITY AS A FUNCTION OF TEMPERATURE

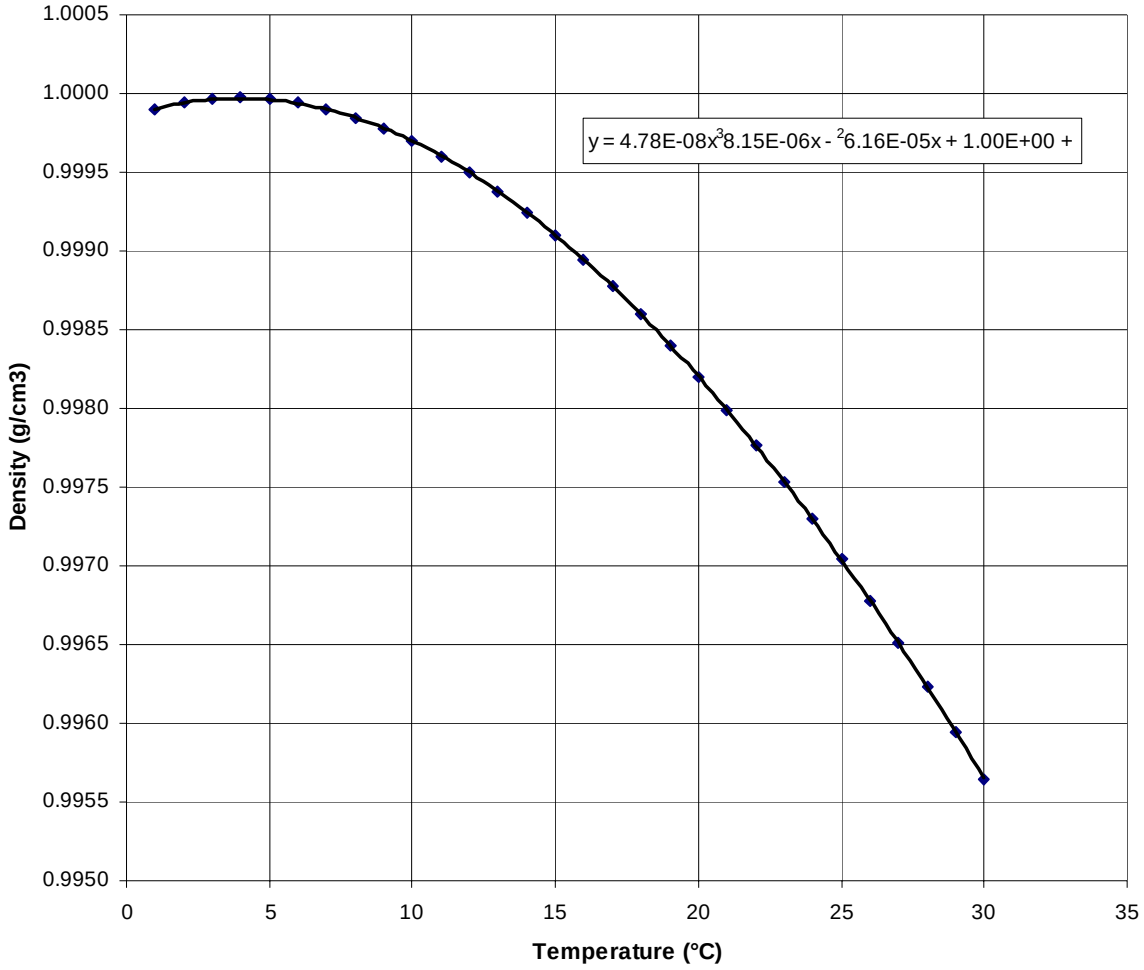
The density of water is dependant upon temperature. The following table and graph summarize the density of water at various temperatures.

TABLE A2-1
RELATIONSHIP BETWEEN TEMPERATURE
AND DENSITY OF WATER

Temp. (°C)	Density (g/cm3)	Temp. (°C)	Density (g/cm3)	Temp. (°C)	Density (g/cm3)
1	0.999900	11	0.999605	21	0.997992
2	0.999941	12	0.999498	22	0.997770
3	0.999965	13	0.999377	23	0.997538
4	0.999973	14	0.999244	24	0.997296
5	0.999965	15	0.999099	25	0.997044
6	0.999941	16	0.998943	26	0.996783
7	0.999902	17	0.998774	27	0.996512
8	0.999849	18	0.998595	28	0.996232
9	0.999781	19	0.998405	29	0.995944
10	0.999700	20	0.998203	30	0.995646

Source: Win-Situ 4 User Manual (In-Situ 2003)

FIGURE A2-1
RELATIONSHIP BETWEEN TEMPERATURE AND FRESH WATER



Source: Win-Situ 4 User Manual (In-Situ 2003)

The following, quoted from the USGS WRIR 00-4014 (Quality Assurance and Analysis of Water Levels in Wells on Pahute Mesa and Vicinity, Nevada Test Site), summarizes the methodology to correct groundwater elevations for temperature-dependant density:

> The following equation, described by Winograd (1970), can be used to calculate a water-level change resulting from a temperature change:
>
> $$n'/n = s/s'$$
>
> where n' is the length of water column above the point of inflow after a given temperature change; n is the measured water column length above the point of inflow (assumed to be the top of the open interval, in this example); s is the specific weight (or density) of water in the column at the mean water-column temperature and hydrostatic pressure; and s' is the specific weight (or density) of water at the new temperature and identical hydrostatic pressure.

For the purposes of the following example, the density of distilled water for a given temperature at 1 bar, obtained from Lide (1992, p. 6-10), will be used.

The density of water, *s*, in well PM-1 at a mean temperature of 113.5°F is 0.9900 gm/cc (grams per cubic centimeter). Assuming that the mean temperature in the well rose 5°F to 118.5°F, the new density of water, *s'*, would be 0.9888 gm/cc. The measured water-column length above the assumed point of inflow, *n*, is 5,450 ft. Solving the above equation for *n'*, the length of the water column after a 5°F rise in temperature would be 5,456.6 ft, resulting in an increase in water level of 6.6 ft. (http://water.usgs.gov/pubs/wri/WRIR00-4014/text/waterlevel.htm#Temperature%20Effects)

SALINITY AND TEMPERATURE ADJUSTMENTS FOR GROUNDWATER ELEVATIONS

Manual and transducer water level data have been corrected for salinity and temperature since January 2003. The salinity and temperature adjusted water elevations are stored in the *CorrectWElev* and *HydHead* fields in *tblWaterLevel* (manual water level data) and *tblPT* (transducer data), respectively. It is assumed that:

- The salinity of the water column with the wells is constant throughout the water column.
- The bottom of the well is the measurement point and the entire water column is adjusted for salinity and temperature.

The salinity adjustment (SalCorr) for each water elevation is calculated as follows:

$$SalCorr\ (ft) = Column \times SAL \times 0.0071$$

where *SAL* is the salinity of the water column in percent, and *Column* is the height of the water column to be adjusted in feet.

For manual water level data, the height of the water column is the distance from the water table to the bottom of the screen. For transducer data, the water column is the distance from the transducer to the bottom of the screen, since the water column above the transducer is inherently adjusted for density (i.e., the transducer measures pressure and not distance).

The temperature-dependant density of water within the well is determined using the following empirical equation (see chart on previous page):

$$Density\ (g/cm^3) = 4.78 \times 10^{-8}\ T^3 - 8.15 \times 10^{-6}\ T^2 + 6.16\ T + 1.00$$

where T is temperature in degrees Celsius (°C).

The temperature adjustment (TempCorr) for each water elevation is calculated as follows:

$$TempCorr\ (ft) = Column \times [1/Density] - Column$$

For manual water level data, the temperature and salinity adjusted groundwater elevation is calculated as follows:

$$CorrectElev\ (ft\ AMSL) = RawElev + SalCorr + TempCorr$$

where RawElev (ft AMSL) is the groundwater elevation with no adjustment for temperature or salinity.

For transducer data, the temperature and salinity adjusted groundwater elevation is calculated as follows:

$$HydHead\ (ft\ AMSL) = PressHead + Offset + SalCorr + TempCorr$$

where PressHead (ft) is the height of the water column above the transducer and offset (ft AMSL) is the elevation of the transducer above the datum.

Example Salinity Correction

From MW-22 on 09/30/99

Well Depth = 23′ below top of casing (BTOC)
Top of PVC = 459.93′ AMSL
Depth to water (DTW) = 4.78′ BTOC
Field SC measurement = 25,600 µS/cm

According to FEC2SAL:

SAL = SC [uS/cm] * 0.75 / 10051.1
= 25,600 * 0.000074619
= 1.91%

The unadjusted groundwater elevation is:

RawWElev = Top of PVC – DTW
= 459.93′ AMSL– 4.78′ BTOC
= 455.15′ AMSL

The salinity adjusted groundwater elevation is:

CorrWElev = RawWElev + (Well Depth – DTW) x Salinity [%] x 0.0071
= 455.15′ + (23′ – 4.78′) x 1.91% x 0.0071
= 455.15′ + 0.247′
= 455.40′ AMSL

Example Salinity & Temperature Corrections

Parameter/Calculation	MW-24BR	MW-33-90	MW-33-90	MW-10
Top of Casing (ft AMSL)	563.95	487.57	487.57	530.65
Well Depth (ft BTOC)	441.21	91	91	97.64
DTW (ft BTOC)	107.09	31.19	31.19	74.03
Water Column (calculated)	334.12	59.81	59.81	23.61
Raw or Uncorr. GW Elev. (from db)	456.86	456.38	456.38	456.62
Uncorr. GW Elev. (calculated)	456.86	456.38	456.38	456.62
Salinity (%)	0.82	0.5	0.5	0.2
Salinity Corr. GW Elev. (from db)	458.8053	456.5923	456.5923	456.6536
Head Difference (Salinity - Raw)	1.9453	0.2123	0.2123	0.0336
Approximate Temperature (°F / °C)	84.5 / 29.2	80.0 / 26.7	85.0 / 29.4	82.8 / 28.2
Temp. Corr. GW. Elev.	455.3989	456.1707	456.1277	456.5307
Head Difference (Temp - Raw)	-1.4611	-0.2093	-0.2523	-0.0893

Appendix C
Performance Monitoring Reports

Appendix C1:
Proposed Content for
Monthly Performance Report

APPENDIX C1

Proposed Content for Monthly Performance Report

Performance Monitoring Plan for Interim Measures in the Floodplain Area
PG&E Topock Compressor Station

Reporting Schedule: Submit 15 days after monthly reporting period for the months of February, March, May, June, August, September, November and December

First Monthly Reporting Period: May 2005

First Monthly Report Due: June 15, 2005

1.0 Introduction

2.0 Extraction System Operations
- 2.1 Extraction Operations
- 2.2 Extracted Water Analytical Results

3.0 Hydraulic Monitoring Results
- 3.1 Data Collection and Processing
- 3.2 Evaluation of Groundwater Gradients for Monthly Reporting Period

4.0 Chemical Monitoring Results

5.0 Upcoming Operation and Monitoring Activities

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Table 2 Analytical Results from Extraction Wells

Table 3 Predicted and Actual Monthly Average Davis Dam Discharge and Colorado River Elevation at I-3

Table 4 Calculated Hydraulic Gradients for Well Pairs, Monthly Reporting Period

Table 5 Cr(VI) and Cr(T) Sampling Results, Monthly Reporting Period

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Figure 1 Average Groundwater Upper Zone and River Elevations (monthly reporting period)

Figure 2 Average Groundwater Middle Zone and River Elevations (monthly reporting period)

Figure 3 Average Groundwater Lower Zone and River Elevations (monthly reporting period)

Figure 4 Location of PMP Wells, Gradient Well Pairs, and Cross Section used for Performance Monitoring

Figure 5 Average Groundwater Elevations for Wells on East-West Cross Section A

Attachments

Attachment 1: Groundwater and River Elevations Hydrographs for Monthly Reporting Period

Attachment 2: Hexavalent Chromium Concentrations in Floodplain Area

Table 2-1: Topock Floodplain Wells Monitoring Program , Groundwater Monitoring Results, September 2004 through Monthly Reporting

Figure 2-1: Cr(VI) Concentrations in Alluvial Aquifer, Monthly Reporting Period (3 zone maps with contouring at 50 and 20 pbb)

Figure 2-2: Cr(VI) Concentrations in Alluvial Aquifer, Monthly Reporting Period, East-West Section A (with Cr(VI) contouring)

Appendix C2:
Proposed Content for
Quarterly Performance Report

APPENDIX C2

Proposed Content for Quarterly Performance Report

Performance Monitoring Plan for Interim Measures in the Floodplain Area
PG&E Topock Compressor Station

Reporting Schedule: Submit 30 days after quarterly reporting periods of February through April, May through July, and August through October

First Quarterly Reporting Period: February-March-April 2005

First Quarterly Report Due: May 30, 2005

1.0 Introduction

2.0 Extraction System Operations and Monitoring Summary for Quarterly Reporting Period
- 2.1 Extraction Operations
- 2.2 Performance Monitoring and Reporting Activities

3.0 Capture Zone Analysis for Quarterly Reporting Period
- 3.1 Comparison of Target and Actual Capture Zone
- 3.2 Evaluation of Groundwater Gradients, Extraction Rates, River Levels
- 3.3 Evaluation of Cr(VI) Distibution and Trends in Floodplain Wells

4.0 Performance Evaluation and Recommendations
- 4.1 Performance Standard
- 4.2 Extraction System Operations
- 4.3 Monitoring System
- 4.4 Response Actions

5.0 Upcoming Operation and Monitoring Activities

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Table 2 Analytical Results from Extraction Wells

Table 3 Predicted and Actual Monthly Average Davis Dam Discharge and Colorado River Elevation at I-3

Table 4 Calculated Hydraulic Gradients for Well Pairs by Month for Quarterly Reporting Period

Table 5 Comparison of Target Hydraulic Gradients for Well Pairs and Actual Hydraulic Gradients for Quarterly Reporting Period

Table 6 Cr(VI) and Cr(T) Sampling Results for Quarterly Reporting Period

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Figure 1 Average Groundwater Upper Zone and River Elevations (quarterly reporting period, including each of three months individually)

Figure 2 Average Groundwater Middle Zone and River Elevations (quarterly reporting period, including each of three months individually)

Figure 3 Average Groundwater Lower Zone and River Elevations (quarterly reporting period, including each of three months individually)

Figure 4 Location of PMP Wells, Gradient Well Pairs, and Cross Section used for Performance Monitoring

Figure 5 Average Groundwater Elevations for Wells on East-West Section A (quarterly period, including each of three months individually)

Figure 6 Graphs (Rose Diagrams) of Hydraulic Gradients Achieved in Upper, Middle, and Lower Zones of Alluvial Aquifer for Quarterly Period ____ to _____, 2005

Attachments

Attachment 1: Groundwater and River Elevation Hydrographs for Quarterly Reporting Period

Figures 1-1 through 1-xx

Attachment 2: Hexavalent Chromium Concentrations in Floodplain Area

Table 2-1: Topock Floodplain Wells Monitoring Program , Groundwater Monitoring Results, September 2004 through Quarterly Reporting Period

Figure 2-1: Cr(VI) Concentrations in Alluvial Aquifer, Quarterly Reporting Period (3 zone maps with posted results for past 3 months on each aquifer zone map

Figure 2-2: Cr(VI) Concentrations in Alluvial Aquifer, Quarterly Reporting Period, East-West Section A (results posting for past 3 months)

Attachment 3: Hexavalent Chromium Concentration Graphs for Floodplain Monitoring Wells

Figure 3-1 through 3-23

Appendix C3:
Proposed Content for
Annual Performance Report

APPENDIX C3

Proposed Content for Annual Performance Evaluation Reports

Performance Monitoring Plan for Interim Measures in the Floodplain Area
PG&E Topock Compressor Station

Reporting Schedule: Submit 45 days after annual evaluation period of February 1 through January 31

First Annual Performance Evaluation Period: February 1, 2005 through January 31, 2006

First Annual Report Due: March 15, 2006

1.0 Introduction

2.0 Extraction System Operations, Monitoring, and Reporting Summary for Annual Reporting Period
- 2.1 Extraction Operations
- 2.2 Performance Monitoring Activities

3.0 Capture Zone Analysis for Annual Reporting Period
- 3.1 Comparison of Target and Actual Capture Zone
- 3.2 Evaluation of Groundwater Gradients, Extraction Rates, River Levels
- 3.3 Evaluation of Cr(VI) Distibution and Trends in Floodplain Wells

4.0 Performance Evaluation and Recommendations
- 4.1 Performance Standard
- 4.2 Extraction System Operations
- 4.3 Monitoring System
- 4.4 Response Actions

5.0 Upcoming Operation and Monitoring Activities

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Table 1 Pumping Rate and Extracted Volume (annual reporting summary and cumulative)

Table 2 Analytical Results from Extraction Wells

Table 3 Predicted and Actual Monthly Average Davis Dam Discharge and Colorado River Elevation at I-3

Table 4 Calculated Hydraulic Gradients for Well Pairs by Month for Annual Reporting Period

Table 5 Comparison of Target Hydraulic Gradients for Well Pairs and Actual Hydraulic Gradients for Annual Reporting Period

Table 6 Cr(VI) and Cr(T) Sampling Results for Annual Reporting Period

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Figure 1 Average Groundwater Upper Zone and River Elevations (annual reporting period, including each of 12 months individually)

Figure 2 Average Groundwater Middle Zone and River Elevations (annual reporting period, including each of 12 months individually)

Figure 3 Average Groundwater Lower Zone and River Elevations (annual reporting period, including each of 12 months individually)

Figure 4 Location of Wells, River Stations, Well Pairs and Cross-Section used for Performance Monitoring

Figure 5 Average Groundwater Elevations for Wells on East-West Section A (annual period, including each of 12 months individually)

Figure 6 Graphs (Rose Diagrams) of Hydraulic Gradients Achieved in Upper, Middle, and Lower Zones of Alluvial Aquifer for Annual Period ____2005 to _____2006

Attachments

Attachment 1: Long-term Groundwater Gradient Contour Maps for Annual Reporting Period

Figures 2-1 through 2-5 (3 average gradient map zones and average gradients on cross-section A)

Attachment 2: Hexavalent Chromium Concentrations in Floodplain Area

Table 2-1: Topock Floodplain Wells Monitoring Program , Groundwater Monitoring Results, September 2004 through Annual Reporting Period

Figure 2-1: Cr(VI) Concentrations in Alluvial Aquifer, Annual Reporting Period (3 zone maps, (post minimum and maximum detections & dates for wells on each aquifer zone map).

Figure 2-2: Cr(VI) Concentrations in Alluvial Aquifer, Annual Reporting Period, East-West Section A (post minimum and maximum detections & dates for wells on cross-section A)

Attachment 3: Hexavalent Chromium Concentration Graphs for Floodplain Wells

Figures 3-1 through 3-23 (annotate samples for Annual Reporting Period)

Appendix C3:
IM No. 3 Groundwater Compliance Monitoring Plan

Pacific Gas and Electric Company®

Yvonne J. Meeks
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June 17, 2005

Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue, Suite 200
Berkeley, California 94710

Subject: Groundwater Compliance Monitoring Plan (CMP)
Interim Measures No. 3
PG&E Topock Compressor Station, Needles, California

Dear Mr. Shopay:

Enclosed is the *Groundwater Compliance Monitoring Plan (CMP) for the Interim Measures No. 3 Injection Area*, prepared in compliance with DTSC's monitoring requirements for the injection well field and in response to DTSC comments of May 24, 2005 on the Draft CMP.

This plan is also being submitted to the Colorado River Basin Regional Water Quality Control Board, in response to the Board's comments of May 16, 2005 and in compliance with Monitoring and Reporting Program (MRP) No. R7-2004-0103 associated with the Board Order (CRBRWQCB 2004b).

If you have any questions on this report, please call me at (805) 546-5243.

Sincerely,

Teri Hetson
for Yvonne Meeks

Enclosure

CC: Liann Chavez/CRBRWQCB
Jose Cortez/ CRBRWQCB
Kate Burger/DTSC

Groundwater Compliance Monitoring Plan for Interim Measures No. 3 Injection Area

Waste Discharge Requirements
Order No. R7-2004-0103
PG&E Topock Compressor Station
Needles, California

Prepared for

California Regional Water Quality Control Board
Colorado River Basin Region

and

California Department of Toxic Substances Control

on behalf of

Pacific Gas and Electric Company

June 17, 2005

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, CA 94612

Groundwater Compliance Monitoring Plan for Interim Measures No. 3 Injection Area Waste Discharge Requirements Order No. R7-2004-0103 PG&E Topock Compressor Station Needles, California

Prepared for
California Regional Water Quality Control Board, Colorado River Basin Region
and
California Department of Toxic Substances Control

on behalf of
Pacific Gas and Electric Company

June 17, 2005

This monitoring plan was prepared under supervision of a California-certified Engineering Geologist

Paul Bertucci, C.E.G.
Senior Hydrogeologist

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Appendix

A Procedures for Calculation of Freshwater Equivalent Heads, PG&E Topock Program

Acronyms and Abbreviations

CRBRWQCB	Regional Water Quality Control Board Colorado River Basin Region
CMP	Compliance Monitoring Program
COC	constituent of concern
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
DTSC	Department of Toxic Substances Control
IM	interim measures
MRP	Monitoring and Reporting Program
µg/L	micrograms per liter
mg/L	milligrams per liter
PG&E	Pacific Gas and Electric Company
TDS	total dissolved solids
USEPA	United States Environmental Protection Agency
WDR	Waste Discharge Requirements

1.0 Introduction

On July 29, 2004, Pacific Gas and Electric Company (PG&E) submitted an application and Report of Waste Discharge for subsurface injection of treated water to the California Regional Water Quality Control Board Colorado River Basin Region (CRBRWQCB). Subsurface injection is proposed as a water management option for Interim Measures Number 3 (IM No. 3) at the Topock Compressor Station in Needles, California. IM No. 3, which is being conducted under the lead oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), requires expansion of groundwater extraction and treatment facilities to maintain hydraulic control of the chromium plume boundaries near the Colorado River, in compliance with DTSC directives under previous interim measures (CH2M HILL 2004a). The project consists of groundwater extraction, construction of a new groundwater treatment facility, installation of piping to convey the water from the extraction wells to the treatment facility, and disposal of treated water by injection wells. The proposed location for the injection well field is on PG&E property, identified as Parcel 650-151-06, near the groundwater extraction and treatment facilities.

On October 13, 2004, CRBRWQCB adopted Waste Discharge Requirements (WDR) Order No. R7-2004-0103 specifying effluent limitations, prohibitions, specifications, and provisions for subsurface injection (CRBRWQCB 2004a). This groundwater compliance monitoring plan has been prepared in accordance with the requirement in the Monitoring and Reporting Program (MRP) No. R7-2004-0103 associated with the Board Order that specifies that such a plan be submitted at least 30 days prior to start of discharge (CRBRWQCB 2004b). It also addresses DTSC's monitoring requirements for the injection well field.

The objectives of this groundwater compliance monitoring plan are to:

- Describe the objectives of the groundwater compliance monitoring program (CMP) for IM No. 3.
- Describe the components of the CMP.
- Present the proposed monitoring frequency, analytical program, and additional monitoring well installation program.
- Present the proposed data evaluation procedures and the process for making any future modifications to the monitoring program.
- Describe the schedule and contents of reports.

1.1 Project Background

The Topock Compressor Station is located in eastern San Bernardino County, approximately 15 miles to the southeast of Needles, California (Figure 1-1). As directed by the DTSC under Interim Measures No. 2, PG&E is currently pumping groundwater from one deep extraction well (TW-2D) located on a bench along the station access road and above the Colorado River

floodplain. The bench, referred to as the monitoring well MW-20 bench, is owned by the United States Bureau of Reclamation and is managed by the United States Bureau of Land Management. PG&E began pumping from this location in March 2004 and is currently pumping at a rate of approximately 70 gallons per minute.

On June 30, 2004, DTSC issued to PG&E conditional approval to implement the IM No. 3 project to expand the existing groundwater extraction and management facilities to address hydraulic control of the chromium plume at the Topock site (DTSC 2004a). PG&E purchased San Bernardino County Parcel No. 650-151-06, the proposed site of the project, from the Metropolitan Water District of Southern California in September 2004. The parcel encompasses 100 acres and is located approximately 1,650 feet north of the PG&E compressor station property.

Three general areas were identified on Parcel 650-151-06 as potential sites for injection. Two primary areas, identified as the East and West Mesas, were selected based on the topography of the site, representing areas of relatively flat ground that could be made accessible to drilling equipment with only minor grading. A secondary area, identified as the Center Mesa, which is relatively flat but not easily accessible, was identified as a contingency area that would be used only if hydrogeologic conditions turned out to be unfavorable for injection wells on one or both of the primary areas. Initial investigations (installation of observation wells) were conducted on the East and West Mesas. Based on favorable hydrogeologic conditions and proximity to the new treatment system, it was decided to further investigate the East Mesa as an injection well site. An investigation of Center Mesa was not performed after it was determined that sufficient injection capacity could be obtained by wells on the East Mesa alone. Figure 1-2 shows the locations of Parcel No. 650-151-06 and the IM No. 3 project area and features.

1.2 Project Documents and Approvals

The installations of injection, observation, and compliance monitoring wells for the IM No. 3 project were implemented under the following work plans, documents, and agency approvals:

- Technical Memorandum "Revised-Final Field Activities Summary for Observation Well Installation and Groundwater Characterization under IM No. 3," dated September 1, 2004 (CH2M HILL 2004b). The DTSC conditionally approved the plan in a letter dated September 3, 2004 (DTSC 2004b).
- *Final Work Plan for Injection Well Installation on Parcel 650-151-06*, dated November 15, 2004 (CH2M HILL 2004c). The DTSC conditionally approved the work plan in a letter dated November 2, 2004 (DTSC 2004c).
- Technical Memorandum "Selection of Locations for Compliance Monitoring Wells," dated November 9, 2004 (CH2M HILL 2004d). The DTSC conditionally approved the compliance wells selection plan in a letter dated December 23, 2004 (DTSC 2004d).
- *Draft Design Plan for Groundwater Compliance Monitoring, PG&E Topock Compressor Station, Needles, California*, dated November 23, 2004 (CH2M HILL 2004e). The DTSC conditionally approved the design plan in a letter dated December 23, 2004

(DTSC 2004d). The CRBRWQCB conditionally approved the design plan in a letter dated December 1, 2004 (CRBRWQCB 2004c). The *Final Design Plan for Groundwater Compliance Monitoring, PG&E Topock Compressor Station, Needles, California* (CH2M HILL 2005a) was submitted on January 5, 2005.

The results and assessment of the well drilling, groundwater sampling, and testing program conducted during September 2004 through May 2005 to characterize the hydrogeology and groundwater quality conditions in the IM No. 3 injection area are summarized in the June 22, 2005 report entitled *Groundwater and Hydrogeologic Report for Interim Measures No. 3* Injection *Area* (CH2M HILL 2005b). That report documents the baseline hydrogeologic and water quality conditions of the injection area, and serves as a companion document to this compliance monitoring plan.

2.0 Background

Background hydrogeologic and water quality information relevant to the IM No. 3 groundwater compliance monitoring program is presented below.

2.1 Site Hydrogeology

The Topock site is located at the extreme southern end of the Mohave Valley along the western floodplain of the Colorado River. Bedrock outcrops to the south and west of the site create barriers to groundwater flow. While the overall trend of groundwater flow throughout most of the Mohave Valley is southerly, groundwater flow directions at the Topock site are predominantly north to northeasterly. Groundwater is forced to flow in this direction as it approaches the low-permeability bedrock of the Chemehuevi Mountains that prevents further regional groundwater flow to the south.

Groundwater occurs under unconfined to semi-confined conditions within the alluvial fan and fluvial sediments beneath most of the Topock site. The saturated portion of the alluvial fan and fluvial sediments are collectively referred as the Alluvial Aquifer. The water table in the Alluvial Aquifer is very flat throughout the site and typically equilibrates to an elevation within 2 to 3 feet of the river level. The unconsolidated alluvial and fluvial deposits are underlain by the Miocene conglomerate and pre-Tertiary metamorphic and igneous bedrock with very low permeability; therefore, groundwater movement occurs primarily in the overlying unconsolidated deposits.

The Alluvial Aquifer in the IM No. 3 injection area has a total saturated thickness of over 250 feet and is composed primarily of moderately-consolidated, sandy gravel and silty/clayey gravel alluvial fan deposits of Tertiary age. These deposits comprise a thick sequence of undeformed oldest alluvium that unconformably overlies older Miocene and pre-Tertiary metamorphic bedrock formations. In the East Mesa injection area, bedrock is encountered at approximately 340 to 350 feet below ground surface and is characterized by both metamorphic (metadiorite, gneiss) and sedimentary rock types.

For convenience during the IM No. 3 hydrogeologic characterization, the Alluvial Aquifer was subdivided into upper, middle, and lower zones. These zones do not represent distinct hydrostratigraphic units. There are no laterally extensive aquitards present to hydraulically segregate the aquifer. There are gradational changes in water quality with depth in the aquifer and vertical head gradients. Defining three zones in the aquifer provides a convenient way to evaluate water quality and horizontal gradients within a group of wells that are similar in depth. In the IM No. 3 investigation area, groundwater occurs under unconfined to semi-confined conditions. The depth to groundwater ranges from 110 feet below ground surface in higher mesa areas to 25 feet below ground surface in lower Bat Cave Wash (eastern portion of Parcel 650-151-06).

A more detailed discussion of the site hydrogeologic setting is available in the draft *RCRA Facility Investigation/Remedial Investigation Report* (CH2M HILL 2005c).

2.2 Summary of Conclusions from Baseline Sampling

Groundwater samples from the IM No. 3 injection, observation, and compliance monitoring wells, as well as other monitoring wells in the area, were collected and analyzed during various field investigations conducted from June 2004 through May 2005 (CH2M HILL 2005b). Groundwater was analyzed for hexavalent chromium [Cr(VI)], total chromium [Cr(T)], general chemistry, metals, and field water quality parameters.

The general chemistry of the groundwater is dominated by sodium and chloride, with a few exceptions. Total dissolved solids (TDS) of IM No. 3 injection area groundwater ranges from 650 milligrams per liter (mg/L) to over 12,000 mg/L, increasing with depth. The median average TDS concentration in the East Mesa injection area is 4,200 mg/L (CH2M HILL 2005b). Oxidation-reduction (redox) indicators show a trend of more reducing conditions with depth, similar to other alluvial wells at the site. The strongest reducing conditions are found in the deep wells at the East Mesa.

In the IM-3 investigation area, data indicate that elevated concentrations of chromium (i.e., greater than 50 micrograms per liter [µg/L]) are limited in vertical and lateral extent. The elevated concentrations are limited to the lower depths of the Alluvial Aquifer beneath portions of Bat Cave Wash to the south of well MW-41D (Figure 1-2). This is expected as the original release occurred in the southern Bat Cave Wash area.

The shallow wells in the IM No. 3 injection area contains a median Cr(VI) concentration of about 22 µg/L and a range of <0.2 to 34.3 µg/L. This range is considered to be consistent with the potential range of natural background levels on the basis of Cr(VI) disposal locations, present and historical groundwater flow direction, and published data in the region. The median concentration of Cr(VI) in the middle-depth and deep wells of the IM No. 3 injection area is 4.8 µg/L, reflecting the more reducing conditions in these wells. A chromium background study is currently underway to estimate the concentration range of naturally occurring Cr(VI) at the Topock site and surrounding area.

Proposed injection in the East Mesa well field will be designed so that injected water will be of similar quality to average groundwater. The approximate TDS of injectate will be 4,200 mg/L, the average of East Mesa groundwater. This is more than 1,500 mg/L lower than that of the raw groundwater currently being pumped from TW-2D, so there will be a net reduction in site groundwater salinity. Geochemical modeling of the injection of water treated to match the average salinity of the East Mesa aquifer showed no predicted scaling or clogging effects from mixing between native East Mesa groundwater and treated groundwater.

3.0 Compliance Monitoring Program Objectives

This section presents the objectives of the groundwater compliance monitoring under WDR No. R7-2004-0103 and describes the network of monitoring wells to be used in the program.

3.1 Monitoring Objectives

The primary objective of the CMP is to monitor the aquifer in the injection well area to ensure that the injection of treated groundwater is not causing an adverse effect on the aquifer water quality. The objectives will be achieved by collecting and analyzing groundwater samples, as well as measuring groundwater levels in the vicinity of the injection wells. Groundwater analyses will be performed to ensure that the distribution and concentrations of constituents of concern (COCs) remain consistent with the baseline sampling results, which were established during multiple rounds of sampling conducted from June 2004 to May 2005 (CH2M HILL 2005b, 2005e). The collection of water levels will determine whether or not the aquifer is able to accept the additional water from the injection wells without adverse effects (such as surface soil instability or surface discharge of groundwater via springs).

The specific objectives of the CMP are to:

- Monitor water levels to assess groundwater flow directions and the development of groundwater mounding near the injection wells.
- Monitor the rate at which injected groundwater migrates from the injection wells.
- Monitor water quality throughout the shallow, middle, and lower depths of the aquifer to evaluate the degree of vertical migration and mixing of groundwater during groundwater injection.
- Detect any measurable aquifer plugging due to turbidity in the injected water, precipitation of minerals in the aquifer matrix, or cation exchange effects.
- Assess whether injection of treated groundwater results in any mobilization of trace metals from aquifer sediments to groundwater as a result of changes in pH, oxidation-reduction potential, and major ion composition.

In order to meet these objectives, the CMP includes the:

- Collection of spatially-appropriate chemical and hydraulic data representative of the site conditions.
- Collection of groundwater data at an appropriate frequency (monthly, quarterly, and semi-annually) to assess any changes in the distribution and concentration of the COCs.
- Use of appropriate State-certified laboratory methods for the COC analyses and data quality control measures to support decision-making.

- Use of laboratory reporting limits at levels below screening criteria (i.e., drinking water maximum contaminant levels).

These data quality objectives are sufficient to support data needs for the current and future CMP activities at the Topock site.

3.2 Description of CMP Monitoring Well Network

The IM No. 3 groundwater injection system consists of the two injection wells IW-2 and IW-3 in the East Mesa area and a network of monitoring wells that surround the injection wells (Figure 1-2). The CMP monitoring well network consists of both observation wells and compliance monitoring wells. Well construction details for the injection, observation, and compliance monitoring wells are provided in Table 3-1. The CMP monitoring well network is described in detail below.

3.2.1 Observation Wells Clusters

The observation well clusters OW-1, OW-2, and OW-5 in the East Mesa constitute the inner network of monitoring wells surrounding the injection wells. They are located within approximately 50 to 100 feet from the injection wells; therefore, any change in groundwater hydraulics or quality is likely to be detected in the observation wells long before it is observed in the more distant compliance monitoring wells. The estimated travel time for the injected groundwater to reach the observation wells is approximately 2 to 4 months, based on the groundwater model used to design the injection system.

Each observation well cluster consists of three monitoring wells screened at shallow, medium, and deep intervals in the Alluvial Aquifer. The well clusters will allow the measurement of changes in water chemistry and water levels across the entire aquifer thickness and will permit an analysis of the degree of vertical mixing of groundwater that is occurring during injection. Monitoring of the observation wells will also allow any impacts to groundwater quality from injection to be identified and evaluated early during the operation of the groundwater injection system. Corrective action can be taken accordingly for any potential negative effects that may arise such as aquifer plugging, excessive mounding, or mobilization of trace metals from the aquifer matrix.

3.2.2 Compliance Monitoring Wells

The compliance monitoring well clusters CW-1 through CW-4 represent the outer network of monitoring wells surrounding the two injection wells. They are located approximately 300 to 550 feet away from the injection wells, or approximately a 2- to 4-year travel time from the injection wells. Each compliance monitoring well cluster consists of two monitoring wells with 50-foot screened intervals. The combined screened intervals in each compliance well cluster approximately correlate to those in the injection wells, which were screened from about 60 feet below the water table to near the bottom of the Alluvial Aquifer.

Water level and chemical data will be collected at the compliance monitoring wells to monitor the arrival of the injected water front, evaluate any mounding effects or changes in

groundwater quality, and provide information to adjust parameters in the groundwater model, if necessary.

3.2.3 Other Monitoring Wells

Several other monitoring wells are located in the general vicinity of the injection area. These wells (OW-3 cluster, MW-18, MW-14, MW-41S, MW-41M, MW-41D, MW-13, MW-37S, and MW-37D) are located at distances representing approximately 8 to 12 years or more in travel time from the injection wells. These locations would not be useful for compliance monitoring in the near term; therefore, they are not addressed in this plan. However, if the results of monitoring at the observation and compliance monitoring wells indicate that these wells would be useful in future monitoring, the plan will be revised accordingly.

4.0 Proposed Monitoring Program

This section describes the proposed monitoring, sampling, and analysis program for the groundwater compliance monitoring under WDR No. R7-2004-0103. All groundwater monitoring activities will be performed in accordance with the procedures, analytical methods, reporting limits, and quality control plan for the Topock program as described in the *Sampling, Analysis, and Field Procedures Manual (*CH2M HILL 2005d).

4.1 Overview of CMP Monitoring Activities

The CMP activities consist of:

- **Manual water level monitoring** at the observation and compliance monitoring wells to assess hydraulic gradients and to calibrate transducers.
- **Use of dedicated transducers** in observation wells and compliance monitoring wells for continuous measurement of water levels and specific conductance to evaluate any immediate changes in hydraulic gradient and groundwater quality.
- **Sampling of observation wells** during the initial 2 to 4 months of operation to assess impacts of treated groundwater injection on groundwater quality.
- **Sampling of compliance monitoring wells** to assess background water quality and the arrival of the injected water front in approximately 2 to 4 years.
- **Installation of shallow compliance monitoring wells** at the 4 compliance monitoring well clusters.
- **An optional tracer test** to evaluate groundwater flow velocities and flow paths.

4.1.1 Manual Groundwater Level Monitoring

Manual water level measurements are performed quarterly for the Topock Groundwater Monitoring Program at all monitoring wells at the Topock site, including the observation and compliance monitoring wells. In addition, water levels will be manually measured at each monitoring well prior to purging and sampling. These water level data will be used to calibrate the transducers installed in the observation wells.

4.1.2 Water Level/Specific Conductance Transducers

Two types of dedicated transducers will be installed in the wells surrounding the injection area. Wells OW-2D and OW-5D have Insitu™ Troll 9000 transducers (or equivalent) that continuously measure hydraulic head and the specific conductance and temperature of groundwater. The remaining wells (OW and CW) have Insitu™ miniTrolls (or equivalent) that continuously measure hydraulic head and temperature. The use of transducers will assist in determining when the injected water arrives at the wells, as indicated by increases

in hydraulic head and changes in the specific conductance and possibly temperature of the groundwater.

After an extended period (several months) of injection, it is anticipated that the natural groundwater at the radius of the observation wells will be displaced with injected water and the water quality in the observation wells will begin to mirror the water quality of the injected water. After this happens, there may be no reason to continue monitoring water quality at the observation wells. However, monitoring water levels in these wells would continue as a way of tracking the performance of the injection wells. Transducers are needed in the compliance monitoring wells to discern between injection effects and the influence of the Colorado River.

Specific conductance values can be used to estimate the TDS of groundwater in the observation wells. TDS data are important as they will be used to assess the lateral migration of injected groundwater and potential vertical mixing of deeper, higher TDS groundwater with the shallower, lower TDS groundwater.

The transducers will be operated, downloaded, and maintained in accordance with the standard operating procedures described in the *Sampling, Analysis, and Field Procedures Manual* (CH2M HILL 2005d).

4.1.3 Sampling of Observation and Compliance Monitoring Wells

The collection and analysis of groundwater samples from the observation and compliance monitoring wells constitute the main portion of the monitoring program. These data will be used to characterize background water quality conditions, assess any changes in water quality as the front of injected groundwater arrives, and confirm that groundwater impacted by injected water meets applicable water quality standards. The frequency of sampling and the laboratory and field parameters to be analyzed are described in Sections 4.2 and 4.3, respectively.

4.1.4 Shallow Compliance Monitoring Wells

Four monitoring wells will be installed under the Compliance Monitoring Plan to provide additional shallow depth information for the aquifer in the vicinity of the injection wells. A work plan for the installation of one shallow monitoring well at each of four existing compliance well clusters will be submitted for approval prior to installation. The schedule for installation will be provided in the work plan and will be based on simulation results of the updated injection area groundwater flow model. Regardless of the results of model simulation, the wells will be installed within 545 days of injection startup.

Pending DTSC approval of installation, the additional wells will be added into the manual water level, transducer and analytical sampling programs after they have been installed, developed and completed.

4.1.5 Optional Tracer Test

A tracer test may be performed to provide additional data regarding groundwater flow paths, velocities, mixing, and dispersion. Fluorescein dye is currently under consideration as the tracer due to its non-toxic properties, low cost, ease of use, and ability to be detected at low levels. Adsorber "socks" can be suspended in the monitoring wells, and they can be

recovered and analyzed on a routine schedule to determine the arrival time of the tracer. PG&E is considering a tracer test to provide data on groundwater flow velocities needed for evaluating other types of remedial actions, such as *in-situ* chemical reduction and *in-situ* bioremediation. It is possible that smaller scale tracer tests could be performed in conjunction with the pilot testing of these technologies. If a tracer test in conjunction with the operation of the injection wells is determined to be desirable, the proposed procedures will be described in a separate work plan.

4.2 Sampling Frequency

The proposed sampling frequency for the observation and compliance monitoring wells is based on the site hydrogeologic model and the baseline sampling results established during multiple rounds of sampling from June 2004 to May 2005 (CH2M HILL 2005b, 2005e). During the first 2 years of operation, the observation wells will be sampled monthly for the first 6 months of operation. If significant changes or trends in water quality are not observed during that time, the sampling frequency for the observation wells will then decrease to quarterly for the remainder of the 2-year sampling period. Data evaluation procedures that will be used to assess concentration trends are described in Section 5. The compliance monitoring wells will be sampled semi-annually (every 6 months) for the first 2 years of operation. The proposed sampling schedule for the observation and compliance monitoring wells is outlined in Table 4-1. The sampling frequency will be re-evaluated after the conclusion of the initial 2-year sampling period, and a proposal for any modifications to the program will be submitted to the CRBRWQCB and DTSC for consideration.

Observation wells are proposed to be sampled more frequently than the compliance monitoring wells due to their proximity to the injection wells. Because the injected water front is anticipated to reach the observations within 2 to 4 months, the data collected from the observation wells will provide valuable information regarding any negative impacts to groundwater quality or aquifer plugging. If significant impacts are observed, the early identification of these issues will allow sufficient time for corrective action before the injected groundwater reaches the compliance wells. After an extended period of injection, it is anticipated that the natural groundwater at the radius of the observation wells will be displaced with injected water and the water quality in the observation wells will begin to mirror the water quality of the injected water. After this happens, a discontinuation or a decrease in frequency of sampling of the observation wells may be warranted. This will be evaluated after the initial 2-year sampling period.

Semi-annual monitoring of the compliance monitoring wells is expected to provide sufficient data to meet the sampling objectives. Since the injected groundwater front is not anticipated to reach the compliance wells until approximately 2 to 4 years after the start of injection, it is estimated that at least four rounds of monitoring will have been performed at the compliance wells prior to the arrival of the injected water front and the onset of any potential changes in groundwater quality.

As a supplement to this monitoring plan, a contingency plan for the IM No. 3 groundwater injection system has been submitted to DTSC (CH2M HILL 2005f). The plan outlines the criteria and notification procedures when concentrations of specified parameters reported for the observation and compliance monitoring wells exceed target values established in the

submittal *Baseline Groundwater Quality for the IM No. 3 Injection* Area (CH2M HILL 2005e).). The contingency plan includes provisions for verification sampling and initiating response actions for the IM injection system, including increasing the frequency of sampling.

4.3 Analytical and Testing Program

Groundwater samples collected from the compliance monitoring network will be analyzed for field and laboratory parameters, as described below.

4.3.1 Field Water Quality Parameters

A flow-through cell will be used to measure water quality parameters during well purging and sampling of all groundwater monitoring wells. The field parameters to be measured include specific conductance, temperature, pH, turbidity, oxidation-reduction potential, and dissolved oxygen. These parameters typically are used to determine when wells have been sufficiently purged prior to sampling, but the parameters will also be useful as indicator parameters to help determine when the injected water reaches the observation wells. The parameters are also needed to assess the geochemical conditions of groundwater and to evaluate potential subsurface reactions between injected water and the aquifer materials. Procedures for measurement of field water quality parameter are provided in the *Sampling, Analysis, and Field Procedures Manual* (CH2M HILL 2005d).

4.3.2 Laboratory Analytical Parameters

Two suites of laboratory analytical parameters are proposed for use in the CMP, as summarized below:

- Full Suite – Cr (VI), Cr(T), metals, TDS, general minerals
- Limited Suite - Cr (VI), Cr(T), TDS, general minerals

Table 4-2 provides a detailed list of these parameters.

Groundwater samples from the observation wells will be analyzed for the full suite of analytes for the first year of monitoring. The metals and general mineral analyses will assist in evaluating when the injected water front arrives at the observation wells and will provide the data needed to assess if there are any short term immediate negative impacts to groundwater quality (such as mobilization of trace metals from the aquifer matrix). Based on an evaluation of data collected from the observation wells during the first year using the methods described in Section 5, PG&E will request RWQCB and DTSC for approval to analyze observation well samples for the limited suite quarterly and for the full suite semi-annually after the first year. Groundwater samples from the compliance monitoring wells will be analyzed for the full suite of analytes at every semi-annual event during the initial 2-year monitoring period. The entire analytical program will be re-evaluated after the conclusion of the initial 2-year sampling period, and a proposal for any modifications to the program will be submitted to the CRBRWQCB and DTSC for consideration.

Analytical methods, sample volumes and containers, sample preservation requirements, and quality control sample requirements are provided in the *Sampling, Analysis, and Field Procedures Manual* (CH2M HILL 2005d). Data validation and management will be conducted

in accordance with the *Quality Assurance Project Plan* provided as Appendix D of the *Sampling, Analysis, and Field Procedures Manual*.

5.0 Data Evaluation Methods

This section describes the methods that will be used to summarize and evaluate the data collected as part of the Compliance Monitoring Program.

5.1 Hydraulic Evaluation

Groundwater levels at the Topock site fluctuate in response to changes in river level. Wells near the injection well field exhibit small fluctuations which are lagged in time from the rivers cycles. Because of this complex and nearly continuous fluctuation in groundwater levels, it is not possible to accurately measure average gradients at this site from a single round of water level measurements. In order to resolve accurate average gradients, the set of water level data collected at each well using transducers will be averaged over a period of time to determine the average gradient. A monthly averaging period has been established for compliance monitoring, to be consistent with the concurrent Performance Monitoring Program for Interim Measures in the floodplain area (CH2M HILL 2005g).

Hydraulic evaluation of the data will consist of normalization of water level data to freshwater head, calculations of horizontal and vertical gradients, and comparison of gradients to baseline and predicted conditions, as described below.

5.1.1 Groundwater Elevation Calculations and Adjustments

The temperatures and salinity of surface and groundwater are highly variable across the Topock site. In general, colder, lower salinity groundwater is found in shallow wells closest to the river and warmer, higher salinity groundwater is found in deep wells farther from the river. Historically, groundwater temperatures have ranged from 62°F to over 100°F; the salinity of groundwater ranges from <0.1 percent to 4 percent. In order to obtain water level elevation data that are comparable across the site, adjustments for temperature and salinity must be made to the raw data to obtain water levels normalized to freshwater head.

Well-specific average salinity and the best-available temperature data will be used to adjust the groundwater elevation data. The salinity data for each well will be routinely evaluated to identify any trends in salinity and insure that correct average salinity values are being used for each well. Daily average temperatures from pressure transducers are considered the best-available temperature data. If transducer temperature data are not available, then temperature data from groundwater sampling will be used.

The methodology to adjust groundwater elevations for differences in density due to salinity and temperature are further described in Appendix A. Both the unadjusted and density-corrected groundwater elevations will be stored in the project database.

5.1.2 Horizontal Gradient Calculation and Presentation

Groundwater elevations (adjusted to equivalent fresh water heads with salinity and temperature) from transducer data will be evaluated quarterly. The monthly average and

quarterly average groundwater elevations will be calculated at each monitoring location, and these data will be posted on plan view maps. The three plan view maps will contain the monitoring wells separated into shallow, middle-depth, and deep wells of the Alluvial Aquifer. The quarterly average groundwater elevation data posted onto each map will then be contoured to assist with an evaluation of any changes in hydraulic gradient and flow directions in relation to groundwater injection.

The onset of injection is expected to change gradients and flow fields in the region surrounding the injection sites, so a comparison will be made to the conceptual model for how the groundwater mound was estimated to grow. The gradient and flow data will be compared on a quarterly basis to both baseline conditions and simulated conditions predicted by the groundwater flow model as described in the *Groundwater and Hydrogeologic Investigation Report for Interim Measures No. 3 Injection Area* (CH2M HILL 2005b). Since the original model was used projected injection rates, model inputs will be updated to reflect actual conditions. Simulations will be re-run on a semi-annual basis to incorporate operational injection rates. The development of any groundwater mounding near the injection wells will be monitored to ensure that surface discharge does not occur.

5.1.3 Vertical Gradient Calculation and Presentation

The quarterly-average groundwater elevation data also will be used to calculate vertical gradients for each well cluster or pair. The vertical gradient information will be provided in tabular form, and will be assessed for any changes that result from groundwater injection.

5.2 Water Quality Evaluation

Analytical data collected as part of the CMP will be compared to target values proposed in the *Baseline Groundwater Quality for the IM No. 3 Injection* Area (CH2M HILL 2005e). A portion of the target values were set equivalent to the concentration levels at which groundwater quality exceeded RWQCBWDR groundwater discharge limit. To protect the Alluvial Aquifer, action levels for these parameters will be set so that a response is initiated before concentrations reach target values. A value of 75% of the target level seen at any compliance point within the injection well monitoring network would mandate implementation of the Contingency Plan notification procedures and response actions.

For the remaining parameters, baseline concentration measured in the injection area groundwater prior to injection exceeded the standard of 75% of the RWQCB WDR discharge limit (all remain parameters exceeded the WDR with the exception of boron, which was 95% of the WDR). Target values were selected as the highest occurrence concentration for that parameter measured within the Alluvial Aquifer wells in the injection area. Action levels for parameters whose naturally occurring concentrations exceed the RWQCB discharge limits in injection area groundwater will be determined in a different manner. For these parameters, the action level is set as an exceedance of one standard deviation above the current baseline upper limit value. Since additional information is collected each sampling round, the standard deviation will be updated on a continuing basis.

Table 5-1 lists the target values and action levels for each of the monitored parameters.

If reported concentrations of the specified monitored parameters exceed their respective action levels during any event, notification procedures and response actions will be implemented as outlined in the contingency plan for IM No. 3 groundwater injection (CH2M HILL 2005f). The initial response action is re-sampling to verify the exceedance, which is followed by an increased frequency of sampling if the verification is positive.

There are a number of parameters that are being monitored for operational or geochemical purposes, but are not considered to have action levels. Concentrations of metals, general minerals, and field water quality parameters will be evaluated to assess changes in groundwater geochemistry with time, and to monitor for potential negative effects that may arise such as aquifer plugging or mobilization of trace metals from the aquifer matrix. Once a sufficient set of data has been collected (at least 3 events), graphs of selected analyte concentrations over time will be prepared for each well to evaluate concentration trends. The Mann-Kendall test, or some similar non-parametric statistical test for trend analysis, will be used to determine if there is a significant trend to the data.

6.0 Reporting

This section identifies the reporting schedule for the CMP. The reports will be submitted to both CRBRWQCB and DTSC.

6.1 Quarterly Monitoring Reports

As specified in MRP No. R7-2004-0103, the quarterly CMP reports will be submitted by January 15, April 15, July 15, and October 15 of each year.

- First quarter monitoring period (January through March): report due April 15
- Second quarter monitoring period (April through June): report due July 15
- Third quarter monitoring period (July through September): report due October 15
- Fourth quarter monitoring period (October through December): report due January 15

Injection is currently projected to start in late July 2005; accordingly, the first quarterly report will be submitted on October 15, 2005 for third quarter 2005 and will cover the period from start of injection to end of September 2005. If injection is delayed, the first quarterly report will be similarly delayed. Each report will summarize all sampling activities that occurred within the specified quarter. Hydraulic and analytical data collected during each quarter, as well as historic data, will be summarized in tabular format. Groundwater elevation contour maps will be prepared for the upper, middle, and lower zones of the Alluvial Aquifer. Horizontal and vertical gradients in the well field vicinity will be discussed. Each report will include an evaluation of hydraulic and water quality conditions relative to baseline conditions and target values.

6.2 Semi-annual Monitoring Reports

The second and fourth quarter reports, to be submitted July 15 and January 15 of each year, will serve as semi-annual monitoring reports. The reports will summarize all sampling activities that occurred within the specified semi-annual period. Hydraulic and analytical data collected during that period, as well as historic data, will be summarized in tabular format. Groundwater elevation contour maps will be prepared for the shallow, middle-depth, and deep wells in the Alluvial Aquifer. Horizontal and vertical gradients in the well field vicinity will be discussed. Each report will include an evaluation of hydraulic and water quality conditions relative to baseline conditions and target values. .

6.3 MRP Specifications

Other reporting specifications are outlined in MRP No. R7-2004-0103, and are summarized below.

- The data will be presented in tabular form so that the specified information is readily discernible. The data will be summarized in such a manner as to clearly illustrate whether the facility is operating in compliance with WDRs.
- Records of monitoring information will include:
  - The date, exact place, and time of sampling or measurement(s).
  - The individual(s) who performed the sampling or measurement(s).
  - The date(s) analyses were performed.
  - The individual(s) who performed the analyses.
  - The analytical techniques or method used.
  - The results of such analyses.
- The results of any analysis taken more frequently than required at the locations specified in the MRP will be reported to the CRBRWQCB.
- Monitoring reports will be certified under penalty of perjury to be true and correct and will contain the required information at the designated frequency.
- Each report will contain the following statement:

  "*I declare under the penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for knowing violations.*"
- A duly authorized representative of the discharger may sign the documents if:
  - The authorization is made in writing by the discharger.
  - The authorization specifies an individual or person having responsibility for the overall operation of the regulated disposal system.
  - The written authorization is submitted to the CRBRWQCB's Executive Officer.
- Reporting of any failure in the facility will be performed as described in WDR Order No. R7-2004-0103. Results of any analysis performed as a result of a failure of the facility will be provided within 14 days after collection of the samples.
- A cover letter will be attached to each report. The information contained in the cover letter will clearly identify violations of the WDRs, discuss corrective actions taken or planned, and the proposed time schedule of corrective actions. Identified violations will include a description of the requirement that was violated and a description of the violation.

7.0 References

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_____. 2005f. Interim Measures No. 3 Injection Well Operation and Maintenance Plan Addendum.

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Tables

TABLE 3-1
Well Elevations and Construction Summary
Interim Measures No. 3. Groundwater Compliance Monitoring Program, PG&E Topock Compressor Station

Well ID LocID_Post	Well Note	Date Installed	Well Elevation		Boring Total Depth (ft bgs)	Well Depth (ft bgs)	Approx Depth to Water (ft TOC)	TOP of Screen		BASE of Screen		Well Casing & Sump Length	Screen Length (feet)
			Measure Pt. Elevation (ft MSL)	Ground Elevation (ft MSL)				Depth (ft bgs)	Elevation (ft MSL)	Depth (ft bgs)	Elevation (feet MSL)		
Observation, Compliance & Injection Wells													
CW-1M	IM3 compliance MW	Jan-05	566.07	563	195	190	112	140	423	190	373	2" PVC	50
CW-1D	IM3 compliance MW	Jan-05	566.46	564	360	320	112	250	314	300	264	2" PVC - 20' sump	50
CW-2M	IM3 compliance MW	Jan-05 / Feb-05	549.45	547	203	202	95	152	395	202	345	2" PVC	50
CW-2D	IM3 compliance MW	Jan-05	549.43	547	385	355	96	285	262	335	212	2" PVC - 20' sump	50
CW-3M	IM3 compliance MW	Feb-05	534.10	532	223	222	80	172	359	222	309	2" PVC	50
CW-3D	IM3 compliance MW	Jan-05	534.14	532	360	340	80	270	262	320	212	2" PVC - 20' sump	50
CW-4M	IM3 compliance MW	Jan-05	518.55	516	170	170	64	120	396	170	346	2" PVC	50
CW-4D	IM3 compliance MW	Jan-05	518.55	516	337	303	65	233	283	283	233	2" PVC - 20' sump	50
OW-1S	IM3 observation well	Nov-04	550.15	548	115	114	95	84	464	114	434	2" PVC	30
OW-1M	IM3 observation well	Sep-04	550.36	548	186	189	92	165	383	185	363	2" PVC	20
OW-1D	IM3 observation well	Sep-04	550.37	548	291	277	92	257	291	277	271	2" PVC	20
OW-2S	IM3 observation well	Dec-04	548.75	546	104	101	94	71	475	101	445	2" PVC	30
OW-2M	IM3 observation well	Dec-04	548.52	546	210	210	94	190	356	210	336	2" PVC	20
OW-2D	IM3 observation well	Nov-04 / Dec-04	549.01	547	347	340	95	310	237	330	217	2" PVC - 10' sump	20
OW-5S	IM3 observation well	Nov-04	551.75	549	112	110	97	70	479	110	439	2" PVC	40
OW-5M	IM3 observation well	Nov-04	551.75	549	252	250	97	210	339	250	299	2" PVC	40
OW-5D	IM3 observation well	Nov-04	552.35	550	350	350	98	300	250	320	230	2" PVC - 30' sump	20
IW-2	IM3 injection well	Jan-05	550.11	547	412	340	96	170	377	330	217	6" SS - 10' sump	160
IW-3	IM3 injection well	Jan-05	554.44	551	411	330	100	160	391	320	231	6" SS - 10' sump	160

NOTES:

1. Well elevations for IM-3 wells in feet above mean sea level (MSL) from PG&E well survey conducted 2/15/05.
2. Ground surface elevations and all well/screen depth and elevations rounded-off to whole-foot values.
3. Depth to water values are average depths in feet below top of well casing (TOC) rounded off to whole-foot values.

TABLE 4-1
Proposed Sampling Schedule and Analyses
Interim Measures No. 3. Groundwater Compliance Monitoring Program
PG&E Topock Compressor Station

Wells	FIRST YEAR								SECOND YEAR			
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 9	Month 12	Month 15	Month 18	Month 21	Month 24
Observation Wells												
OW-1S	F	F	F	F	F	F	F	F	L [1]	F	L [1]	F
OW-1M	F	F	F	F	F	F	F	F	L [1]	F	L [1]	F
OW-1D	F	F	F	F	F	F	F	F	L [1]	F	L [1]	F
OW-2S	F	F	F	F	F	F	F	F	L [1]	F	L [1]	F
OW-2M	F	F	F	F	F	F	F	F	L [1]	F	L [1]	F
OW-2D	F	F	F	F	F	F	F	F	L [1]	F	L [1]	F
OW-5S	F	F	F	F	F	F	F	F	L [1]	F	L [1]	F
OW-5M	F	F	F	F	F	F	F	F	L [1]	F	L [1]	F
OW-5D	F	F	F	F	F	F	F	F	L [1]	F	L [1]	F
Compliance Wells												
CW-1M						F		F		F		F
CW-1D						F		F		F		F
CW-2M						F		F		F		F
CW-2D						F		F		F		F
CW-3M						F		F		F		F
CW-3D						F		F		F		F
CW-4M						F		F		F		F
CW-4D						F		F		F		F

Notes:
F - Full Suite: Cr(VI), Cr(T), TDS, metals, general minerals
L - Limited Suite: Cr(VI), Cr(T), TDS, general minerals
[1] Depending on data collected during the first year, PG&E will request agency approval to analyze observation well samples for the limited suite during alternate quarters in the second year.

TABLE 4-2
Proposed Analytical Program
Interim Measures No. 3. Groundwater Compliance Monitoring Program
PG&E Topock Compressor Station

		Proposed Groundwater Sampling for Compliance Monitoring Plan		Treatment System Effluent Parameters Required Under MRP No. R7-2004-0103
Constituents	**Units**	**Full Suite**	**Limited Suite**	
General Minerals				
TDS	mg/L	X	X	X
Turbidity	NTU	X	X	X
Specific Conductance	µmhos/cm	X	X	X
pH	pH units	X	X	X
Fluoride	mg/L	X	X	X
Ammonia (as N)	mg/L	X		X
Nitrate/nitrite (as N)	mg/L	X	X	X
Sulfate	mg/L	X	X	X
Chloride	mg/L	X	X	
Total Iron	mg/L	X		X
Boron	mg/L	X	X	X
Calcium	mg/L	X		
Magnesium	mg/L	X		
Potassium	mg/L	X		
Sodium	mg/L	X		
Alkalinity (as CaCO3)	mg/L	X		
Metals				
Aluminum	µg/L	X		X
Antimony	µg/L	X		X
Arsenic	µg/L	X		X
Barium	µg/L	X		X
Beryllium	µg/L	X		
Cadmium	µg/L	X		
Cobalt	µg/L	X		
Chromium, Total	µg/L	X	X	X
Chromium VI	µg/L	X	X	X
Copper	µg/L	X		X
Lead	µg/L	X		X
Manganese	µg/L	X		X
Mercury	µg/L	X		
Molybdenum	µg/L	X		X
Nickel	µg/L	X		X
Selenium	µg/L	X		
Silver	µg/L	X		
Thallium	µg/L	X		
Vanadium	µg/L	X		
Zinc	µg/L	X		X

TABLE 5-1
Target Levels and Action Levels for WDR Constituents for Observation Wells in East Mesa Injection Area
Groundwater Compliance Monitoring Plan
Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

Constituent	Range	Standard Deviation	Upper Limit of Range Exceeds WDR Discharge Limit	WDR Discharge Limit		Target Value	Action Level
				Average	units		
Aluminum	ND (52)	NA		50	µg/L	50	37.50
Ammonia (as N)	ND (0.5)	NA		1.5	mg/L	1.5	1.13
Barium	0.0319 - 0.113	NA		0.3	mg/L	0.3	0.23
Boron	0.374 - 1.80	0.44	X	1.9	mg/L	1.9	2.3
Copper	1.55 - 10.6	NA		20	µg/L	20	15
Fluoride	ND (0.5) - 2.16	0.76	X	0.3	mg/L	2.16	2.92
Hexavalent Chromium	ND (1.0) - 32.6	8.65	X	8	µg/L	32.6	41
Iron (total)	ND (0.021) - 0.407	0.117	X	0.3	mg/L	0.407	0.52
Lead	ND (1) - ND (2.1)	NA		2	µg/L	2	1.50
Manganese	1.07 - 628	154	X	50	µg/L	628	782
Molybdenum	11.5 - 89.3	22.8	X	10	µg/L	89.3	112
Nickel	ND (1) - 21	4.8	X	12	µg/L	21	25.8
Nitrate as N	0.107 - 3.18	NA		10	mg/L	10	7.50
pH	7.53 - 8.62	0.2	X	7.5	units	8.62	8.82
Sulfate	107 - 571	142	X	250	mg/L	571	713
TDS	908 - 10,800	2,380	X	500	mg/L	10,800	13,180
Total Chromium	ND (1.0) - 29.5	8.7	X	25	µg/L	29.5	38
Zinc	ND (10) - 80.2	11	X	80	µg/L	80.2	91.2

Notes:
1. Concentrations: micrograms per liter (µg/L), milligrams per liter (mg/L), and pH units
2. ND = not detected at listed reporting limit
3. NA = not applicable
4. Shading indicates upper limit of parameter range exceeds WDR discharge limits
5. Refer to Section 5.2 for explanation of Target Values and Action Levels

Figures

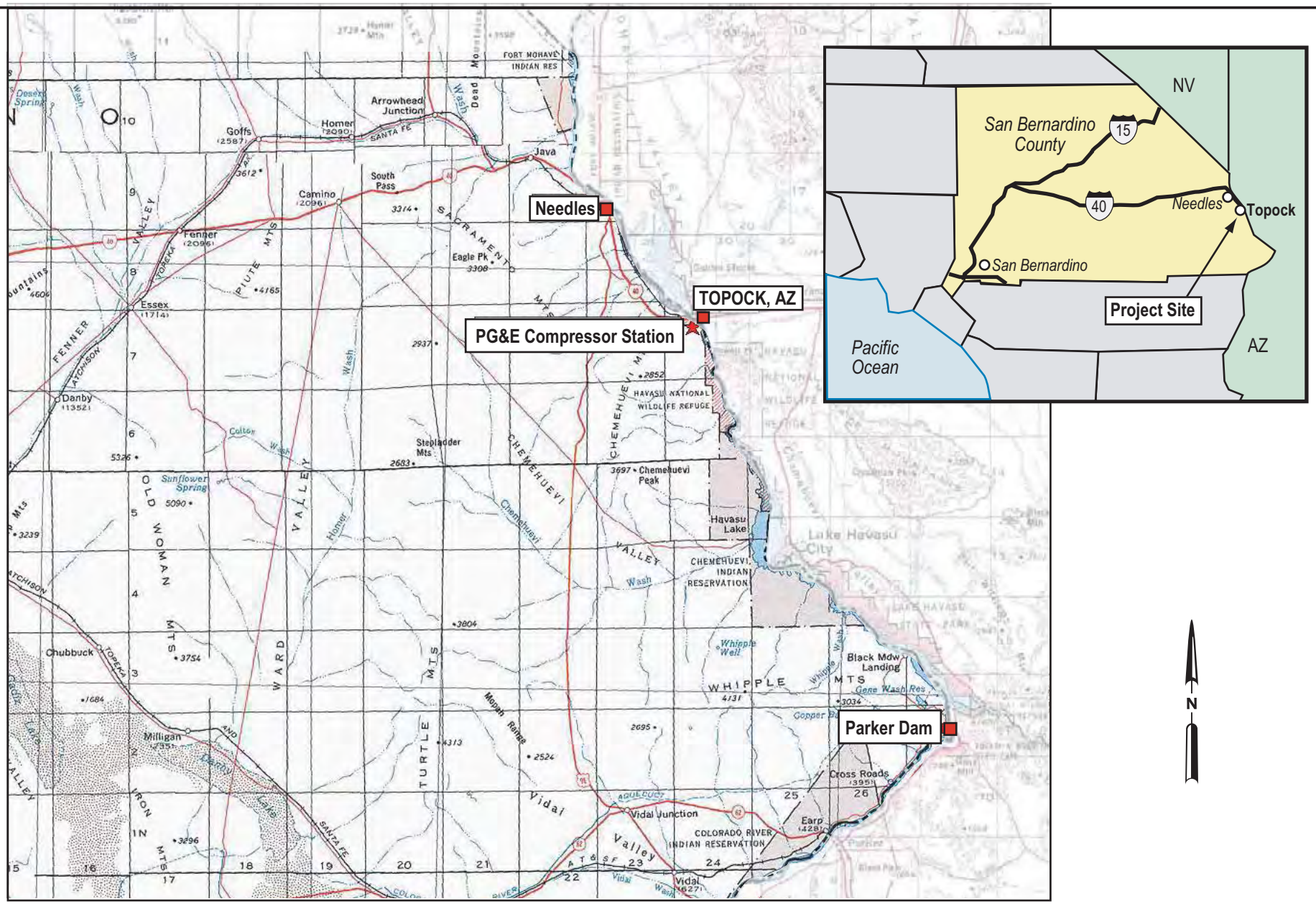

FIGURE 1-1
SITE LOCATION
IM-3 COMPLIANCE MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

315994.PS.07.IW_Figure 2-1 SiteLocMap-Final_4/4/05_ccc

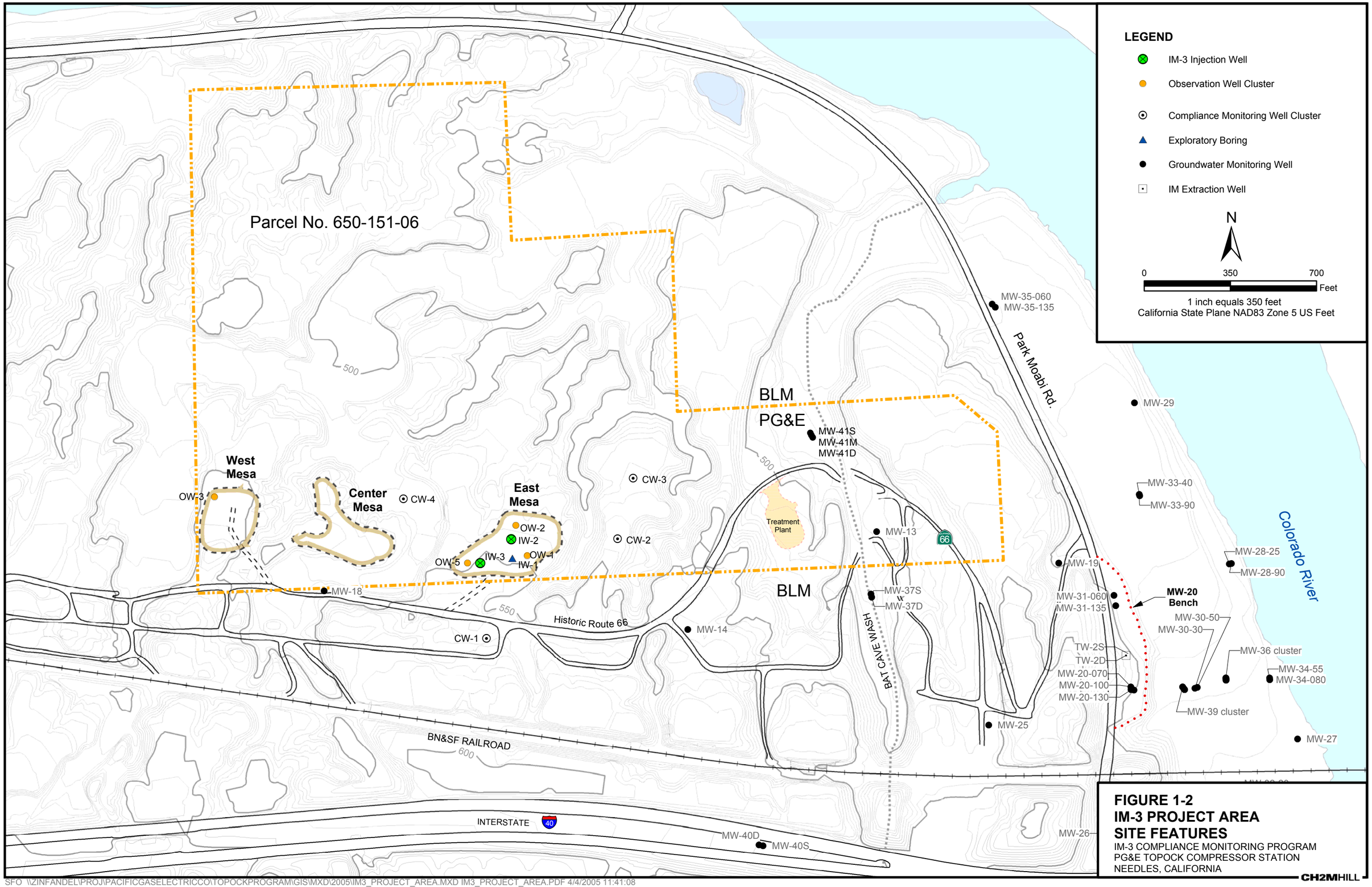

FIGURE 1-2
IM-3 PROJECT AREA
SITE FEATURES
IM-3 COMPLIANCE MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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Appendix A
Procedures for Calculation of Freshwater Equivalent Heads, PG&E Topock Program

Procedures for Calculation of Freshwater Equivalent Heads

PG&E Topock Program

This technical procedure details instructions for adjusting groundwater elevations to freshwater equivalent heads. As necessary, this document also identifies procedures for "legacy" data (data collected before current protocols were implemented).

FIELD MEASUREMENT OF SALINITY

The following parameters may be measured in the field or laboratory to determine the density of the water column:

Parameter	Units	Typical Range	Description
Specific Conductance (SC)	µS/cm @ 25°C	FW: 0-1,500 µS/cm BW: 1,500-15,000 µS/cm SW: 15,000-150,000 µS/cm BR: >150,000 µS/cm	The conductivity normalized to a temperature of 25°C. Note that a typical seawater SC is approximately 47,000 µS/cm. The term Electrical Conductivity (EC) is often used interchangeably, though this parameter is not corrected to 25°C.
Salinity	%	FW: 0-0.1% BW: 0.1-1% SW: 1-10% BR: >10%	A measure of the dissolved salts in water on a mass per mass basis. Note that a typical seawater salinity is approximately 3.5.
Total Dissolved Solids (TDS)	mg/L	FW: 0-1,000 mg/L BW: 1,000-10,000 mg/L SW: 10,000-100,000 mg/L BR: >100,000 mg/L	A measure of the mass of dissolved solids in water on a mass per volume basis. Note that a typical seawater TDS is approximately 35,000 mg/L.

Notes:
FW – Fresh Water; BW – Brackish Water; SW – Salt Water; BR – Brine

Field instruments typically report EC at 25°C, which is by definition specific conductance.

CALCULATION OF DENSITY

The density of water in a well is required to adjust hydraulic heads to freshwater equivalent heads. However, the density of water is rarely measured in the field. Rather, either the salinity or conductance of the water is measured in the field or the conductance or total dissolved solids is measured in the laboratory and a density is calculated from these values.

Salinity and TDS measure very similar properties and conversion between the two parameters can be done using the following formula:

$$Salinity\,(\%) = \frac{TDS\,(mg/L)}{10{,}051.1}$$

Salinity and TDS are typically laboratory-based measurements. If salinity or TDS are provided as field measurements, they are likely based upon a linear, non-site-specific conversion from a specific conductance measurement.

Specific conductance (electrical conductivity at 25°C), however, is often the most commonly available measurement in both field and laboratory data. Specific conductance is a measure of a water's ability to conduct electricity, but can used to estimate the density of the water. With site-specific information regarding the relationship between the specific conductance and the salinity, TDS, or density, the specific conductance measurements can be used to accurately make the freshwater head corrections. The following formula is used to convert specific conductance to TDS:

$$TDS\,(mg/L) = SC\,(\mu S/cm)\cdot K$$

where K is a dimensionless constant typically ranging between 0.55 to 0.8.

The dimensionless constant K is often assumed to be 0.65 for typical groundwater. However, K is dependent upon the type of groundwater. For example, water that contains predominantly sodium and chloride will have a different constant than water that contains predominantly sodium and bicarbonate. Where a high level of accuracy is required in calculating the density from specific conductance is required, site-specific constants can be obtained for calculating salinity or TDS from specific conductance. An evaluation of the site-specific constants at the Topock site is provided in Appendix A.

DATABASE SETUP

Within the Topock database, manual and transducer water level data are stored in the tables ***tblWaterLevel*** and ***tblPT***, respectively. Salinity and temperature data used to adjust the water levels are also stored for each measurement in these tables. The design of both tables is shown below.

tblWaterlevel : Table

Field Name	Data Type	Description
LocID	Text	Location ID (e.g., well, boring, station)
SampleDate	Date/Time	Date of measurement
SampleTime	Date/Time	Time of measurement
EventCode	Text	Monitoring event code
SrcCode	Text	Data source (e.g., CH2M HILL, PG&E, Legacy, etc.)
MeasPtElev	Number	Elevation (ft AMSL) from which depth to water was measured (e.g., top of PVC)
DTW	Number	Depth to water (ft)
RawSalinity	Number	Raw salinity measurement (e.g., salinity, field measured specific conductance, lab TDS, etc.)
RawSalinityDate	Date/Time	Date of salinity measurement, if applicable
CalcCode	Text	Code identifying the type of raw salinity and conversion used to convert to salinity
CalcComment	Text	Comment on salinity conversion
Salinity	Number	Final salinity of water column (%)
Temperature	Number	Temperature of water column (°F)
TemperatureComment	Text	Comment on temperature conversion
RawWElev	Number	Unadjusted groundwater elevation (ft AMSL)
CorrectWElev	Number	Final salinity and temperature adjusted groundwater elevation (ft AMSL)
Comments	Text	General comment
dbdate	Date/Time	db upload date

tblPT : Table

Field Name	Data Type	Description
LocID	Text	Location ID (e.g., well, boring, station)
Date	Date/Time	Date of measurement
Time	Date/Time	Time of measurement
ElapsedTime	Number	Elapsed time since transducer test began (minutes)
Temp	Number	Temperature (°C)
PressHead	Number	Raw pressure head (ft)
Offset_ft	Number	Offset or elevation of transducer above datum (ft)
Salinity	Number	Salinity of water columnn (%)
SalCorr	Number	Salinity correction to be applied (ft)
TempCorr	Number	Temperature correction to be applied (ft)
HydHead	Number	Final salinity and temperature adjusted hydraulic head (ft AMSL)
Comment	Text	Comment regarding measurement
DST	Number	True (-1) if PDT; FALSE (0) if standard PST
Exclude	Number	True (-1) if data point to be excluded; FALSE (0) if valid data

In tblWaterLevel, the field CalcCode identifies what value is stored in the *RawSalinity* field and how the final salinity value is determined. Possible conversions codes and the corresponding conversions to salinity (in %) include:

FEC2SAL field-measured EC[1] (uS/cm) converted to salinity (%) [SAL=EC*0.65/10051.1]

LEC2SAL laboratory-measured EC[1] (uS/cm) converted to salinity (%) [SAL=EC*0.65/10051.1]

FTDS2SAL field-measured TDS (mg/L) converted to salinity (%) [SAL=TDS/10051.1]

LTDS2SAL laboratory-measured TDS (mg/L) converted to salinity (%) [SAL=TDS/10051.1]

LSAL laboratory-measured salinity (%) [no conversion]

FSAL field-measured salinity (%) [no conversion]

PSAL salinity (%) measured during previous event [no conversion]

DETERMINATION OF DENSITY AS A FUNCTION OF SALINITY

Data collected and reported prior to 2002 were not adjusted to freshwater equivalent heads. In 2003, well and date-specific salinity data were used to adjust these legacy data to freshwater equivalent heads. The legacy data have numerous sources and field-measured salinity data were often not available. The following, in order of precedence, details the methodology to populate the salinity value for the legacy manual water level measurement.

1. Field salinity (%) available ±3 days of the water level measurement:
   - *RawSalinity* is the field salinity value in %
   - *RawSalinityDate* is the date of the field salinity measurement
   - *CalcCode* is FSAL for a direct field salinity measurement
   - *Salinity* is populated with *RawSalinity* x 1.00 (the *CalcConversion* for *FSAL*)

[1] The term "EC" as used here is actually SC, as Topock field meters already convert to conductance at 25°C.

2. Field (1st) or Lab (2nd) SC available at ±3 days of the water level measurement:

   - *RawSalinity* is the field or lab SC value
   - *RawSalinityDate* is the date of the field or lab SC measurement
   - *CalcCode* is FEC2SAL LEC2SAL indicates the field or lab SC value, respectively, is to be converted to salinity
   - *Salinity* is populated with *RawSalinity**0.75/10051.1 (or multiply 0.000074619)

3. Field (1st) or laboratory (2nd) TDS available at ±3 days of the water level measurement:

   - *RawSalinity* is the field or lab TDS value
   - *RawSalinityDate* is the date of the field or lab TDS measurement
   - *CalcCode* is FTDS2SAL or LTDS2SAL indicates the field or lab TDS value, respectively, is to be converted to salinity
   - *Salinity* is populated with *RawSalinity*/10051.1 (or multiply 0.000099492)

4. Salinity value from previous sampling/monitoring event:

   - *RawSalinity* is the salinity (%) from previous monitoring event
   - *RawSalinityDate* is the date of the measurement for the previous event
   - *CalcCode* is PSAL indicating salinity is from a previous event
   - *Salinity* is populated with *RawSalinity* (i.e., no conversion)

On 06/02/03, there were 506 manual water level measurements (data through 12/02/02) in the Topock db. As outlined in Steps 1 through 3, salinity values were populated into *tblWaterLevels* using date matches (±3 days) between water level and salinity (including EC or TDS) measurements. The results were as follows:

FSAL (measured field salinity):	74 records (15%)
FEC2SAL (field measured SC):	79 records (16%)
LEC2SAL (lab measured SC):	189 records (37%)
FTDS2SAL (field measured TDS):	0 records
LTDS2SAL (lab measured TDS):	0 records

Further evaluation was required for legacy manual water level data which did not have salinity measurements on the same date. Some older legacy data only had year and month, and in such cases salinity values from that month were used. Many others slightly exceeded the ±3 days search window, but had data ±10 days. Ultimately, reasonably close dates for legacy manual water level and salinity data were found, so that salinity adjusted groundwater elevations could be calculated.

Data collected between January 2003 and August 2004 were corrected for salinity using field measured salinity. If a field salinity measurement was not available, the same routine was used to populate the salinity field as shown above for the legacy data.

Beginning August 2004, a median salinity for the water column has been used to adjust groundwater elevations for salinity. The median salinity value is used because:

- the median salinity of the water column is more representative of the water column than the salinity obtained from sampling the aquifer

- an error during a single even can result in an erroneous groundwater elevation whereas the median salinity is not significantly affected

The median salinity value for each well is evaluated quarterly to ensure trends in salinity are not present. In addition, sampling protocols have been changed to ensure the entire well casing volume (blank and screened portions of a well) are purged during sampling events.

DETERMINATION OF DENSITY AS A FUNCTION OF TEMPERATURE

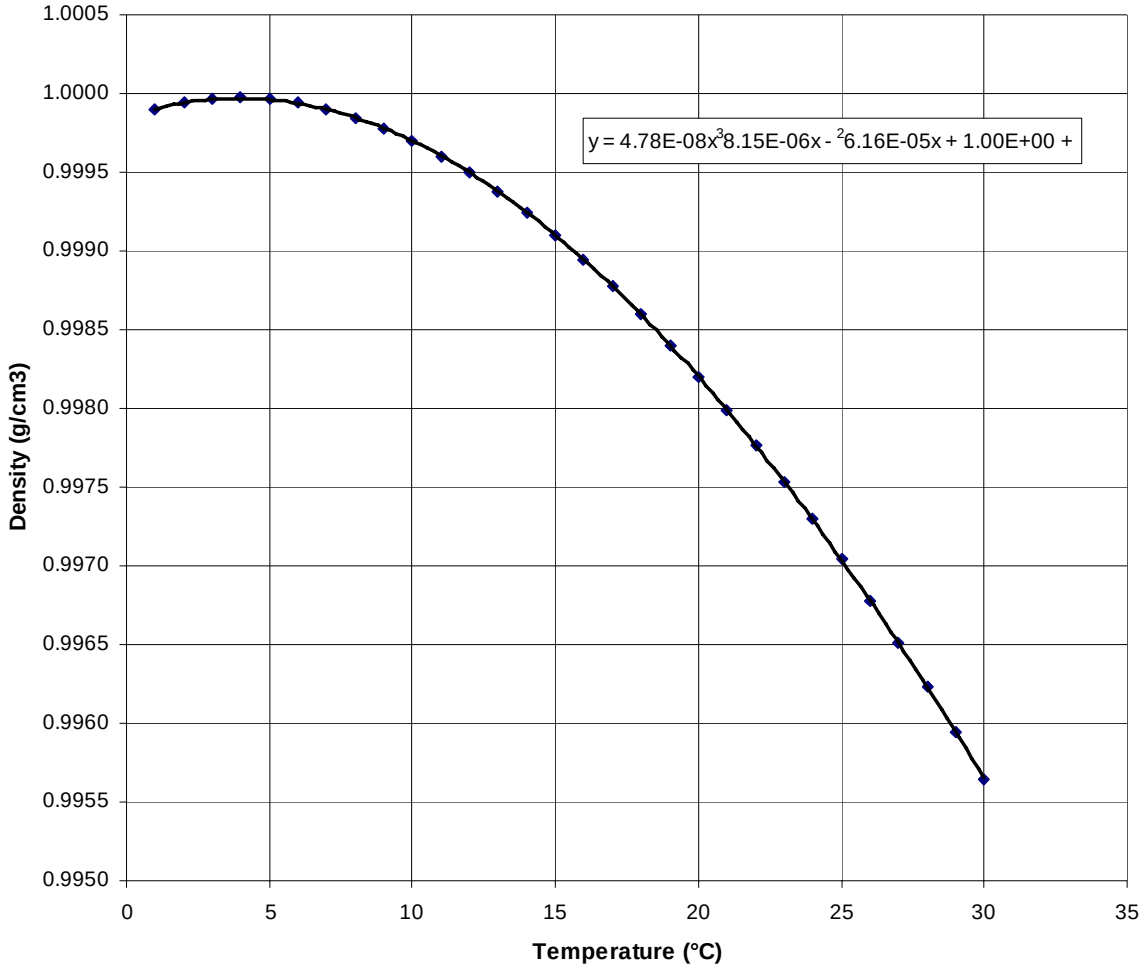
The density of water is dependant upon temperature. The following table and graph summarize the density of water at various temperatures.

TABLE A2-1
RELATIONSHIP BETWEEN TEMPERATURE
AND DENSITY OF WATER

Temp. (°C)	Density (g/cm3)	Temp. (°C)	Density (g/cm3)	Temp. (°C)	Density (g/cm3)
1	0.999900	11	0.999605	21	0.997992
2	0.999941	12	0.999498	22	0.997770
3	0.999965	13	0.999377	23	0.997538
4	0.999973	14	0.999244	24	0.997296
5	0.999965	15	0.999099	25	0.997044
6	0.999941	16	0.998943	26	0.996783
7	0.999902	17	0.998774	27	0.996512
8	0.999849	18	0.998595	28	0.996232
9	0.999781	19	0.998405	29	0.995944
10	0.999700	20	0.998203	30	0.995646

Source: Win-Situ 4 User Manual (In-Situ 2003)

FIGURE A2-1
RELATIONSHIP BETWEEN TEMPERATURE AND FRESH WATER



Source: Win-Situ 4 User Manual (In-Situ 2003)

The following, quoted from the USGS WRIR 00-4014 (Quality Assurance and Analysis of Water Levels in Wells on Pahute Mesa and Vicinity, Nevada Test Site), summarizes the methodology to correct groundwater elevations for temperature-dependant density:

> The following equation, described by Winograd (1970), can be used to calculate a water-level change resulting from a temperature change:
>
> $$n'/n = s/s'$$
>
> where n' is the length of water column above the point of inflow after a given temperature change; n is the measured water column length above the point of inflow (assumed to be the top of the open interval, in this example); s is the specific weight (or density) of water in the column at the mean water-column temperature and hydrostatic pressure; and s' is the specific weight (or density) of water at the new temperature and identical hydrostatic pressure.

For the purposes of the following example, the density of distilled water for a given temperature at 1 bar, obtained from Lide (1992, p. 6-10), will be used.

The density of water, *s*, in well PM-1 at a mean temperature of 113.5°F is 0.9900 gm/cc (grams per cubic centimeter). Assuming that the mean temperature in the well rose 5°F to 118.5°F, the new density of water, *s'*, would be 0.9888 gm/cc. The measured water-column length above the assumed point of inflow, *n*, is 5,450 ft. Solving the above equation for *n'*, the length of the water column after a 5°F rise in temperature would be 5,456.6 ft, resulting in an increase in water level of 6.6 ft. (http://water.usgs.gov/pubs/wri/WRIR00-4014/text/waterlevel.htm#Temperature%20Effects)

SALINITY AND TEMPERATURE ADJUSTMENTS FOR GROUNDWATER ELEVATIONS

Manual and transducer water level data have been corrected for salinity and temperature since January 2003. The salinity and temperature adjusted water elevations are stored in the *CorrectWElev* and *HydHead* fields in *tblWaterLevel* (manual water level data) and *tblPT* (transducer data), respectively. It is assumed that:

- The salinity of the water column with the wells is constant throughout the water column.
- The bottom of the well is the measurement point and the entire water column is adjusted for salinity and temperature.

The salinity adjustment (SalCorr) for each water elevation is calculated as follows:

$$SalCorr\ (ft) = Column \times SAL \times 0.0071$$

where *SAL* is the salinity of the water column in percent, and *Column* is the height of the water column to be adjusted in feet.

For manual water level data, the height of the water column is the distance from the water table to the bottom of the screen. For transducer data, the water column is the distance from the transducer to the bottom of the screen, since the water column above the transducer is inherently adjusted for density (i.e., the transducer measures pressure and not distance).

The temperature-dependant density of water within the well is determined using the following empirical equation (see chart on previous page):

$$Density\ (g/cm^3) = 4.78 \times 10^{-8}\ T^3 - 8.15 \times 10^{-6}\ T^2 + 6.16\ T + 1.00$$

where T is temperature in degrees Celsius (°C).

The temperature adjustment (TempCorr) for each water elevation is calculated as follows:

$$TempCorr\ (ft) = Column \times [1/Density] - Column$$

For manual water level data, the temperature and salinity adjusted groundwater elevation is calculated as follows:

$$CorrectElev\ (ft\ AMSL) = RawElev + SalCorr + TempCorr$$

where RawElev (ft AMSL) is the groundwater elevation with no adjustment for temperature or salinity.

For transducer data, the temperature and salinity adjusted groundwater elevation is calculated as follows:

$$HydHead\ (ft\ AMSL) = \mathrm{Pr}essHead + Offset + SalCorr + TempCorr$$

where PressHead (ft) is the height of the water column above the transducer and offset (ft AMSL) is the elevation of the transducer above the datum.

Example Salinity Correction

From MW-22 on 09/30/99

Well Depth = 23′ below top of casing (BTOC)
Top of PVC = 459.93′ AMSL
Depth to water (DTW) = 4.78′ BTOC
Field SC measurement = 25,600 µS/cm

According to FEC2SAL:

SAL = SC [uS/cm] * 0.75 / 10051.1
= 25,600 * 0.000074619
= 1.91%

The unadjusted groundwater elevation is:

RawWElev = Top of PVC – DTW
= 459.93′ AMSL– 4.78′ BTOC
= 455.15′ AMSL

The salinity adjusted groundwater elevation is:

CorrWElev = RawWElev + (Well Depth – DTW) x Salinity [%] x 0.0071
= 455.15′ + (23′ – 4.78′) x 1.91% x 0.0071
= 455.15′ + 0.247′
= 455.40′ AMSL

Example Salinity & Temperature Corrections

Parameter/Calculation	MW-24BR	MW-33-90	MW-33-90	MW-10
Top of Casing (ft AMSL)	563.95	487.57	487.57	530.65
Well Depth (ft BTOC)	441.21	91	91	97.64
DTW (ft BTOC)	107.09	31.19	31.19	74.03
Water Column (calculated)	334.12	59.81	59.81	23.61
Raw or Uncorr. GW Elev. (from db)	456.86	456.38	456.38	456.62
Uncorr. GW Elev. (calculated)	456.86	456.38	456.38	456.62
Salinity (%)	0.82	0.5	0.5	0.2
Salinity Corr. GW Elev. (from db)	458.8053	456.5923	456.5923	456.6536
Head Difference (Salinity - Raw)	1.9453	0.2123	0.2123	0.0336
Approximate Temperature (°F / °C)	84.5 / 29.2	80.0 / 26.7	85.0 / 29.4	82.8 / 28.2
Temp. Corr. GW. Elev.	455.3989	456.1707	456.1277	456.5307
Head Difference (Temp - Raw)	-1.4611	-0.2093	-0.2523	-0.0893

Appendix C4:
IM No. 3 Action Memo

BLM Fax Cover Sheet

Bureau of Land Management
Lake Havasu Field Office
2610 Sweetwater Avenue • Lake Havasu City, Arizona 86406
Phone (928) 505-1200 • *Fax* (928) 505-1280
Toll Free 1-888-213-2582 • *Website:* lakehavasu.az.blm.gov

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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Office CH2M Hill

Phone (510) 587-7597 **Fax** (510) 622-9097

Sender Cat White **Phone** (928) 505-1309

Notes/Comments:

Signed action Memo #3
w/ Mitigation Measures
will follow up w/
copies!
Can you please scan & post this
doc so it can go E-mail
to all Cat.

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAKE HAVASU FIELD OFFICE

In Reply Refer To:
CAAZCA 43660
2640 (AZ-070)

September 17, 2004

ACTION MEMORANDUM

TO: State Director

FROM: Acting Field Manager, Lake Havasu Field Office

THROUGH: Acting District Manager, Colorado River District

SUBJECT: Time Critical Removal Action No. 3,
Pacific Gas and Electric Topock Compressor Facility

I. PURPOSE

This Action Memorandum documents the basis for authorizing a time critical removal action to address the release of hazardous substances from the Pacific Gas and Electric ("PG&E") Compressor Station near Topock, Arizona (hereafter "PG&E facility"). Hazardous substances released from the PG&E facility have migrated onto or under land managed by the Bureau of Land Management ("BLM") on behalf of the Bureau of Reclamation ("BOR"). Specifically, hazardous substances including, without limitation, hexavalent chromium released from the PG&E facility have been detected in groundwater under BLM-managed land. This plume of contaminated groundwater has been detected in groundwater within 100 feet of the Colorado River and is or may be migrating toward the Colorado River.

This proposed time critical removal action is authorized pursuant to the response action authority of Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. 9604. Pursuant to Executive Order 12580, as amended, and Department of the Interior ("DOI") Departmental Manual, Section 104 response action authority has been delegated to BLM to address the release or threatened release of hazardous substances on or from land under BLM's jurisdiction, custody, or control.

The purpose of this proposed time critical removal action is to undertake additional measures, as specified herein, to maintain hydraulic control of the groundwater plume to prevent or abate the release of hexavalent chromium into the Colorado River.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The PG&E facility comprises approximately 265 acres located 15 miles southeast of Needles, California, south of Interstate 40, in the north end of the Chemehuevi Mountains. The facility is on private land owned by PG&E and is situated within the Havasu National Wildlife Refuge. The facility is located within one-half a mile of BLM-managed land and is less than one mile from the Colorado River.

PG&E has been the owner and operator of the PG&E facility since 1951 and has owned the property on which the facility is located since 1965. Beginning in 1951 and continuing to approximately 1989, PG&E conducted onsite disposal of significant quantities of wastewater containing hexavalent chromium from the cooling towers of the compressor station at the facility. According to PG&E's estimates, from 1951 to 1969, PG&E disposed annually at least six million gallons of untreated chromium-contaminated wastewater into Bat Cave Wash, an ephemeral stream that flows north from the facility across Havasu National Wildlife Refuge and BLM-managed land emptying into the Colorado River. From 1970 to 1989, PG&E disposed its wastewater into evaporation ponds on Havasu National Wildlife Refuge property adjacent to BLM-managed property.

B. Other Actions to Date

In 1988, PG&E completed a soil investigation in the Bat Cave Wash area at the request of the California Department of Health Services (now known as the Department of Toxic Substances Control ("DTSC")) and the U.S. Environmental Protection Agency ("EPA"). The soil investigation documented chromium releases to the environment. In 1989, a "Comprehensive Ground Water Monitoring Evaluation" prepared by the California Regional Water Quality Control Board identified chromium releases in groundwater.

By letter dated May 29, 1995, PG&E reported the presence of chromium in groundwater samples taken on the east side of Bat Cave Wash near the north boundary of the PG&E facility. In response, on February 26, 1996, DTSC and PG&E executed a Corrective Action Consent Agreement pursuant to State law under which DTSC directed PG&E to perform a "Facility Investigation" as well as any "Interim Measures" determined to be necessary to address immediate or potential threats to human health and/or the environment.

In the course of implementing groundwater monitoring required under the Corrective Action Consent Agreement, PG&E has documented an extensive plume of groundwater contaminated with hexavalent chromium that stretches from the PG&E facility under National Wildlife Refuge and BLM-managed property toward the Colorado River. On February 3, 2004, PG&E reported concentrations of hexavalent chromium of 111 parts per billion ("ppb") in groundwater taken

from monitoring well MW34-80. This monitoring well is located on BLM-managed property within 100 feet from the Colorado River.

Based on this finding, DTSC ordered PG&E to prepare and submit Interim Measures ("IM") Work Plan No. 2 "to immediately begin pumping, transport and disposal of groundwater from existing monitoring wells at the MW20 cluster." These monitoring wells located on or near the "MW20 bench" are on BLM-managed property. By Action Memorandum issued March 3, 2004, BLM authorized PG&E to conduct a time critical removal action, consistent with IM No. 2, to prevent or abate the release of hexavalent chromium into the Colorado River. The scope of this removal action was to extract contaminated groundwater from existing or, if necessary, new wells to reverse the groundwater gradient away from the Colorado River and maintain hydraulic control of the chromium-contaminated plume.

On May 20, 2004, BLM issued a second Action Memorandum authorizing PG&E to operate, for a limited period of time, a batch treatment system on the MW20 bench. The purpose of this time critical removal action was to reduce the volume of hazardous waste being shipped offsite by allowing treatment of contaminated groundwater onsite prior to offsite transport and disposal as non-hazardous waste.

III. THREATS TO PUBLIC HEALTH, OR WELFARE, OR THE ENVIRONMENT

As documented by recent groundwater sampling results, hexavalent chromium has been detected in significant concentrations in wells within 100 feet of the Colorado River. The proximity of the groundwater plume to the Colorado River constitutes an actual or potential threat to the environment.

To date, the rate of extraction of groundwater has succeeded in maintaining hydraulic control of the chromium plume. However, due to the influence of water levels in the Colorado River on groundwater gradient, increasing groundwater extraction rates is expected to be necessary to maintain hydraulic control of the chromium-contaminated plume. Specifically, during the period of lowest river levels from October 2004, through January 2005, extraction rates between 120-150 gallons per minute may be required to maintain such hydraulic control. Existing storage and treatment capacity on the MW20 bench is insufficient to satisfy these increased extraction rates.

Expansion of the existing facilities on the MW20 bench as the sole means of managing the maximum projected groundwater volume poses several concerns for public health and safety, and ease of implementation. Our review of the Potential Expansion of Facilities on the Monitoring Well 20 (MW20) Bench, submitted on September 17, 2004 shows that transporting the maximum projected volume of groundwater from the MW20 bench would require more than 40 trucks per day, increasing risks of transportation accidents and hazardous waste spills, adverse impacts on local roads and residents, and potential impacts on cultural and biological resources. Additional offsite treatment and disposal facilities that could accommodate the additional volume of hazardous waste on a 24 hours a day, seven days a week basis would be required. Such disposal facilities would be several hundred miles from the Topock site. For these reasons and others, expanding the MW20 bench facilities as the sole means of managing the volume of

extracted groundwater necessary to maintain hydraulic control of the chromium-contaminated plume is undesirable.

IV. ENDANGERMENT DETERMINATION

Actual or threatcned releases of hazardous substances through groundwater may continue to migrate toward the Colorado River and may reach the River if not addressed by implementing the time critical removal action described in this Action Memorandum. This time critical removal action is necessary to prevent or abate the release or substantial threat of release of hazardous substances into the Colorado River. Due to the proximity of the groundwater plume to the River, BLM determines, in accordance with Section 300.415(b)(2) of the National Oil and Hazardous Substances Contingency Plan ("National Contingency Plan" or "NCP"), 42 U.S.C. §300.415(b)(2), that a time critical response is necessary.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

As described specifically in the attached *Interim Measures No. 3 Work Plan, Revision 1* ("Work Plan"), which is incorporated herein, the proposed time critical removal action includes the following actions: (1) installation and utilization of piping from the MW20 bench to a proposed private treatment facility on Parcel 650-151-06; (2) installation and utilization of piping for conveyance of treated water from the proposed private treatment facility to proposed injection wells on Parcel 650-151-06; (3) any necessary improvements to existing access roads to install piping or remove waste materials from the proposed private treatment facility; (4) potential installation of monitoring wells to evaluate the effects on groundwater flow and chemistry due to injection of treated waste water; and (5) expansion of facilities on, and transportation from, the MW20 bench to accommodate, for a limited time period, the potential need to transport treated water and brine until more permanent disposal measures are in place. These activities, as identified in the attached Work Plan, are authorized by this Action Memorandum: provided, however, that prior to implementation all such activities are subject to BLM review and approval. Specifically, all such measures must comply with appropriate mitigation measures as identified by BLM in consultation with affected parties, to address impacts on cultural and biological resources and satisfy all applicable Federal requirements.

In particular, implementation of the activities identified in the Work Plan must comply with all mitigation measures identified in the *Cultural Resources Management Plan for the Topock Compressor Station Expanded Groundwater Extraction and Treatment System, San Bernardino County, California (September 2004)*, as specified by the Memorandum of Agreement executed on September 14, 2004, by BLM, and the California State Historic Preservation Officer regarding Interim Measures No. 3. Furthermore, implementation of the activities identified in the Work Plan must comply with all mitigation measures identified, and to be identified by BLM in the attached Lake Havasu Field Office Wildlife and Threatened or Endangered Species Stipulations, and in consultation with State agencies and the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act, 16 U.S.C. §1536.

Because such actions will be financed by PG&E, BLM has not determined the estimated costs to implement this time critical removal action.

VI. EXPECTED CHANGE IN SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

In the event this time critical response action is delayed or not taken, hazardous substances may be released, or there is a substantial threat of such release, into the Colorado River.

VII. OUTSTANDING POLICY ISSUES

BLM is coordinating this time critical removal action with work required of PG&E pursuant to the Corrective Action Consent Agreement issued by DTSC. This coordination of BLM CERCLA authorities and State RCRA authorities is intended to facilitate and streamline PG&E's performance of work necessary to protect the Colorado River. BLM must ensure, however, that such work is performed in a manner consistent with CERCLA, the NCP, and other applicable Federal requirements. In the event that Federal requirements are not satisfied through this coordination effort, BLM may be required to initiate, or require PG&E to perform, activities independent of State law.

VIII. ENFORCEMENT

BLM and DOI have determined that PG&E is a responsible party pursuant to Section 107 of CERCLA, 42 U.S.C. §9607. As defined by CERCLA, PG&E is the owner and operator of the PG&E facility from which hexavalent chromium has been released into the environment. Hexavalent chromium is a hazardous substance under CERCLA.

By letter dated February 12, 2004, DOI has notified PG&E of its potential liability under CERCLA and has requested that PG&E enter into an administrative order on consent ("AOC") by which PG&E would perform future response action and agree to reimburse DOI, BLM, and other DOI bureaus for response costs incurred in overseeing PG&E's performance of response action on Federal property. In the event that DOI is unable to reach an agreement with PG&E over the terms of this AOC, DOI may decide to take response action unilaterally, may initiate enforcement action or take any other measures necessary to direct or require PG&E to perform response action, and seek to recover all response costs incurred from PG&E.

IX. ADDITIONAL MITIGATION MEASURES

Further review of the proposal revealed that the Mitigation Measures in Section 7.0 of Interim Measures No. 3 Work Plan, Revision 1 need further revision. The attachment entitled Mitigation Measures, Lake Havasu Field Office replaces Section 7.0 of the Interim Measures No. 3 Workplan, Revision 1, in its entirety.

X. RECOMMENDATION

This decision document identifies the current proposed time critical removal action to prevent or abate releases of hexavalent chromium from the PG&E facility from migrating to the Colorado River. BLM has determined that PG&E is capable of performing this removal action in a manner consistent with the NCP, contingent on PG&E's full compliance with the requirements of this Action Memorandum including the attached Work Plan. Conditions at the site meet the criteria for undertaking the proposed time critical removal action, as specified by Section 300.415 (b)(2) of the NCP, 40 CFR §300.415(b)(2). We recommend your approval of the proposed time critical removal action.

Patricia A. Taylor
Acting Field Manager

9-17-04
Date

I Concur:

Wayne King
Acting District Manager

9/17/2004
Date

Elaine Y. Zielinski
Approval
State Director

9/17/04
Date

Disapproval
State Director

Date

Attachments:

Interim Measures No. 3 Work Plan, Revision 1
Memorandum of Agreement between BLM, Lake Havasu Field Office and California State Historic Preservation Officer
Mitigation Measures, Lake Havasu Field Office
Potential Expansion of Facilities on the Monitoring Well 20 (MW20) Bench

MITIGATION MEASURES

LAKE HAVASU FIELD OFFICE

1. All project activities shall be conducted in a manner that avoids take of a Federally listed species. Take is defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Should a listed species enter the project site or become harmed or killed by project activities, the project shall be shut down and the USFWS, BLM and CDFG shall be consulted. Impacts to habitat shall also be minimized to the maximum possible extent.

2. PG&E shall designate a field contact representative (FCR) who shall be responsible for overseeing compliance with the mitigation measures. The FCR must be onsite during all construction activities. The FCR shall have authority to halt all activities that are in violation of the mitigation measures and/or pose a danger to listed species. The FCR shall have a copy of all mitigation measures when work is being conducted on the site. The FCR may be a project manager, PG&E representative, or a biologist.

3. PG&E shall have a qualified biologist responsible for assisting crews in compliance with the mitigation measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist shall be implemented for special-status wildlife species in impact areas immediately prior to initiation of ground-disturbing activities. The inspection shall provide 100 percent coverage of the area within the project limits. All desert tortoise burrows and pallets outside of, but near, the project footprint shall be flagged at that time so that they may be avoided during work activities. At the conclusion of work activities, all flagging shall be removed.

4. Listed species including the desert tortoise shall not be handled or harassed. Encounters with a listed species shall be reported to the project biologist and BLM Lake Havasu (BLM) biologists. These biologists will maintain records of all listed species encountered during project activities. This information will include for each individual: the locations (narrative, vegetation type, and maps) and dates of observations; general conditions and health; any apparent injuries and state of healing; and diagnostic markings.

5. All PG&E employees and contractors involved with the proposed project shall be required to attend PG&E's threatened and endangered species education program prior to initiation of activities. New employees shall receive formal, approved training prior to working on-site.

6. To the maximum extent possible, facilities (treatment facility, pipelines, injection wells, and access routes) shall be sited within an existing right–of-way (ROW) and previously-disturbed or barren areas to limit new surface disturbance.

7. Existing routes of travel to and from the proposed project site shall be used. Cross-country use of vehicles and equipment shall be prohibited.

8. Trash and food items shall be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as common ravens (*Corvus corax*), coyotes (*Canis latrans*), and feral dogs.

9. To minimize effects, lights shall be angled toward the ground, reduced in intensity to levels compatible with safety concerns, and limited in duration of usage. The hue of lighting shall be that which is most compatible with and least disturbing to wildlife.

10. Employees shall not bring pets to the project site.

11. Firearms shall be prohibited from the project site, except as required for security employees.

12. Employees shall be required to check under their equipment or vehicle before it is moved. If a desert tortoise is encountered, the vehicle is not to be moved until the animal has voluntarily moved to a safe distance away from the parked vehicle.

13. Upon project completion, all unused material and equipment shall be removed from the site. This condition does not apply to fenced sites.

14. Palo verde, ocotillo, mesquite, cat-claw, smoke tree, and cacti species are considered sensitive by the BLM. To the extent practicable, these species shall be avoided. If avoidance is not possible, these species shall be transplanted when practical. Should any of the aforementioned plants be destroyed, they shall be replaced.

15. The area of disturbance shall be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors. As needed, work area boundaries shall be delineated with flagging or other marking to minimize surface disturbance associated with vehicle straying.

16. All activities shall be restricted to a pre-determined corridor. If unforeseen circumstances require project expansion, the potential expanded work areas shall be surveyed for listed species prior to use of the area. All appropriate mitigation measures shall be implemented within the expanded work areas based on the judgment of the agencies and the project biologist. Work outside of the original ROW shall proceed only after receiving written approval from the BLM, Fish and Wildlife Service (Service) and CDFG describing the exact location of the expansion.

17. PG&E has the option of erecting desert tortoise fencing in lieu of inspection of open trenches. If the trench is short, personnel may monitor the trench. All open holes and trenches shall be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum. During excavation of trenches or holes, earthen ramps shall be provided to facilitate the escape of any wildlife species that may inadvertently become entrapped. If desert tortoises are trapped, the project biologist shall be notified immediately. The desert tortoise shall be allowed to escape before work continues in that location. A final inspection of the open trench segment shall also be made immediately before back filling. All open pipe segments shall be covered when work activity is not occurring at the site.

18. All construction vehicles and equipment shall be periodically checked to ensure proper working condition and to ensure that there is no potential for fugitive emissions of oil, hydraulic fluid or other hazardous products. The BLM shall be informed of any hazardous spills.

19. Workers shall exercise caution when traveling to and from the project area. To minimize the likelihood for vehicle strikes of listed species, speed limits when commuting to project areas on ROW roads shall not exceed 20 miles per hour.

20. Intentional killing or collection of either plant or wildlife at construction sites and surrounding areas shall be prohibited. The BLM shall be notified of any such occurrences.

21. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E shall notify the BLM within 48 hours. As a part of this emergency response, the BLM may require specific measures to protect listed species. During cleanup and repair, the agencies may also require measures to recover damaged habitats.

22. Once the treatment facility is no longer needed, PG&E shall restore disturbed areas in a manner that will assist in the re-establishment of biological values within the disturbed ROW. Methods of such restoration shall include the reduction of erosion, re-spreading of the top two inches of soil, planting with appropriate native shrubs, and scattering of bladed vegetation and rocks across the ROW, depending upon the appropriateness or effectiveness in a given area.

23. Within 60 days of completion of construction activities, the FCR and biologist shall prepare a brief report for the BLM documenting the effectiveness and practicality of the mitigation measures and making recommendations for modifying the measures to enhance species protection. The report will also provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.

24. Any future construction during the nesting season for migratory birds, generally February to August for most birds, will require preconstruction surveys for nesting pairs, nests, and eggs. These preconstruction surveys shall occur in areas proposed for any vegetation removal and active nesting areas flagged. If nesting birds are detected, vegetation removal will be avoided during the nesting season. All construction activity within 200 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests.

25. All areas within the proposed action area, subject to operations and maintenance activities, and within the potential impact of the action shall be monitored semiannually during the active period for tortoise by a biologist knowledgeable of desert tortoise ecology. Surveys shall be completed throughout the duration of the action to verify the presence or absence of desert tortoise and reports shall be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.

26. Riparian areas surrounding the proposed action site and subject to influence of operations and maintenance activities shall be surveyed for southwestern willow flycatchers according to the protocol established by the Service. These surveys shall be completed each year by a biologist permitted by the Service to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports shall be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.

27. Upon locating an individual of a dead or injured listed species, PG&E shall make initial notification to the BLM and US Fish and Wildlife Service (Service) within three working days of its finding. The notification must be made in writing to the Service's Division of Law Enforcement in Torrance (370 Amapola Avenue, Suite 114, Torrance, California 90501;

(310) 328-1516) and by telephone and writing to the Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003; (805) 644-1766). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities shall be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the CDFG and the BLM shall be contacted for final disposition of the animal.

28. PG&E will immediately notify the BLM Lake Havasu Field Manager (or his designated representative) of any cultural resources (prehistoric/historic sites or objects) and/or paleontological resources (fossils) encountered during permitted operations and will maintain the integrity of such resources pending subsequent investigation. All operations in the immediate area of the discovery must be suspended until written authorization from BLM to proceed is issued. An evaluation of the discovery shall be made by a qualified archaeologist or paleontologist to determine appropriate actions to prevent the loss of significant cultural or scientifically-important paleontological values.

29. No permanent improvements that affect the integrity of the bridge/culvert over Bat Cave Wash on historic Route 66 will be implemented.

30. Actions that result in impacts to archaeological or historical resources are subject to the provisions of the Archaeological Resources Protection Act of 1979, as amended, and the Federal Land Policy and Management Act of 1976.

MEMORANDUM OF AGREEMENT
BETWEEN
THE BUREAU OF LAND MANAGEMENT, LAKE HAVASU FIELD OFFICE
AND
THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
THE PACIFIC GAS & ELECTRIC TOPOCK INTERIM MEASURES NO. 3, EXPANDED GROUNDWATER EXTRACTION AND TREATMENT PROJECT
SAN BERNARDINO COUNTY, CALIFORNIA

WHEREAS, Pacific Gas & Electric Company (PG&E) proposes to construct, operate and maintain in the area depicted as the "Area of Potential Effects" (APE) in Figure 1 of Attachment 1 to this Memorandum of Agreement (MOA), an expanded groundwater extraction and treatment system, called the Topock Interim Measures No. 3 Project (Project), in order to maintain hydrologic control of an area in which groundwater has been contaminated by Chromium VI to prevent Chromium-contaminated groundwater from impacting the Colorado River; and

WHEREAS, the U.S. Department of the Interior, Bureau of Land Management (BLM), Lake Havasu Field Office, proposes to issue an Action Memorandum under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Undertaking) authorizing PG&E to conduct that portion of the Project located on public lands, and will act as lead federal agency for all lands within the current and within any expanded APE of the Undertaking and the Project, regardless of ownership, for purposes of complying with Section 106 of the National Historic Preservation Act, as amended (NHPA) (16 U.S.C. 470f), and its implementing regulations codified at 36 CFR part 800; and

WHEREAS the BLM, in consultation with the California State Historic Preservation Office (SHPO), has determined that construction, operation, maintenance, and subsequent dismantling of the Project will have an adverse effect upon CA-SBr-2910H, a property determined eligible for inclusion in the National Register of Historic Places (NR) and upon CA-SBr-219, a property listed in the NR (historic properties), and notified the Advisory Council on Historic Preservation (ACHP) of the adverse effect finding in accordance with 36 CFR part 800, regulations effective January 11, 2001, implementing Section 106 of the NHPA; and

WHEREAS, PG&E will construct, operate, maintain, and ultimately dismantle the Project, implement the *Cultural Resources Management Plan for the Topock Compressor Station Expanded Groundwater Extraction and Treatment System, San Bernardino County, California* (Applied Earthworks, September 2004) (CRMP) that is Attachment 1 to this MOA, has participated in the consultation, and has been invited to concur in this MOA; and

WHEREAS, the BLM has consulted the Quechan Tribe-Fort Yuma, Ft. Mohave Indian Tribe, Cocopah Indian Tribe, Chemehuevi Indian Tribe, Havasupai Tribe, Hualapai Tribe, Yavapai-Prescott Indian Tribe, Twenty-Nine Palms Band of Mission Indians and Colorado River Indian Tribes (Tribes) regarding the Project and the Undertaking and their effect on historic properties, and will continue to consult with the Tribes throughout the implementation of this MOA and the CRMP;

NOW, THEREFORE, the BLM and the SHPO agree that the Project and the Undertaking shall be implemented in accordance with the following stipulations in order to take into account the effects of the Project and the Undertaking on historic properties, and further agree that these stipulations shall govern the Project and the Undertaking and all of their parts until this MOA expires or is terminated.

Stipulations

The BLM shall ensure that the following measures are carried out:

I. MANAGEMENT OF HISTORIC PROPERTIES AND CULTURAL RESOURCES

A. The BLM shall ensure that known historic properties and other cultural resources, whether known or unknown that may be subsequently identified, within the current APE and within any expanded APE, are managed in accordance with the CRMP. Unsurveyed portions of the current APE and any expanded APE shall be surveyed and inventoried as prescribed in the CRMP.

B. Notwithstanding the current provisions of section 1.3, page 4, of the CRMP, the parties to this MOA agree that copies of survey and evaluation reports and of annual reports will routinely be submitted to the SHPO.

C. The parties to this MOA agree that the effects and any prospective effects of the Project and of the Undertaking on historic properties and cultural resources subject to this MOA shall be resolved by satisfactory implementation and completion of the measures prescribed in the CRMP or in any amendments thereto agreed upon pursuant to stipulation II.C.2., below.

II. ADMINISTRATIVE PROVISIONS

A. **Confidentiality.** The parties to this MOA acknowledge that historic properties and cultural resources covered by this MOA are subject to the provision of § 304 of the National Historic Preservation Act of 1966 and § 6254.10 of the California Government Code (Public Records Act), relating to the disclosure of archaeological site information and, having so acknowledged, will ensure that all actions and documentation prescribed by this MOA are consistent with § 304 of the NHPA and § 6254.10 of the California Government Code.

B. Resolving Objections.

1. Should any party to this MOA object to the manner in which the terms of this MOA are implemented, to any action carried out or proposed with respect to implementation of the MOA (other than the Project and the Undertaking itself) or to any documentation prepared in accordance with and subject to the terms of this MOA, the BLM shall immediately notify the other parties to this MOA of the objection and consult with the objecting party and the other parties to this MOA for no more than fourteen (14) days to resolve the objection. The BLM shall reasonably determine when this consultation will commence. If the objection is resolved through such consultation, the action in dispute may proceed in accordance with the terms of that resolution. If, after initiating such consultation, the BLM determines that the objection cannot be resolved through consultation, the BLM shall forward all documentation relevant to the objection to the ACHP, including the BLM's proposed response to the objection, with the expectation that the ACHP will within thirty (30) days after receipt of such documentation:

   a. advise the BLM that the ACHP concurs in the BLM's proposed response to the objection, whereupon the BLM will respond to the objection accordingly; or

   b. provide the BLM with recommendations, which the BLM will take into account in reaching a final decision regarding its response to the objection; or

   c. notify the BLM that the objection will be referred for comment pursuant to 36 CFR § 800.7(c), and proceed to refer the objection and comment. The BLM shall take the resulting comment into account in accordance with 36 CFR § 800.7(c)(4) and Section 110(1) of the NHPA.

2. Should the ACHP not exercise one of the above options within thirty (30) days after receipt of all pertinent documentation, the BLM may assume the ACHP's concurrence in its proposed response to the objection.

3. The BLM shall take into account any ACHP recommendation or comment provided in accordance with this stipulation with reference only to the subject of the objection. The BLM's responsibility to carry out all actions under this MOA that are not the subjects of the objection will remain unchanged.

4. At any time during implementation of the measures stipulated in this MOA, should an objection pertaining to such implementation be raised by a Tribe, the BLM shall notify the other parties to the MOA in writing of the objection and take the objection into consideration. The BLM shall consult with the objecting party and, if the objecting party so requests, with the other parties to this MOA for no more than fifteen (15) days. Within ten (10) days following closure of this consultation period, the BLM will render a decision regarding the objection and notify all consulting parties hereunder of its decision in writing. In reaching its decision, the BLM will take into account any comments from the consulting parties and the

objecting party regarding the objection. The BLM's decision regarding the resolution of the objection will be final.

5. The BLM shall provide all parties to this MOA, and the ACHP when ACHP comments have been issued hereunder, and any parties that have objected pursuant to paragraph 4. of section B. of this stipulation, with a copy of its final written decision regarding any objection addressed pursuant to this stipulation.

6. The BLM may authorize any action subject to objection under this stipulation to proceed after the objection has been resolved in accordance with the terms of this stipulation.

7. Notwithstanding any provision of stipulation II.B., the Project and the Undertaking may proceed without interruption during the resolution of any objections under this MOA. Following resolution of any objection, the BLM shall ensure that measures required by such resolution are carried out.

C. Amendments.

1. Any party to this MOA may propose that this MOA be amended, whereupon the parties to this MOA will consult for no more than fifteen (15) days to consider such amendment. The amendment process shall comply with 36 CFR §§ 800.6(c)(1) and 800.6(c)(7). This MOA may be amended only upon the written agreement of the signatory parties. If it is not amended, this MOA may be terminated by either signatory party in accordance with Stipulation II.D., below.

2. Attachment 1 (CRMP, including Appendices) to this MOA may be amended through consultation among the parties to this MOA without amending the MOA proper.

D. Termination.

1. If this MOA is not amended as provided for in section C.1. of this stipulation, or if either signatory party proposes termination of this MOA for other reasons, the signatory party proposing termination shall, in writing, notify the other parties to this MOA, explain the reasons for proposing termination, and consult with the other parties for at least thirty (30) days to seek alternatives to termination. Such consultation shall not be required if the BLM proposes termination because the Undertaking no longer meets the definition set forth in 36 CFR § 800.16(y).

2. Should such consultation result in an agreement on an alternative to termination, then the consulting parties hereunder shall proceed in accordance with the terms of that agreement.

3. Should such consultation fail, the signatory party proposing termination may terminate this MOA by promptly notifying the other parties to this MOA in writing. Termination hereunder shall render this MOA without further force or effect.

4. If this MOA is terminated hereunder and if the BLM determines that the Undertaking and the Project authorized by the Undertaking will nonetheless proceed, then the BLM shall either consult in accordance with 36 CFR § 800.6 to develop a new MOA or request the comments of the ACHP pursuant to 36 CFR Part 800.

E. Duration of the MOA.

1. Unless terminated pursuant to section D. of this stipulation, or unless it is superseded by an amended MOA, this MOA will be in effect following execution by the signatory parties until the BLM, in consultation with the other parties to this MOA, determines that all of its stipulations have been satisfactorily fulfilled. Upon a determination by the BLM that all of the terms of this MOA have been satisfactorily fulfilled, this MOA will terminate and have no further force or effect. The BLM will promptly provide the other parties to the MOA with written notice of its determination and of the termination of this MOA. Following provision of such notice, this MOA will have no further force or effect.

2. The terms of this MOA shall be satisfactorily fulfilled within ten (10) years following the date of execution by the SHPO. If the BLM determines that this requirement cannot be met, the parties to this MOA will consult to reconsider its terms. Reconsideration may include continuation of the MOA as originally executed, amendment, or termination. In the event of termination, the BLM will comply with section D.4 of this stipulation if it determines that the Undertaking and the Project authorized by the Undertaking will proceed notwithstanding termination of this MOA.

3. If the Undertaking has not been implemented within ten (10) years following execution of this MOA by the SHPO, this MOA shall automatically terminate and have no further force or effect. In such event, the BLM shall notify the other parties to this MOA in writing and, if it chooses to continue with the Undertaking and the Project authorized by the Undertaking, shall reinitiate review of the Undertaking and the Project in accordance with 36 CFR Part 800.

F. Effective Date of this MOA. This MOA will take effect on the date that it has been executed by the BLM and the SHPO.

EXECUTION of this MOA by the BLM and the SHPO, its transmittal by the BLM to the ACHP in accordance with 36 CFR § 800.6(b)(1)(iv), and subsequent implementation of its terms, shall evidence, pursuant to 36 CFR § 800.6(c), that this MOA is an agreement with the ACHP for purposes of Section 110(1) of the NHPA, and shall further evidence that the BLM has afforded the ACHP an opportunity to comment on the Undertaking and the Project and their effects on historic properties, and that the BLM has taken into account the effects of the Undertaking and the Project on historic properties.

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LAKE HAVASU CITY, AZ

SIGNATORY PARTIES:

BUREAU OF LAND MANAGEMENT,
LAKE HAVASU FIELD OFFICE

By: Patricia L. Taylor Date: 9-14-04

Title: Acting Field Manager

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

By: [illegible] wayne donaldson Date: 14 SEP 2004

Title: State Historic Preservation Officer

CONCURRING PARTY:

PACIFIC GAS & ELECTRIC COMPANY

By: Robert C. Doss Date: Sept. 14, 2004

Title: Principal Engineer, Environmental Affairs

United States Department of the Interior

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To Terri Herson	From Yvonne Meeks
Co.	Co.
Dept.	Phone # 805-234-2254
Fax # 310 622-9697	Fax #

Share with John G.

In reply refer to:

8100 (330)

October 14, 2004

Yvonne Meeks
Portfolio Manager – Site Remediation
Pacific Gas & Electric Company
4325 South Higuera Street
San Luis Obispo, CA 93401

Dear Ms. Meeks:

This letter is in response to your October 6, 2004, electronic mail request. You requested authorization for access to PG&E property from the west (Park Moabi Road) across Historic Route 66, and submitted the biological review of this additional area outside of the Area of Potential Effect (APE). A determination has been made that the use of the road will have no effect on the Desert tortoise.

Based on your transmittal, the proposed request for approved of construction and operational use of the western access road is approved only after installation of geotextile fabric and a minimum of five (5) inches of aggregate ("protective blanket") on top of the existing Historic Route 66, in compliance with the Cultural Resources Management Plan and Transportation Management Plan. The western access road may be used strictly for emergency ingress and egress until PG&E installs the "protective blanket".

You are hereby authorized to initiate the installation of the protective blanket on Historic Route 66 from Park Moabi Road intersection with Historic Route 66 in the west to the Treatment facility. Use of heavy equipment will be restricted to the equipment necessary for the construction of the protective blanket. No widening or realignment of the Historic Route 66 is allowed.] *

Following installation of the 'protective blanket', the western access road will provide secondary access, in compliance with the requirements of the San Bernardino County Fire Department's emergency access provisions, and for construction and operation use as identified in your letter. We understand that your primary access will continue to be from the eastern access road. Use of any other access route is subject to additional review and approval by the Bureau of Land Management.

You must also comply with the mitigation measures attached to Action Memorandum Number 3, dated September 17, 2004, which authorized Interim Measures No. 3 Work Plan, Revision 1.

If you have questions, contact Project Manager Cathy Wolff-White at (928) 505-1309 or Archaeologist Sally Murray at (928) 505-1238.

Sincerely,

Patricia A. Taylor

Patricia A. Taylor
Acting Field Manager

BLM Fax Cover Sheet

Bureau of Land Management
Lake Havasu Field Office
2610 Sweetwater Avenue · Lake Havasu City, Arizona 86406
Phone (928) 505-1200 · *Fax* (928) 505-1280
Toll Free 1-888-213-2582 · *Website:* lakehavasu.az.blm.gov

Number of Pages 3
(Including this cover sheet)

Date 2/25/05

Deliver To Teri Herson

Office CH2M Hill

Phone ( ) _____ **Fax** (510) 622-9097

Sender Cat White **Phone** (928) 505-1309

Notes/Comments:

Letter is in the mail

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Lake Havasu Field Office
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406-9071

In reply refer to:
CAAZCA 43660 (330)

Yvonne Meeks
Portfolio Manager – Site Remediation
Pacific Gas & Electric Company
4325 South Higuera Street
San Luis Obispo, CA 93401

Dear Ms. Meeks:

This letter is in response to your request dated February 23, 2005 for the Bureau of Land Management (BLM) review of well installation and construction activities on BLM Managed Land. You requested the following:

1. Field Activity Summary for Supplemental Interim Measures No. 2, Well Installation on BLM-Managed Land. These wells are included under Action Memo No. 2 previously approved by the BLM. BLM has reviewed and will approve the drilling of the following monitoring and extraction wells: PE-1, PE-1A and PE-1B. Previous surveys by BLM personnel have identified this location as an area of concern because of possible southwestern willow flycatcher habitat. All drilling must be completed prior to March 15, 2005 because of this concern.

You must continue to comply with the mitigation measures attached to Action Memorandum No. 3, dated September 17, 2004, which authorized Interim Measures No. 3 Work Plan, Revision 1 and Action Memorandum No 2, dated March 3, 2004. Additional special conditions of approval are attached to this letter and should be considered a compliance requirement.

If you have questions, contact Project Manager Cathy Wolff-White at (928) 505-1309 or Archaeologist Sally Murray at (928) 505-1238.

Sincerely,

Robert M. Henderson
Acting Field Manager

SPECIAL CONDITIONS OF APPROVAL

1. All drilling activities will be completed prior to March 15. Completing drilling activities by this date should minimize impacts to wildlife and any local/transient Threatened or Endangered Species that could potentially occur within the project area.

2. Only trimming and minor vegetation removal shall occur to allow access by drilling equipment. A biologist knowledgeable with southwestern flora and fauna will conduct a pre-construction survey and will be present during vegetation removal to identify native tree species.

3. All native tree species shall be avoided if possible. In the event that native trees cannot be avoided, those trees will be transplanted to a nearby location approved by the on-site biologist.

4. Disturbance will be kept to a minimum while conducting monitoring studies in the floodplain.

5. A summary biological report will be submitted within 30 days of completion of Phase 2 Interim Measures No. 2. This report will consist of records for all wildlife sightings by on-site biologists during construction. A list of all vegetation removed and transplanted shall also be provided within the report. Photographs of all well locations prior to and after installation will also be provided for BLM review.

6. Staging for these three wells will be at the MW35 well location, immediately upon completion of the drilling phase all cutting bins will be relocated to the MW20 Bench or onto PG&E properties.

Appendix C5:
IM No. 3 Land Use Analysis Memo

Interim Measures No. 3, Land Area Use

DATE: July 8, 2005

Introduction

Ongoing Topock cleanup activities include construction of a groundwater treatment system under the direction of the California Department of Toxic Substances Control (DTSC) as part of Interim Measure No. 3 (IM-3). In response to a request from tribal representatives, DTSC has asked Pacific Gas and Electric (PG&E) to estimate the area of land that has already or will be used in some manner[1] during construction of the groundwater treatment plant and associated pipelines, roadways, and wells. This memorandum provides an updated summary of the ground use associated with IM-3, including the analysis methodology and assumptions. [2]

Construction of IM-3 facilities commenced in late September 2004, and startup of operations is anticipated to begin no sooner than July 16, 2005, pending approvals by the county, state and federal regulatory agencies. Approval of IM-3 by the Bureau of Land Management (BLM) and DTSC was subject to conditions provided in separate biological and cultural resource assessments of IM-3 activities. In conformance with these conditions, pre-construction surveys of all areas subject to use during construction of IM-3 facilities were conducted. Under the terms of the BLM approval, all construction work was conducted in areas where significant cultural or biological resources are not present. In addition, appropriate physical barriers were placed and construction activities were continuously monitored by qualified professional staff to insure the protection of nearby cultural and biological resources.

Methods Used to Measure Used Area

To assess the area of use associated with IM-3, a survey using Global Positioning System (GPS) technology was conducted to delineate the sub-areas subject to ground-use construction activities. Such activities include grading associated with the IM-3 treatment plant, staging area, injection wells, conveyance piping, monitoring wells, and access roads.

Various past activities have resulted in significant previous disturbance of the area where the IM-3 construction is occurring. The area is traversed by a major railway line, several gas pipelines, historic U.S. Route 66, and the National Old Trails Highway. Portions of the area were disturbed by a former gravel quarry, roadside debris piles, World War II era military training exercises, and a former roadhouse/restaurant adjacent to the IM-3 project site boundary. During design of the IM-3 facilities, much care was taken to utilize these previously disturbed areas wherever possible. Trenching was routed along existing roadways and pipeline right of ways. The treatment plant and staging area were located in

---

[1] The significance of the term "use" for IM-3 means only that some activity has taken place over such land. It does NOT signify that any land has been harmed or that any other adverse effects on the land have occurred as a result of the activity.

[2] This memorandum was originally submitted on February 7, 2005. The updated summary of the ground use associated with IM-3 has been updated to reflect conditions at completion of construction in July 2005.

the area previously disturbed by gravel quarrying during the construction of the former U.S. Route 66 highway. To minimize disturbance of that historic roadway pursuant to the requirements of BLM, above-ground piping was installed to convey treated water from the treatment plant to the injection wells. As further protection of that resource, a fabric and gravel blanket was placed over the historic roadway – this blanket is not included as IM-3 construction use because it is mitigation and because the blanket is removable. In calculating the areas used by the IM-3 construction, previously disturbed ground was distinguished from ground that did not appear to be significantly disturbed previously.[3]

Data collected during the GPS survey data was imported into the geographic information system (GIS) maintained for the IM-3 project. Polygons were defined for each sub-area used as a result of IM-3 construction activities. In addition, polygons were defined for those areas determined to be previously disturbed. The acreage of each of the polygons was determined, and the total (net) area of use resulting from IM-3 was calculated by subtracting the previously disturbed acreage from the gross acreage used during IM-3 construction.

The assessment of IM-3 ground use also includes an estimate of use associated with IM-3 compliance monitoring wells. Four compliance monitoring wells were installed in the vicinity of the eastern injection well field. Access routes were provided to three of the four compliance monitoring wells. These are not constructed roadways, but rather just tracks of vehicles driving over the ground surface, but are included as "used area". In addition, the area used for installation of a potential extraction well (PE-1) was calculated and included.

The attached table summarizes the total area of use related to IM-3. Sub-totals are provided for each sub-area associated with IM-3 (e.g., treatment plant site, staging area, injection well areas, etc.). The summary table provides sub-totals for private (PG&E) and public (BLM) lands to reflect land ownership. The total area used includes all areas used by the construction activities, regardless of the prior condition of the ground. Also shown in the table is the area of ground that did not appear to be significantly disturbed previously and which was used by the construction activities.

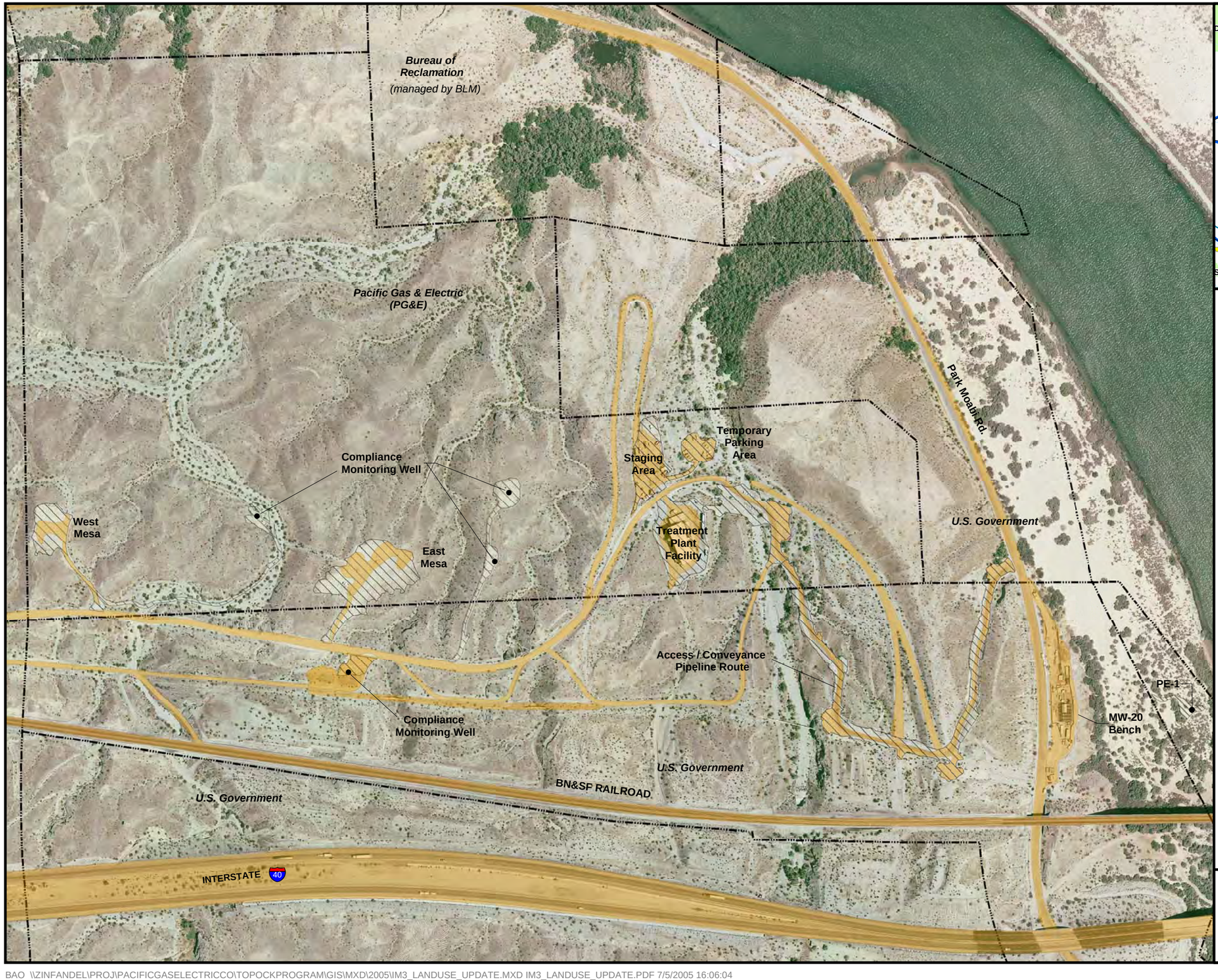
Conclusion

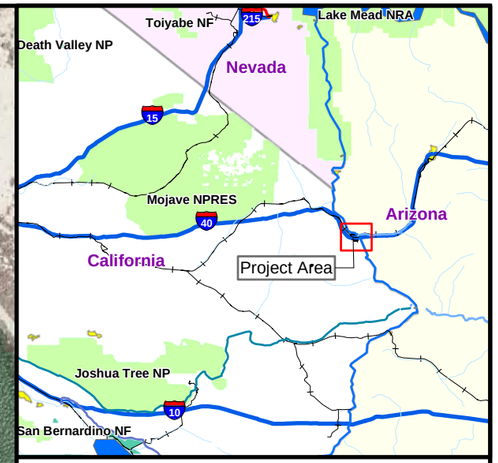
The total area of use resulting from construction of the IM-3 facilities is approximately 8.0 acres. Of these 8.0 acres, approximately 3.9 acres are on ground that was previously significantly disturbed. Thus, the net area of ground which was used, and which did not appear to be significantly disturbed previously, is about 4.1 acres. Approximately 1.2 acre of such area is located on public (BLM) land and 2.9 acres are located on private (PG&E) land.

[3] Land that did not appear to be previously disturbed may, in fact, have been significantly disturbed in the past, prior to the construction of IM-3.

GROUND USE ASSOCIATED WITH IM-3					
IM-3 Sub-Area	**Public Land**		**Private Land**		**Total Public & Private Land**
	Total Area Used by IM-3 (acres)	Previously Undisturbed Ground[1] Used by IM-3 (acres)	Total Area Used by IM-3 (acres)	Previously Undisturbed Ground[1] Used by IM-3 (acres)	Previously Undisturbed Ground Used by IM-3 (acres)
West Mesa	NA	NA	0.57	0.33	0.33
East Mesa	0.15	0.11	1.28	0.84	0.95
Staging Area	NA	NA	0.95	0.16	0.16
Treatment Facility	NA	NA	1.11	0.38	0.38
Pipeline Trench[2]	1.91	0.84	0.89	0.51	1.35
Compliance Monitoring Wells and PE-1	0.37	0.22	0.72	0.72	0.94
Total	**2.43**	**1.17**	**5.52**	**2.94**	**4.11**

Notes:
NA – Not Applicable
1 – Does not include acreage affected by prior ground-disturbing activities unrelated to IM-3 (e.g., roadways, pipelines, etc.). Land noted as being “previously undisturbed” did not appear to be significantly disturbed at the time of the construction of IM-3, but, in fact, may have been subject to prior disturbance.
2 – The acreage calculation for the pipeline trench includes the area used during improvement of the eastern access road.





N

0 175 350 700 Feet

1 inch equals 350 feet

LEGEND

- Property Boundaries
- Previously Disturbed Area
- Area Used* for IM-3

*The significance of the term "use" for IM-3 means only that some activity has taken place over such land. It does NOT signify that any land has been harmed or that any other adverse effects on the land have occurred as a result of the activity.

Sources: San Bernardino County Assessor, Parcel quest, State Board of Equalization, Pacific Gas and Electric Company, and Plat maps provided by BLM.

TOPOCK IM3 PROJECT
LAND USE MAP
JULY 2005

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Appendix C6:
IM No. 3 Biological Investigation

Final

Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino County, California

Prepared for

Pacific Gas & Electric Company

September 2004

Prepared by

CH2MHILL

155 Grand Avenue, Suite 1000

Oakland, California 94612

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Acronyms and Abbreviations

BLM	Bureau of Land Management
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CWA	Clean Water Act
DTSC	California Department of Toxic Substances Control
FESA	Federal Endangered Species Act
HCP	Habitat Conservation Plan
msl	mean sea level
MWD	Metropolitan Water District of Southern California
NEPA	National Environmental Policy Act
PG&E	Pacific Gas and Electric
PRC	Public Resources Code
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). In a letter dated June 30, 2004, DTSC directed PG&E to implement Interim Measures Number 3 (IM No. 3) to expand existing groundwater extraction and management facilities to address hydraulic control of the chromium plume at the Topock site. The IM No. 3 project requires PG&E to conduct additional groundwater investigations for further plume delineation, to characterize groundwater conditions for the design of IM No. 3 facilities, and to proceed with the design and installation of the piping and conveyance of extracted water to a treatment system, the treatment of extracted groundwater using reduction-precipitation-filtration and reverse osmosis, and management of treated water.

Pursuant to Section IV.A. of the Corrective Action Consent Agreement (CACA) between DTSC and PG&E (DTSC 1996), DTSC determined that immediate action is required to continue to prevent and/or mitigate potential impacts to the Colorado River. Recognizing the time-critical nature of its directive, DTSC prepared a California Environmental Quality Act Notice of Exemption pursuant to §21080(b)(4) of the Public Resources Code for the IM No. 3 project. As noted in the NOE signed by DTSC on June 30, 2004, "these project activities are necessary to prevent or mitigate an emergency situation wherein the waters of the Colorado River may be impacted with a hazardous constituent, chromium which is in contaminated groundwater in close proximity to the river. Immediate action is necessary to contain and reverse the flow of groundwater away from the Colorado River. Commencement of the development of additional extraction, treatment and treated water disposal capacity is urgent to assure that increased pumping rates will be available to respond to impending fluctuations in the Colorado River level."

By two Action Memoranda issued pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. §§9601 et seq., and dated March 3, 2004 and May 20, 2004, the Arizona State Director, United States Bureau of Land Management (BLM), authorized PG&E to conduct a time-critical removal actions to prevent or abate the release of hexavalent chromium into the Colorado River, and to reduce the volume of hazardous waste transported off site from the MW-20 cluster, respectively.

1.1 Project Background

In February 1996, PG&E and DTSC entered into a CACA pursuant to Section 25187 of the California Health and Safety Code. Under the terms of the CACA, PG&E was directed to conduct a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and to implement corrective measures to address constituents of concern released in the Bat Cave Wash Area near the PG&E Topock Compressor Station. The primary constituents of concern at Topock are hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]. The source was Cr(VI) salts used historically as a corrosion inhibitor in the station's cooling towers. DTSC is the lead administering agency for the project.

PG&E is currently proceeding with the corrective measures process by which a long-term remedy for the site will be selected under State law. PG&E submitted the Corrective Measures Study (CMS) work plan in December 2002, pursuant to the RCRA corrective action process and in accordance with the DTSC CACA. The DTSC approved the CMS work plan in June 2003. Beginning in August 2003, DTSC and PG&E began working in a collaborative process with affected and interested agencies through the Topock Consultative Work Group (CWG), constituted under California's site designation process. CWG members include:

- DTSC
- Colorado River Basin Regional Water Quality Control Board (CRBRWQCB)
- United States Fish and Wildlife Service
- Bureau of Land Management
- Representatives from local Indian Tribes
- United States Bureau of Reclamation
- Metropolitan Water District of Southern California (MWD)
- United States Geological Survey

Concurrently with the CMS, and in compliance with the DTSC directive of February 9, 2004 (to implement actions referred to as Interim Measures No. 2), PG&E commenced pumping, transport, and disposal of groundwater from existing wells at the MW-20 cluster. The Interim Measures No. 2 (IM No. 2) is part of the overall corrective measures process for the site. It is a step in establishing a long-term approach for site remediation. The IM, proposed additional measures, and the results of the groundwater investigation will be integrated into the long-term corrective measure for the site.

DTSC has determined that the objective of the IM is defined as follows:

> ***Initiate hydraulic control of the plume boundaries near the Colorado River to achieve a net reversal of gradient away from the Colorado River.***

In March 2004, PG&E began extracting groundwater at the MW-20 bench location, on property owned by the United States Bureau of Reclamation (BOR) and managed by the BLM. At the direction of DTSC and upon approval of BLM, PG&E installed two extraction wells on the MW-20 bench and is currently pumping at rate of approximately 20 gallons per minute from this location (Well TW-2D).

These measures have contributed to the prevention of groundwater containing chromium from reaching the Colorado River. However, due to the influence of the Colorado River stage on groundwater levels (as described below), extracting groundwater at higher rates is likely to be needed to maintain the stated goal of hydraulic control.

The daily fluctuations in river stage cause the surface water-groundwater interaction at this site to be dynamic. As the river levels begin to decline, the pumping rate must increase to overcome the natural tendency of the groundwater to flow toward the river. Space, limitations and constraints on treatment and disposal alternatives make necessary the installation of additional facilities to extract, treat, and manage the significantly higher groundwater flows required to maintain hydraulic control of the plume near the Colorado River. Treatment facilities will be built on MWD property (San Bernardino County

Assessor's Parcel No. 650-151-06), which PG&E is in the final stages of purchasing from MWD. (MWD is providing PG&E with access to undertake required work in the property prior to the formal transfer of title of the property.)

1.2 Regional Environmental Setting

The proposed project site is located near the town of Topock, Arizona, a community situated halfway between Laughlin, Nevada and Lake Havasu City, Arizona. Agriculture and public lands along the surrounding landscape dominate the area. Access to the project site is via I-40 that links Barstow, California and Topock, Arizona. The project site is bordered to the east by the Colorado River, to the north by Historic Route 66, to the south by the railroad tracks and I-40, and Sacramento Mountains to the west. Topography is abrupt, rising from around 450 feet above mean sea level (msl) at the Colorado River to over 1,200 feet above msl within 1 mile to the south and southwest. Slopes encountered west of the river reflect a series of ancient river terraces.

1.3 Project Location

The MWD parcel is located approximately 15 miles to the southeast of the City of Needles along Interstate 40 and 0.25 mile northwest of the PG&E Topock Compressor Station in the easternmost portion of San Bernardino County, California. The site includes the approximately 100-acre MWD property (San Bernardino County Assessor's Parcel No. 650-151-06) as well as areas to the south and west managed by the BLM. The MWD parcel is surrounded by land that is owned and managed by a number of federal and regional agencies including the BLM, United States Fish and Wildlife Service (USFWS), BOR, and areas under the jurisdiction of San Bernardino County. The project area can be identified on the Topock and Whale Mountain United States Geological Survey (USGS) Quadrangle Topographic Map. Figure 1 in Appendix A depicts the general vicinity of the proposed project site.

2.0 Project Description

The project description is divided into three sections - previously authorized activities, activities currently seeking authorization under Action Memorandum 3, and activities that may need authorization at a future date. The project consists of several elements including well installation, piping and conveyance, treatment facilities, and management of the treated water. The treatment facility will be a closed system. Therefore, untreated water will not be exposed to the environment that may potentially impact wildlife. Treatment facilities will be built on MWD property, which PG&E is in the final stages of purchasing from MWD. Immediate planning and permitting followed by construction of the proposed activity allows for handling the necessary increased extraction rates. PG&E is planning and designing these project facilities to extract and treat approximately 135 gallons per minute by fall 2004.

Access to the site is available from the Park Moabi Road interchange with Interstate 40. Internal portions of the project site may be accessed from the west at the intersection of Park Moabi Road and old Route 66; access from the east is provided from Park Moabi Road and the proposed pipeline access roads.

The final project layout and components may include some minor additions and/or modifications to the conceptual design summarized below. Each project element is described in the following sections. Figure 2 in Appendix A depicts the conceptual project site plan.

2.1 Drilling and Investigation Activities

2.1.1 Previously Authorized Activities

The IM No. 3 project will include drilling and well installation on BLM-managed property. Activities include the installation of new extraction wells to support the existing pumping operations, and monitoring wells for further characterization of chromium concentrations in groundwater. BLM has authorized this activity under a previous Action Memorandum, dated March 3, 2004. The siting, installation and pumping of these potential wells will be subject to review and approval by BLM, USFWS, and DTSC.

Currently, one existing extraction well (TW-2D) is being pumped to extract contaminated groundwater. Two wells (of the seven additional well locations previously authorized by Action Memorandum) are planned initially to supplement pumping from extraction well TW-2D. Both of these wells (PE-1 and PE-2) are in the western portion of the site (Figure 2).

The proposed well installations would result in negligible impacts to the surface environment. Submersible pumps would be placed down-hole, and subsurface concrete vaults equipped with instrumentation, valves, and other pipe appurtenances would complete the well head construction. Underground piping and electrical conduits would be connected to the well heads to convey water and provide power.

Groundwater monitoring wells on BLM-managed property to be installed for further characterization of chromium concentrations in groundwater are not addressed in this work plan as BLM has authorized this activity by previous Action Memorandum.

2.1.2 Activities Requiring Authorization under Time Critical Action Memorandum No. 3

Other drilling, well installation, and testing activities on BLM-managed property to be conducted as part of the IM No. 3 and subject to a new Action Memorandum are described below.

At the direction of DTSC, PG&E submitted a separate work plan on July 19, 2004 to summarize the drilling activities on Parcel 650-151-06 (Conceptual Work Plan for Hydrogeologic Characterization and Well Installation on Parcel 650-151-06). These field activities, in support of IM No. 3, involve drilling potential injection wells and conducting hydrogeologic testing. Data collected will be used to evaluate injection into the aquifer as a discharge option to manage the treated water. The conceptual plan includes the drilling and installation of up to ten injection wells and eight observation/monitoring well clusters (to assess water levels) to be installed on Parcel 650-151-06. The approximate locations of the injection well fields are shown in Figure 2. Because the proposed injection fields are close to BLM property, it is possible that PG&E may be required to drill observation wells on BLM land in the vicinity of the injection well system to collect additional data and to monitor changes in water levels. DTSC may make a determination in September as to the need for additional drilling to support the siting of facilities for the IM. The siting, installation and pumping of these potential wells on BLM property will be subject to review and approval by BLM and DTSC.

The wells will be drilled and installed using mud-rotary drilling methods. Equipment needed for mud-rotary drilling typically includes a large drilling rig, a pipe truck, a water truck, a mud screen/shaker table, and two or more large bins or tanks for cuttings and waste drilling mud. A support/water truck and smaller four-wheel-drive trucks will be used for crew and equipment and material transfer to the drilling sites. Short-term material storage at the sites will be necessary to accommodate the drilling operations. Materials to be temporarily stored at the well sites include drilling equipment and well construction materials (casing, sand, bentonite, cement grout, etc.) and a lined steel roll-off soil bin for cuttings generated from drilling.

Drill cuttings may potentially contain chromium, although during previous drilling operations at the Topock site these materials had non-detectable concentrations of chromium. The cuttings will be contained in lined roll-off bins at the drill sites during the drilling and sampling activities. After sampling and characterization, all cuttings bins will be removed from the drill sites for ultimate disposition by PG&E. The cuttings will be screened for chromium, the main chemical of concern for the site, as appropriate. If the cuttings are characterized as a hazardous waste, they will be transported off site for disposal at a permitted hazardous waste disposal facility. It is estimated that the soil investigation-derived waste bins temporarily staged on BLM property will not exceed 45 days.

Water generated during well drilling and development activity will be contained in storage tanks on the drilling support truck and transferred to storage tanks in PG&E's operations area for characterization, treatment, or disposal at a permitted waste disposal facility.

Incidental trash (empty paper and plastic bags, cardboard boxes, wooden pallets, and miscellaneous debris) will be collected at the end of each drilling shift and hauled off the drill site to an appropriate disposal facility. Personal protective equipment and disposable sampling equipment designated as non-hazardous waste will be double-bagged and disposed of in dumpsters at the station. In the unlikely event that such equipment is designated as hazardous waste, it will be disposed of at a permitted facility in compliance with hazardous waste regulatory requirements.

2.1.3 Potential Activities to Support IM No. 3 That May Require Future Authorization

Additional sampling or characterization may be conducted, as directed by DTSC. These measures may include additional data collection to support evaluation of remedial technologies, including the potential installation of a slurry wall and/or the use of *in-situ* treatment techniques to augment remediation activity.

In-situ treatment techniques have the potential to enhance the effectiveness of existing and planned groundwater extraction and above-ground treatment by providing additional treatment in the subsurface. *In-situ* field pilot testing at existing and/or new wells on land managed by BLM will be considered by DTSC. *In-situ* pilot testing is proposed to obtain information for design of future supplemental remediation measures. PG&E will describe the methodology and location of the *in situ* pilot test wells and piping in a future work plan, and such activities will be subject to approval by DTSC and BLM for those wells located on BLM-managed land. Figure 1 shows the proposed location for the potential *in-situ* testing wells.

Also, in furtherance of the site conceptual model, a seismic evaluation in the floodplain may be necessary to supplement the drilling activities, and to obtain additional data to evaluate the potential feasibility of additional remediation approaches, including the potential installation of a barrier wall. DTSC has recommended that PG&E undertake a seismic refraction survey over the Colorado River, involving water-borne transducer technology, and thereby avoiding physical impacts to the floodplain. A water-borne survey could provide valuable information to complete the conceptual site model of the area beneath the river, and thereby complementing the data collected on land. It is not anticipated that the water-borne survey requires BLM authorization. However, contingent upon the results of a seismic refraction survey over the Colorado River, another investigation may be required by DTSC on the floodplain if additional geophysical and geotechnical evaluations are necessary to define the floodplain's subsurface. This may include the installation of test borings. PG&E would describe the details of such a scope of work, if required by DTSC, in a future submittal to BLM.

2.2 Piping and Conveyance System

2.2.1 Previously Authorized Activities

Conveyance pipelines connecting new extraction wells to the MW-20 bench have been authorized by previous action memoranda.

2.2.2 Activities Requiring Authorization under Time Critical Action Memorandum No. 3

The piping and conveyance system for IM No. 3 will consist of the following:

- Influent and effluent piping and electrical conduit between the MW-20 bench and the PG&E treatment facility. Influent piping will convey extracted groundwater to Parcel 650-151-06. Effluent piping will convey RO brine back to the MW-20 bench. Effluent piping will also convey treated water back to the MW-20 bench until more permanent disposal methods are permitted and in place to accommodate peak extraction rates.
- Piping to convey treated water from the PG&E treatment facility to the disposal facilities (injection well fields on Parcel 650-151-06, direct discharge to the Colorado River, or reuse at the PG&E Compressor Station).

Currently, PG&E is discussing the design and layout of the project facilities with DTSC and the CWG during on-board CWG review sessions. An on-board review process enables interested stakeholders to be involved in the early stages of an expedited design-build project while meeting the accelerated project schedule. A Draft Design Basis Report for Interim Measures Number 3 and accompanying drawings representing a 30 percent design were submitted to DTSC and members of the Topock Consultative Workgroup on July 30, 2004. Engineering design and construction planning are ongoing to meet the accelerated project schedule. The following description of conveyance pipelines is based on the current design and on-board review sessions conducted to date.

The proposed main piping and conveyance alignment for the project follows existing access roads and is designed to avoid impacts to the Topock Maze, former U.S. Highway 66 (Route 66) and other cultural sites. The proposed route is set forth in Figure 2. PG&E is designing all project facilities to avoid or minimize impacts to cultural and natural resources. PG&E has surveyed the site and conducted resource related evaluations. Resource investigation reports have been drafted to document the survey findings. Mitigation measures will be implemented as required by the BLM and other agencies as a result of the consultation process. PG&E will offset the piping from existing utilities in accordance with applicable requirements and will work with the appropriate regulatory agencies to avoid, reduce or mitigate potential cultural and natural resource impacts.

Double wall high-density polyethylene (HDPE) piping will convey extracted groundwater to prevent releases of untreated groundwater. Piping and appurtenances will be sized to accommodate the anticipated system flow rates. Appurtenances to monitor system operations will include:

- Flow meter/totalizers to measure flow rate and cumulative flow from each extraction well;
- In-line sample ports for each extraction well; and
- Electrical or visual indication of pipe leakage within the containment piping. Visual leak indication would be facilitated by underground vaults placed at selected points along the alignment. Electrical leak detection methods include, at a minimum, level detection sensors in the underground vaults.

Given the design, a leak or catastrophic pipe failure is not expected. In the event of any release or other event necessitating an emergency response, PG&E will notify immediately the BLM Lake Havasu Field Office and the United States Bureau of Reclamation Lower Colorado Regional Office as well as other agencies, such as the National Response Center, as required by law.

2.2.2.1 Piping between the MW-20 Bench and Parcel 650-151-06

The water conveyance system delivers (1) untreated water from the extraction wells on the MW-20 bench to the treatment facilities; and (2) RO brine and treated water from the treatment facility back to the MW-20 bench. To minimize and avoid impacts to cultural resources, a combination of subsurface and aboveground alignments are proposed.

From the MW-20 bench to the PG&E treatment facility, piping will be constructed in an excavated trench approximately 7 feet wide to accommodate manual assembly of pipeline. Upon completion of the construction, the piping alignment will be within an existing 10-foot-wide graded gravel access road with 2-foot-wide shoulders. Two subsurface influent (untreated water) pipelines and two subsurface effluent pipelines (treated water and RO brine stream) would be placed in a common trench running to and from the MW-20 bench and Parcel 650-151-06, as shown in Figure 2. The trench will be excavated from the MW-20 bench approximately 700 feet north on the east shoulder of Route 66 (Park Moabi Road). At this point, the pipes will be directionally drilled west beneath Route 66 to the existing access road, where the road starts to run in a southerly direction. By following this existing access road, the alignment of the conveyance system avoids an abandoned segment of Route 66 (old Route 66). The trench will be constructed approximately 1,700 feet on BLM land following this existing access road. The trench will cross onto Parcel 650-151-06, and will be routed to the treatment facility location. Trenching along the roadway will minimize the disturbance to the hill slopes around the MW-20 bench. Directional drilling or other similar techniques (*e.g.*, boring and jacking) will be used to install segments of the piping to avoid impacts to cultural and natural resources.

Influent lines will be double-contained high-density polyethylene, and effluent lines will be single-contained polyvinyl chloride or high-density polyethylene. For the influent line conveying untreated groundwater, it is estimated that the inner pipe will be 4 inches in diameter and the outside pipe will be 8 inches in diameter. Electrical conduit also will be placed in the trench.

2.2.2.2 Piping between the Treatment Facility and the Injection Well Fields

Piping would be installed to deliver treated water from the PG&E treatment facility to the proposed injection wells on the Parcel 650-151-06. A portion of the route for this pipeline will traverse BLM land, as shown on Figure 2. PG&E has conducted resource related evaluations for these project activities; mitigation measures will be implemented as required by the BLM and SHPO as a result of the National Historic Preservation Act Section 106 consultation process.

From the PG&E treatment facility, treated water will be pumped through a single wall pipeline, approximately 4 inches in diameter, to be directionally drilled beneath old Route 66 from the south to the north shoulder. Along the north shoulder of old Route 66, the pipe will be constructed in an aboveground alignment on BLM land to the proposed injection

well fields at the west side of Parcel 650-151-06. The aboveground alignment minimizes disturbance to old Route 66.

2.2.3 Potential Activities to Support IM No. 3 That May Require Future Authorization

At the direction of DTSC, PG&E is evaluating three options to manage the treated water: injection into the aquifer on Parcel 650-151-06, discharge to the Colorado River under a National Pollutant Discharge Elimination System (NPDES) permit, and re-use of the treated water at the Topock Compressor Station. DSTC further directed PG&E to prepare applications to the Colorado River Basin Regional Water Quality Control Board (CRBRWQCB) for consideration at the Board's September 15, 2004 meeting (applications were submitted to the CRBRWQCB on July 28, 2004). No decision has been made regarding which of these alternatives will be used; each alternative remains a potentially viable option for treated water disposal. Of the three disposal alternatives under evaluation, PG&E has performed the detailed engineering design for the injection well disposal method on the basis that it represents the alternative most likely to be permitted and constructed in time to meet the demands of anticipated future pumping in October and November of 2004. The details of piping alignment for the extraction well disposal alternative are described in the preceding section, and they are the subject of approvals requested under Action Memorandum No. 3. In the event that one of the other two options for treated water disposal is chosen instead of, or in addition to, disposal by injection, PG&E will perform the necessary engineering design to implement that option, and will seek BLM approval for activities on BLM property through a future Action Memorandum process.

2.2.3.1 Potential Piping to a River Discharge Point

PG&E is evaluating piping alignments to accommodate the potential discharge of treated water into the Colorado River under a NPDES permit. Under the NPDES scenario, a pipeline would convey the treated water from the PG&E treatment facility across BLM property to the potential point of outfall, which may be directly into the Colorado River or to a drainage course within Bat Cave Wash. The alignment of any potential NPDES discharge pipeline would be determined following the decision by DTSC to implement this disposal option.

2.2.3.2 Potential Piping to the Topock Compressor Station

PG&E is also evaluating the potential reuse of the treated water in the cooling towers at the PG&E Topock Compressor Station. Under this scenario, the treated water from the PG&E treatment facility would be either transported by truck or conveyed in a pipeline across both BLM-managed land and the Havasu National Wildlife Refuge (HNWR). The truck route or the alignment of any potential pipeline would be determined following the decision by DTSC to implement this disposal option.

2.3 Grading and Construction-Related Activities

In support of the IM No. 3 drilling, well installation, and pipeline construction activities, PG&E will perform grading and other construction-related activities on BLM-managed land.

2.3.1 Previously Authorized Activities

As described in Section 2.1.1, the installation of new extraction wells, and the trenching and piping installation associated with those wells, has been authorized under a previous Action Memorandum. Trenches from new extraction wells to the MW-20 bench will be approximately 3-feet wide and will be installed using backhoes or trenching machines.

2.3.2 Activities Requiring Authorization Under Time Critical Action Memorandum No. 3

Interim Measure No. 3 grading and construction-related activities to be authorized under Action Memorandum No. 3 include the following:

- Inspect the BLM property along which conveyance pipeline alignments or road improvements are planned to evaluate the placement of equipment and the suitability of construction methods.
- Perform grading to level ground as required for staging equipment and to provide easy access for construction vehicles (*e.g.*, trucks, drill rigs) at the MW-20 bench and on the access roads. Temporary road crossings in areas where water has washed out roads may be constructed of materials such as soil and road base.
- Improve existing roads and create all-weather roads by filling in any washed out areas, carving/cutting as necessary to build roadway, and placing road base materials to finish the surface.
- Place temporary rip-rap to control erosion at up to four locations along portions of old Route 66, between the PG&E treatment facility and the potential injection well fields.
- Site and install temporary power supply (portable diesel-generator equipped with an auxiliary fuel tank), and auxiliary lighting.
- Trench for pipelines and electrical conduit. Trenches will be constructed with backhoes or trenching machines and will be approximately 3 feet deep and 7 feet wide.

Currently, PG&E is designing the project facilities; technical drawings and grading plans will continue to be discussed with DTSC and interested stakeholders during on-board review sessions.

2.3.3 Potential Activities to Support IM No. 3 That May Require Future Authorization

Grading and construction-related activities associated with (1) construction of an NPDES discharge pipeline across BLM property, and (2) construction of a pipeline conveyance to the PG&E Topock Compressor Station (for reuse of treated water and/or disposal of RO brine) will require authorization under a future Action Memorandum. The design and engineering of such facilities, if required, will commence in the event that DTSC directs PG&E to proceed with those disposal alternatives.

2.4 Temporary Increased Storage of Effluent on, and Trucking From, MW-20 Bench

2.4.1 Previously Authorized Activities

Activities to increase temporarily the storage capacity on the MW-20 bench, and to dispose of the additional stored water, associated with the IM No. 3 activities have not been authorized under previous Action Memoranda.

2.4.2 Activities Requiring Authorization Under Time Critical Action Memorandum No. 3

As discussed in Section 2.2.2, effluent piping will be installed to bring waste streams from the PG&E treatment facility products back to the MW-20 bench. The treatment process presently being designed (treatment to be performed on Parcel 650-151-06) is addition of ferrous chloride or ferrous sulfate to achieve chromium reduction, followed by removal through precipitation and filtration, and final polishing for total dissolved solids separation through RO. The process will produce three waste streams – RO concentrate (i.e., brine), RO permeate (i.e., treated water), and dewatered process sludge. The sludge will be stored at the PG&E treatment facility for transport and disposal to a licensed facility. The RO brine and treated water will be piped back to the MW-20 bench for temporary storage before being transported to an off-site facility by truck. When adequate disposal methods (injection, discharge into the river, or reuse at the PG&E Topock Compressor Station) are permitted and in place to accommodate expected peak extraction rates, PG&E will reduce or discontinue the conveyance of treated water to the MW-20 bench.

With a peak expected groundwater extraction rate of 135 gallons per minute (gpm), contingency storage of treated water and RO brine may be necessary. During the peak flow, a total of twelve or thirteen holding tanks (of 17,500-gallon capacity each) would be needed on the MW-20 bench to provide sufficient holding capacity for the RO brine and the treated water from the PG&E treatment facility. Assuming that 3 of the existing treated water tanks on the MW-20 bench are available for such use, 9 to 10 additional holding tanks may need to be added to the existing facilities. The existing operations would be expanded to accommodate the additional tanks within a lined containment area, although full secondary containment will not be necessary (the RO brine and the treated water will be nonhazardous). Approximately 25 percent of the holding capacity will be used for the RO brine, and approximately 75 percent of the holding capacity will be used for the treated water. Once a sufficient water management/on-site disposal option is in place, the extra tanks will be decommissioned and removed from the bench.

At peak groundwater extraction, up to 42 truck loads per day would be required. The site's comprehensive transportation plan will be updated to address the increase in truck traffic along Park Moabi Road. The transportation plan would include measures to protect the roadway where needed, and to limit the effects of project traffic to designated areas. Site operators at the MW-20 bench will continue to be responsible for daily trucking operation. The facility operational procedures will be updated to address the expanded operations. Each operator will be trained on proper operation of system equipment, field instruments, and monitoring equipment, and will be familiar with the normal operating ranges of system

components. The pumping and storage system will be equipped with automatic shutoffs to prevent tank overflow and pipe failures. The automatic shutoffs combined with site inspection will provide operational reliability and safety. Site security is provided to safeguard against vandalism and injury. During implementation of this IM, appropriate security measures will be implemented for the express purpose of providing safety to operators and the public, consistent with current operations.

2.4.3 Potential Activities to Support IM No. 3 That May Require Future Authorization

The use of the MW-20 bench for the storage and shipping of treated water is anticipated to be a temporary measure, to be implemented following startup of the treatment facilities and until a direct disposal method (injection, NPDES discharge, reuse at the Topock Compressor Station) is implemented. As such, PG&E does not foresee a need to request future authorization to conduct such work, beyond the authorization requested to be contained within Action Memorandum No. 3.

2.5 Project Schedule

The time critical period for the project, associated with the lowest river levels, is October 2004 through January 2005. It is essential that PG&E immediately begin preparations to expand the interim measure treatment to meet the DTSC directive and prevent potential impacts to the Colorado River. PG&E's ability to meet this schedule is dependent upon BLM's authorization of the IM No. 3 through the issuance of an Action Memorandum as a time-critical removal action under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Without this authorization, PG&E does not have the ability to conduct the necessary site preparation or installation activities to meet the time critical period for the project.

3.0 Applicable Regulations

3.1 Federal Regulations and Standards

The following are the various applicable federal and state regulations and policies, provided here for general information purposes.

- National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code [USC] §§ 4321 *et seq*). The purposes of this act are to declare a national policy to promote efforts that prevent damage to the environment and benefit human health and welfare, increase understanding of natural resources, and establish a National Council on Environmental Quality. The BLM will be the lead federal agency.
- Federal Endangered Species Act (FESA), including coordination requirements of Sections 7 and 10 and Habitat Conservation Plan (HCP) requirements of Section 9 (16 USC §§1531 *et seq.*; 50 Code of Federal Regulations [CFR] Part 402). Section 9 of FESA prohibits the "take" of species federally listed as threatened or endangered. "Take" is further defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Take incidental to otherwise lawful activities can be authorized under Section 7 of FESA, where a federal nexus or agency is involved. PG&E currently possesses a biological opinion for the desert tortoise (*Gopherus agassizii*) entitled *Biological Opinion for Maintenance Activities on the Pacific Gas and Electric Company Gas Pipeline System in the California Desert* (6840, CA-063.50) (1-8-99-F-71) (USFWS 2000).
- Clean Water Act (CWA) – Sections 401 and 404 of the CWA (33 USC §§1344). Activities that have the potential to discharge fill materials into "waters of the United States," including wetlands, are regulated under Section 404 of the CWA, as administered by the United States Army Corps of Engineers (USACE). Fill activities may be permitted by a Nationwide or Individual Permit. The Nationwide Permit Program involves certain activities that have been pre-authorized by USACE. Section 404 (1)(b) guidelines require USACE to rule in favor of the least environmentally-damaging practicable alternative when multiple alternatives are available for a project. Typically, USACE requires mitigation in the form of restoration of areas of temporary impacts, and restoration/enhancement of additional wetland areas at a specified ratio of impacts. Alternatively, in-lieu fees can be paid into a mitigation banking fund. Projects requiring a Section 404 permit also require a CWA Section 401 Water Quality Certification issued by the appropriate RWQCB. BLM will be the lead federal agency.
- Migratory Bird Treaty Act (16 USC 703-712; 50 CFR 10). The federal Migratory Bird Treaty Act prohibits the "take" of migratory birds, unless permitted. This regulation can constrain construction activities that have the potential to affect nesting birds either through vegetation removal and land clearing, or through other construction or

operation-related disturbance. It is not anticipated that a depredation permit will be required.

3.2 State Regulations and Standards

The proposed project may be subject to the following state regulations:

- California Environmental Quality Act of 1970 (CEQA) as amended (Public Resources Code [PRC] §§21000 *et seq.*). The CEQA goals intended to assist California public agencies in identifying potential significant environmental effects of their actions, and either avoiding or mitigating those effects, when feasible. DTSC will be the state lead agency. DTSC has issued an emergency exemption under CEQA.
- California Endangered Species Act (California Fish and Game Code §§2050 *et seq.*). Section 2050 of the California Fish and Game Code prohibits any activities that would jeopardize or take a species listed as threatened or endangered within the state. Projects that have the potential to impact species listed as threatened or endangered by the state might require an Incidental Take Permit from the California Department of Fish and Game (CDFG) under Section 2081 of the Fish and Game code. The application for this permit requires a project description, and analysis of impacts to the species, and an analysis of the probability of the species' long-term survival as related to impacts. PG&E possesses a biological opinion for the desert tortoise issued by USFWS.
- Clean Water Act – Projects requiring a Section 404 permit also require a CWA Section 401 Water Quality Certification issued by the appropriate RWQCB. Section 401 of the CWA, governed by 33 USC 1341 and 40 CFR 121, requires a water quality certification from the State Board or Regional Board when a project: (1) requires a federal license or permit and (2) will result in a discharge to waters of the United States. Such certification may be conditioned. Project activities that typically result in a discharge subject to Section 401 water quality certification are the construction and subsequent operation of a facility.
- CDFG Code 1600 – Streambed Alteration Agreements (California Fish and Game Code §1600). Section 1600 of the Fish and Game Code regulates the alteration of the bed, bank, or channel of a stream, river, or lake, including dry washes. Generally, CDFG asserts jurisdiction up to the top of significant bank cuts or to the outside of any riparian vegetation associated with a water course. Activities that have the potential to affect jurisdictional areas can be authorized through issuance of a Streambed Alteration Agreement (SAA). The SAA specifies conditions and mitigation measures that will minimize impacts to riparian resources from proposed actions. The DTSC has issued an emergency exemption under CEQA. It is anticipated that the CDFG will concur with this finding and inform PG&E that an emergency notification package must be prepared and delivered to CDFG within 14 days of the proposed action.
- California Fully-protected Wildlife Species Provisions (California Fish and Game Code §§3511, 4700, 5050, and 5515). These provisions prohibit the taking of fully-protected birds, mammals, amphibians, and fish.

- Birds of Prey Protection Provision (California Fish and Game Code § 3503.5). This provision prohibit the taking of birds of prey, including any birds of the order Falconiformes or Strigiformes, and including nests or eggs of such birds. Potential impacts to these species will be avoided.

4.0 Survey Methodology

4.1 Purpose and Need

A biological survey of the proposed project site was performed to identify potential biological constraints. The focus of the survey was directed toward the detection of special-status plant and wildlife species and jurisdictional waters. This report documents the survey findings, identifies potential impacts to resources, and proposes measures to avoid, reduce and mitigate potential impacts. Based on the survey findings, the appropriate agencies including the Bureau of Land Management (BLM), United State Fish and Wildlife Service (USFWS), and California Department of Fish and Game (CDFG) will be consulted on permitting requirements. All necessary permits/approvals will be obtained prior to project implementation.

4.2 Background Search

Prior to conducting the field survey, the California Natural Diversity Database (CNDDB), Arizona's Game and Fish Natural Heritage Program, and United States Fish and Wildlife Service's Threatened and Endangered Species Database was queried to identify the potential occurrence of special-status plants, wildlife (including federally and state listed threatened and endangered species), and habitats occurring within 2 miles of the project site. The search encompassed the Topock and Whale Mountain 7.5-minute USGS quadrangle. Figure 3 depicts special-status species identified during the database queries.

4.3 Methodology

On May 4, 5, 17, and 19, 2004, CH2M HILL wildlife biologists Ray Romero and Robert Hernandez conducted a reconnaissance survey for special-status species that may potentially occur at the proposed project site and surrounding lands. On August 11, 2004, the alternative locations for the conveyance pipeline were surveyed. Pedestrian transects spaced approximately 100-200 feet apart, depending on topography, were conducted at the site. The survey encompassed areas within and surrounding the MWD parcel, including washes such as Bat Cave Wash, other unnamed washes, small tributaries, and areas where proposed project facilities including conveyance pipeline options that would be constructed (Figure 2). The field characterization of the habitat at the project site was then compared to suitable habitat for each of the special-status species that is essential for the species survival. In addition to this analysis, a literature review was conducted to determine the potential for the project site to support such species. This comparison is provided in Table 1. The analysis was intended to determine the need for focused species and/or protocol-level surveys.

The primary focus of the survey was directed toward the detection of any live desert tortoises and sign such as carcasses, burrows, scat, courtship rings, tracks, egg shell

fragments, etc. The secondary focus of the survey was to delineate the dry washes and identify any potential impacts that may occur within or adjacent to the project site. A list of plant and wildlife species observed during the survey are presented in Table 2. Photographs of the site and a photo index map of the existing conditions occurring at the project site and surrounding areas are provided in Appendix C.

5.0 Survey Results

5.1 Characterization of Vegetation and Habitat

The site is characterized by arid conditions (precipitation averages less than 5 inches/year) and high temperatures. Structurally diverse vegetation is primarily limited to the Colorado River floodplain and ephemeral washes into the river. Trees observed along these waterways include salt cedar, palo verde, cat claw, smoke tree, and mesquite. The local geology consists of recent and older river deposits progressing westward to older alluvial deposits associated with the local mountains. Sand, gravel and cobblestone dominate these deposits, comprising the principal groundwater aquifer at the site. The main surface water drainage from the study area into the Colorado River is from Bat Cave Wash and a large unnamed desert wash with several tributaries located to the west. These ephemeral desert washes are dry most of the year.

The land in the vicinity of, and including the MWD property, has been significantly disturbed and is highly fragmented. The landscape in the vicinity of the proposed project site has been fragmented and significantly disturbed by construction of I-40 Highway, Park Moabi Road, old Route 66, several dirt roads, gas pipeline corridors, and the Burlington Northern Santa Fe Railway (Figure 2). In addition, significant amounts of litter and several illegal dump sites were observed along the roadways and railroad tracks.

The MWD property is a series of terraces divided by dry desert washes. The landscape within the proposed project area is considerably eroded and can most suitably be described as badlands. The lands are made up of small- to moderately-sized terraces with very steep slopes potentially cut by historic flash flood events. For the most part, terraces occurring on site are homogeneous, comprising rocky soils with very sparse vegetation, mostly resembling creosote bush desert scrub plant community. Vegetation occurring on these sites include, but are not limited to, creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), allscale saltbush (*Atriplex polycarpa*), beavertail cactus (*Opuntia basilaris*), and desert trumpet (*Eriogonum inflatum*). The dry desert washes comprise sandy-to-gravely soils and are sparsely vegetated. Vegetation observed along the washes during the biological reconnaissance survey primarily included creosote bush, salt cedar (*Tamarix* sp), cat-claw (*Acacia greggii*), mesquite (*Prosopis* sp), palo-verde (*Ceridium* sp), and smoke tree (*Dalea spinosa*).

Bat Cave Wash is one of two large dry washes at the project site, located along the eastern portion of the project site. The second wash is a combination of several smaller tributaries merging to form a larger wash that flows along the eastern and northern portions of the MWD property. These washes remain dry throughout most of the year due to arid desert conditions. The low-flow channels within the wash floors are mostly barren of vegetation and comprise a sand, gravel, and cobblestone substrate. Although the ephemeral washes occur within the creosote bush scrub plant community, they contain substantially large stands of salt cedar at the confluence with the Colorado River.

The Colorado River is the primary aquatic habitat located approximately 800 feet northeast from the eastern edge of the MWD parcel. The river is approximately 700 to 900 feet wide and 8 to 15 feet deep at this location. Little to no submergent vegetation exists within the river. Small patches of emergent vegetation along the banks consist of common reed (*Phragmites communis*), cattails (*Typha* sp.), sedges (*Carex* sp.), and rushes (*Scirpus* sp.).

5.2 Wildlife

Based on few wildlife observations and sparse vegetation providing limited cover and forage within the project area, wildlife diversity and abundance is considered low. In addition, due to the disturbed nature of the land on or in close proximity to the project site and adjacent natural barriers such as the Sacramento Mountains and Colorado River, a continuous wildlife corridor is not available. This greatly inhibits movement of terrestrial wildlife species onto the project site. However, the occurrence of trees and patches of native vegetation near the Colorado River may provide limited roosting habitat for avian species and other common wildlife species.

As mentioned previously, two large stands of salt cedar are located at the confluence of the two large washes and the Colorado River, which dominate either bank and may be used as roost trees by various avian species including raptors. Although salt cedar provides habitat and nest sites for some wildlife, many biologists conclude that it provides low quality habitat for most native amphibians, reptiles, birds, and mammals (Lovich and de Gouvenain 1998). However, some literature has documented southwestern willow flycatchers (*Empidonax traillii extimus*) nesting in tamarisk thickets near watercourses including the Colorado River. During the reconnaissance survey, species such as mourning dove (*Zenaida macroura*) were detected within salt cedar. Although salt cedar is not known to provide optimal wildlife habitat, the trees appear to provide the only significant roosting structure, due to limited structural tree diversity in the area.

5.3 Special-status Plants

No special-status plant species were identified in any of the database queries nor was suitable habitat observed during the survey. Physical evidence of the highly-developed and historically-disturbed nature of the project site was evident throughout. These physical characteristics included graded, compacted, and eroded soils due to natural and man-made conditions such as washes, roadways, railroad tracks, pipeline corridors, fence lines, and presence of exotic vegetation. Due to these disturbances in the area, the project site does not provide appropriate conditions for establishment of special-status plant species. Therefore, focused species and/or protocol-level surveys were considered unnecessary. However, the BLM has identified several sensitive plants including the ocotillo (*Fouquieria splendens*), palo verde, cat-claw, mesquite, and all cactus species. These species were observed within and adjacent to the project area.

5.4 Special-status Wildlife

The following section addresses special-status wildlife species observed, reported, or with the potential to occur at the project site or in the immediate vicinity. These resources include habitat and wildlife species that have been afforded recognition by federal and state resource agencies—as well as private conservation organizations—as species with a documented or perceived decline or limitation of its population size or geographical extent and/or distribution, resulting in most cases from habitat loss.

Special-status species include those: (1) listed or proposed for listing by state or federal agencies as rare, threatened, or endangered and (2) federal Species of Concern or state Species of Special Concern. Table 1 in Appendix B provides a list of each special-status wildlife species that may potentially occur in the project area and includes information on status, likelihood for occurrence, and habitat requirements.

No live special-status wildlife was detected during the reconnaissance field survey. However, a desert tortoise carcass was observed within one of the small tributaries to the large unnamed wash located within the central portion of the proposed project site (Figure 2). The desert tortoise carcass, consisting primarily of a disarticulated and bleached plastron, was found in a narrow, sparsely-vegetated wash with a rocky/gravely substrate. Based on the stage of deterioration, the shell appeared to be greater than 20 years old. In addition, due to the considerable degree of habitat disturbance and fragmentation, this portion of the shell may have been washed on site by a historical flash-flood event. Other desert tortoise sign was not observed.

Of all wildlife species identified by the database queries as potentially occurring in the general vicinity of the proposed project site, one mammal, the Nelson's bighorn sheep (*Ovis canadensis nelsoni*), recognized by the BLM as sensitive, has been identified as potentially occurring within the Chemehuevi Mountains south of the proposed project site. Other wildlife identified during the database queries as potentially occurring within 2 miles of the project site are directly associated with the Colorado River and include the Yuma clapper rail (*Rallus longirostris yumanensis*), bonytail (*Gila elegans*), flannelmouth sucker (*Catostomus latipinnis*), and razorback sucker (*Xyrauchen texanus*) (Figure 3). The project site for the treatment facility does not contain suitable habitat for the Yuma clapper rail and three fish species In addition, although not identified in any of the databases or documented during the survey of the project area, the southwestern willow flycatcher has been historically observed breeding near the Colorado River. According to the Southwestern Willow Flycatcher Recovery Plan, the largest breeding population (21 territories) currently known along the Colorado River is found at Topock Marsh (USFWS 2002) located approximately 1.3 miles northeast of the MW-20 bench project site.

The proposed locations for the two additional extraction wells (PE-1 and PE-2) along the Colorado River floodplain is dominated by salt cedar. With the exception of southwestern willow flycatcher, this area does not support suitable habitat for any of the other listed species within the proposed footprints for the extraction wells. Observation records and reports of southwestern willow flycatcher in the immediate project area were not found. The salt cedar at the confluence of Bat Cave Wash and the Colorado River is not expected to

be impacted by the proposed well installation activities. Additionally, the well installation activities will take place outside of the breeding season for the flycatcher.

The Colorado River is subject to boating and other personal watercraft recreation in the area. This portion of the river experiences daily noise impacts from not only watercraft, but vehicle and railroad traffic crossing over the river at this location. Therefore, no adverse impacts to these species are anticipated and, therefore, are not discussed further. The following list of special-status species relative to the proposed treatment facility site are discussed in the subsections below.

5.4.1 Reptiles

5.4.1.1 Desert Tortoise (*Gopherus agassizii*)

The desert tortoise is recognized as a federal- and state-listed threatened species under FESA and CESA, respectively. The desert tortoise was listed under FESA in 1990 and under CESA in 1989. The desert tortoise is widely distributed throughout the Mojave, Sonoran, and Colorado Deserts. Desert tortoises are found in the California desert from below sea level to elevations of at least 7,300 feet. The most favorable habitats occur at elevations of approximately 1,000 to 3,000 feet.

The desert tortoise is a herbivore, feeding mainly on forbs, grasses and cacti. Highest tortoise densities are achieved in desert washes and creosote bush communities with extensive annual wildflower blooms. The Mojave population of desert tortoise generally avoids very steep, rocky areas and prefers open valleys containing creosote bush scrub. The species also requires friable soils for burrow and nest construction. Typically, the tortoise will excavate a burrow under bushes or along dry washes and will occasionally dig into the open soil. Burrows are extremely essential to their survival, especially in extremely hot weather when direct sun can kill a tortoise in an hour or less (Marlow 1979).

Critical habitat for the desert tortoise has not been designated at the proposed project site; however, the Chemehuevi Valley Critical Habitat Unit occurs approximately 9 miles to the west of the proposed project site. Primary constituent elements required for the designation of critical habitat include, but are not limited to:

- Space for individual and population growth and for normal behavior.
- Food, water, or other nutritional or physiological requirements.
- Cover or shelter.
- Sites for breeding, reproduction, and rearing of offspring.
- Generally, habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

Microhabitat requirements for this species are very limited at the proposed project site and in the general vicinity. The project site is previously disturbed and fragmented, providing poor quality habitat for this species. Poor quality habitat at the project site is defined as follows:

- Habitat fragmentation from man-made and natural barriers such as I-40 Highway, Park Moabi Road, railroad tracks, Colorado River, and Sacramento Mountains.
- Previous disturbance from dirt roads, natural gas pipeline corridor, and illegal dumping.
- Lack of friable soils. Soils are predominately rocky and not conducive to burrow construction.
- Low abundance of vegetation providing forage (annual grasses and forbs) and cover (perennial shrubs).

A weathered desert tortoise plastron, thought to be deposited in the area by a flash-flood event, was observed during the field survey. Other than the disarticulated aged carcass, no other desert tortoise sign was observed during the survey. Therefore, there is a very low probability for this species to occur within or adjacent to the project site. Based on the aforementioned, a USFWS protocol-level survey was considered unnecessary.

5.4.2 Birds

5.4.2.1 Burrowing Owl (*Athene cunicularia*)

The burrowing owl is a federal Species of Concern and a California Species of Special Concern. This species is widespread throughout the western United States but has declined in many areas due to habitat loss and modification, poisoning of its prey, and introduced nest predators. This species is diurnal and usually non-migratory in this portion of its range. It excavates nests in friable soils of abandoned burrows from ground squirrels, kit fox, desert tortoise, and other wildlife. It is generally found in low densities in desert habitats but can occur in much higher densities near agricultural lands, where rodent and insect prey tend to be more abundant. The project site does not support suitable habitat for the burrowing owl. Soils are not friable for burrow construction. No database records occur for this species at the project site, and neither individuals nor burrows were observed during the field reconnaissance survey. It is anticipated that there is a low probability for this species to occur within the project site. Therefore, a CDFG protocol-level survey was considered unnecessary.

5.4.2.2 Prairie Falcon (*Falco mexicanus*)

The prairie falcon is recognized as a California Species of Special Concern by CDFG. This species forages in open country, including deserts, prairies, agricultural lands, and open playas. Nest sites are generally located in arid regions, usually in a scrape on a sheltered ledge, and in open terrain with canyons, cliffs, escarpments, and rocky outcrops. Preferred nest sites are on higher cliffs and escarpments. No database records occur for this species in the project site, and prairie falcons were not observed during the course of field surveys. No nesting habitat occurs within the project site; however, marginal nesting habitat may occur within the Sacramento Mountains south of the proposed project site. Therefore, there is a moderate potential for this species to forage at or near the proposed project site.

5.4.2.3 Loggerhead Shrike (*Lanius ludovicianus*)

The loggerhead shrike is recognized as a Federal Species of Concern and a California Species of Special Concern by CDFG. Loggerhead shrikes are common residents and winter visitors of California foothills and lowlands. This species can be found within open habitat types including sage scrub, non-native grasslands, chaparral, riparian, croplands, and areas characterized by open scattered trees and shrubs. Fences, posts, or other potential perches are typically present. The loggerhead shrike forages for large insects over open ground within areas of short vegetation, usually impaling prey on thorns, wire barbs, or sharp twigs to cache for later feeding. No database records occur for this species in the project site. Loggerhead shrikes were not detected during the field survey. However, there is a moderate potential for this species to forage at or near the proposed project site.

5.4.2.4 Ferruginous Hawk (*Buteo regalis*)

The ferruginous hawk is recognized as a federal Species of Concern and a California Species of Special Concern by CDFG. In southern California, this species is a winter visitor or migrant, usually arriving in early fall and departing in early spring (Grinnell and Miller 1944). The hawk is fairly common in grasslands and agricultural regions in southern California from mid-September to early April (Garrett and Dunn 1981). Ferruginous hawks are largely perch hunters, although they will spend more time foraging on the ground than any other large raptor, course low over the ground to flush prey, and hover hunt from heights up to 300 feet (Wakely 1974). This species nests in sagebrush/shrub-step, grassland, mixed shrub/grasslands; in lone trees or sparse groves primarily in the pinyon-juniper ecotone; and in the transition zone between woodland and shrub or grassland habitats (Blair and Schitoskey 1982). No database records occur for this species at the project site, and no ferruginous hawks were observed during the course of field surveys. No nesting habitat occurs within the proposed project site; however, this species has a moderate potential of foraging at the proposed project site and adjacent lands.

5.4.2.5 LeConte's Thrasher (*Toxostoma lecontei*)

Le Conte’s thrasher is recognized as a California Species of Special Concern by CDFG. This species is a desert resident that inhabits areas with sparse desert scrub, alkali desert scrub, and desert succulent scrub habitats with open desert washes (CDFG 2003). It can be found year-round throughout much of the Mojave and Colorado Deserts of California. Its population densities are among the lowest of passerine (perching) birds, estimated at less than five birds per square mile in optimal habitat. This low population density decreases the probability of their detection during field surveys. Le Conte’s thrasher feeds on seeds, insects, small lizards, and other small vertebrates. This species requires areas with an accumulated leaf litter under most plants as cover for its mostly-arthropod prey (BLM undated). No database records occur for this species in the project site. This species was not observed during the course of field surveys.

The creosote bush scrub habitat within and adjacent to the proposed project site on the MWD land may provide marginally suitable habitat for the Le Conte’s thrasher due to monotypic creosote bush scrub, which provides limited cover or nesting sites. Therefore, it is anticipated that this species has a low probability of occurring within the proposed project site.

5.4.3 Mammals

5.4.3.1 Nelson's Bighorn Sheep (*Ovis canadensis nelsoni*)

The Nelson's bighorn sheep is not listed under the FESA or CESA; however, it is recognized as a sensitive species by the BLM. This species is widely distributed from the White Mountains in Mono County to the Chocolate Mountains in Imperial County. The Nelson's bighorn sheep use open, rocky, steep areas rarely disturbed by humans with available water and herbaceous forage. This species graze and browse on a wide variety of plant species. Green, succulent grasses and forbs are preferred; browse is important all year, especially for populations in arid habitats. Some populations use mineral licks, and some may be limited by phosphorus. Nelson's bighorn sheep feed in open habitats, such as rocky barrens, meadows, and low, sparse brushlands (Dunaway 1972; Monson and Sumner 1980; Ginnett and Douglas 1982; Lawson and Johnson 1982).

Database records occur for this species south of the PG&E facility. It is believed that bighorn sheep cross over to the Chemehuevi Mountains from the Sacramento Mountains to the west. The population is estimated to be approximately 20 animals, due to disease, as well as weakening by competition with feral burros (CNDDB 2003). Habitat to support this species nor individuals were observed during the field survey. Therefore, it is anticipated that Nelson's bighorn sheep do not occur within the proposed project site.

6.0 Environmental Consequences

Impacts to biological resources would be considered to be significant if proposed project actions would:

- Substantially affect a rare or endangered species of animal or plant or the habitat of the species, leading to the decline in population below self-sustaining levels;
- Interfere substantially with the movement of any resident or migratory fish or wildlife species;
- Substantially diminish habitat for fish, wildlife, or plants.

The potential impacts to biological resources from project implementation could be distinguished into temporary, permanent, and cumulative impacts.

Temporary impacts are short-term and construction-related impacts, anticipated to occur primarily during construction of the treatment facility, pipelines, and injection well fields on the project site. These impacts may be due to dust, noise, foot traffic, and vehicular activity, resulting in temporary loss of foraging habitat and displacing of species.

Permanent impacts are long-term impacts, anticipated to occur during the construction phase. These impacts may occur due to grading or filling activities, foot traffic, and/or vehicular activities.

Operational impacts are those anticipated to occur during the operational or maintenance phase of the facilities and may include temporary and permanent impacts.

Cumulative impacts are those that may result from implementation of other projects in the project area, simultaneously with the proposed project. Cumulative impacts are not anticipated with the implementation of the proposed project, as no other project activities are planned in the immediate project area.

7.0 Impact Assessment

7.1 Vegetation and Habitat

This section addresses potential temporary and permanent impacts to vegetation and habitat including special-status plant species as a result of implementation of the proposed project.

7.1.1 Temporary Impacts

Due to the lack of favorable conditions at the proposed project site for special-status plant species, temporary impacts to these species are not expected. BLM sensitive plant species generally associated with the ephemeral washes including palo verde, ocotillo, mesquite, cat-claw, smoke tree, and cacti species are located at the project site. These plant species were not detected directly within the project footprint; therefore, temporary impacts including crushing are not anticipated. Temporary impacts, leading to crushed creosote bushes and other native vegetation are anticipated during construction and operational activities. However, it is anticipated that only a few native shrubs will be crushed by project activities as the area is sparsely vegetated.

Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. This would further reduce the likelihood of any temporary impacts to vegetation at the proposed project site.

The proposed project will temporarily impact less than 6 acres of creosote bush scrub habitat from construction-related activities such as use of a construction staging area, placement of the 4-inch pipeline on the existing road surface from the treatment facility to injection well fields, construction-related vehicle traffic, and well installations. It is anticipated that the majority of the temporary disturbance would result from well installation activities within the designated well fields. The footprint of the three well fields comprise of 4.8 acres. Although this figure was used for ease of temporary disturbance calculations, the entire well field areas are not expected to be impacted by well installations due to sensitive cultural resources in the immediate area. Therefore, the actual area of temporary disturbance is expected to be considerably less than 6 acres. Creosote bush scrub habitat is abundant locally and regionally. Therefore, potential temporary impacts are not considered adverse.

7.1.2 Permanent Impacts

Due to the lack of favorable conditions at the proposed project site for special-status plant species, permanent impacts to these species are not expected. BLM sensitive plant species generally associated with the ephemeral washes including palo verde, ocotillo, mesquite,

cat-claw, smoke tree, and cacti species are located at the project site. These plant species were not detected directly within the project footprint; therefore, permanent impacts including removal are not anticipated. Permanent impacts, leading to the loss of creosote bushes and other native vegetation are anticipated during construction and operational activities. However, it is anticipated that only a few native shrubs will be removed by project activities as the area is sparsely vegetated.

Facility siting would be primarily limited to previously disturbed and barren areas. Siting of all facilities as proposed, would primarily occur in areas of previously disturbed creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. This would further reduce the likelihood of any permanent impacts to vegetation at the proposed project site.

It is anticipated that the proposed project will permanently impact less than 3 acres of creosote bush scrub habitat from construction of the treatment facility, injection wells, conveyance pipeline and associated roads. Creosote bush scrub habitat is abundant locally and regionally. Therefore, potential permanent impacts are not considered adverse.

7.2 Wildlife

This section addresses potential temporary and permanent impacts to special-status wildlife species as a result of implementation of the proposed project.

7.2.1 Reptiles

7.2.1.1 Desert Tortoise

Temporary Impacts. As described earlier, the proposed project site consists of poor habitat for this listed as threatened species. Additionally, recent sign of desert tortoise use in the area were not detected during the survey of the proposed project site. Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. This would further reduce the likelihood of any temporary impacts to this species at the proposed project site. Therefore, potential temporary impacts are not considered adverse. In order to avoid, reduce, and mitigate potential effects to this species as a result of the proposed project, minimization measures are proposed in Section 9.0.

Permanent Impacts. Potential permanent impacts anticipated during the operational lifetime of the facility from vehicles or other maintenance activities is minimal, as this species is not likely to occur within the proposed project site. Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be

limited to existing roads. This would further reduce the likelihood of any permanent impacts to this species at the proposed project site. Therefore, potential permanent impacts are not considered adverse. In order to avoid, reduce, and mitigate potential effects to this species as a result of the proposed project, minimization measures are proposed in Section 9.0.

7.2.2 Birds

7.2.2.1 Burrowing Owl

Temporary Impacts. The proposed project site provides limited foraging habitat and does not support any suitable habitat in the form of grasslands with friable soils, which are preferred nesting and breeding habitat for this special-status species. There are no known records of occurrence of this species on the project site, and the species was not observed during field surveys. Therefore, the implementation of the proposed project is not anticipated to result in the loss of burrowing owl habitat. Construction noise impacts are considered temporary. These potential impacts are considered minor when compared to long-term daily noise impacts from I-40 vehicle and railroad traffic. Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. This would further reduce the likelihood of any temporary impacts to this species at the proposed project site. Therefore, potential temporary impacts are not considered adverse. In order to avoid, reduce, and mitigate potential effects to this species as a result of the proposed project, minimization measures are proposed in Section 9.0.

Permanent Impacts. This species is not likely to breed or nest at the project site due to the lack of suitable habitat. Potential permanent impacts anticipated during the operational lifetime of the facility from vehicles or other maintenance activities is minimal, as this species is not likely to occur within the proposed project site. Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. This would further reduce the likelihood of any permanent impacts to this species at the proposed project site. Therefore, potential permanent impacts are not considered adverse. In order to avoid, reduce, and mitigate potential effects to this species as a result of the proposed project, minimization measures are proposed in Section 9.0.

7.2.2.2 Ferruginous Hawk and Prairie Falcon

Temporary Impacts. The project site affords only limited foraging and no nesting habitat for these raptors. These species may therefore occur at the proposed project site only as a transient, occasionally foraging in surrounding open country and agricultural areas. Construction noise impacts are considered temporary. These potential impacts are considered minor when compared to long-term daily noise impacts from I-40 vehicle and

railroad traffic. Due to the proposed construction activities, the foraging habitat may be temporarily unavoidable to these species. However, such habitats are abundant regionally, and these species are likely to use such foraging habitats during this period. These species are likely to resume foraging at the proposed project site once the construction activities are completed. Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. This would further reduce the likelihood of any temporary impacts to these species at the proposed project site. Therefore, potential temporary impacts are not considered adverse. In order to avoid, reduce, and mitigate potential effects to these species as a result of the proposed project, minimization measures are proposed in Section 9.0.

Permanent Impacts. Permanent impacts anticipated during the operational phase are minimal due to the fact that the maintenance activities will be conducted periodically. In addition, due to the lack of nesting habitat, these species are likely to occur at the proposed project site only as transients. Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. This further reduces the likelihood of any long-term, permanent impacts to these species. Therefore, potential permanent impacts are not considered adverse. In order to avoid, reduce, and mitigate potential effects to these species as a result of the proposed project, minimization measures are proposed in Section 9.0.

7.2.2.3 Loggerhead Shrike and Le Conte's Thrasher

Temporary Impacts. As indicated earlier, the proposed project site affords only limited foraging and unsuitable nesting habitat for these species. These species may therefore occur at the proposed project site only as a transient, occasionally foraging in surrounding open country. If these species were to occur within the proposed project sites during construction, it is anticipated that they would use the surrounding lands. These species are likely to resume foraging at the proposed project site once the construction activities are completed. Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. This would further reduce the likelihood of any temporary impacts to these species at the proposed project site. Therefore, potential temporary impacts are not considered adverse. In order to avoid, reduce, and mitigate potential effects to these species as a result of the proposed project, minimization measures are proposed in Section 9.0.

Permanent Impacts. Permanent impacts anticipated during the operational phase are minimal due to the fact that the maintenance activities will be conducted periodically. In addition, due to the lack of suitable nesting habitat, these species are likely to occur at the

proposed project site only as transients. Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. This further reduces the likelihood of any long-term, permanent impacts to these species. Therefore, potential permanent impacts are not considered adverse. In order to avoid, reduce, and mitigate potential effects to these species as a result of the proposed project, minimization measures are proposed in Section 9.0.

7.2.3 Mammals

7.2.3.1 Nelson's Bighorn Sheep

Temporary Impacts. As indicated earlier, the project site affords limited foraging habitat for this species. Nelson's bighorn sheep may therefore occur at the project site only as a transient, occasionally foraging in surrounding open country and mountain ranges. It is anticipated that the proposed construction activities will not impact surrounding foraging habitat. Construction noise impacts are considered temporary; these potential impacts are considered minor when compared to long-term daily noise impacts from I-40 vehicle and railroad traffic. Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. This further reduces the likelihood of any temporary impacts to this species at the proposed project site. Therefore, potential temporary impacts are not considered adverse. In order to avoid, reduce, and mitigate potential effects to this species as a result of the proposed project, minimization measures are proposed in Section 9.0.

Permanent Impacts. Permanent impacts anticipated during the operational phase are minimal due to the fact that the maintenance activities will be conducted periodically. Additionally, due to the lack of suitable habitat, this species is likely to occur at the project site only as a transient. Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance, thus minimizing additional impacts. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. This further reduces the likelihood of any long-term, permanent impacts to this species. Therefore, potential permanent impacts are not considered adverse. In order to avoid, reduce, and mitigate potential effects to this species as a result of the proposed project, minimization measures are proposed in Section 9.0.

8.0 Impact Overview

A total of less than 9 acres (6 acres temporary and 3 acres permanent) of habitat disturbance are anticipated from the implementation of the proposed project. Temporary disturbances include impacts from the construction staging area, surface road placement of conveyance pipelines, well installations, and construction-related vehicle traffic. Less than 3 acres of creosote bush scrub habitat may be permanently impacted by the proposed project from road construction/improvement and well/facility sitting.

Facility siting would be primarily limited to previously disturbed and barren areas within creosote bush scrub habitat. Additionally, existing roads will be improved and used for access and pipeline conveyance. During construction, most of the vehicular traffic would be restricted to existing dirt and paved roads. During operations, all vehicular traffic would be limited to existing roads. Thus, these actions will further minimize potential impacts.

The project site consists of unsuitable habitat for special-status plant species; therefore, potential adverse impacts are not expected. BLM sensitive plant species occur on the project site. To the extent practicable, these species will be avoided. Adverse impacts to special-status wildlife species that may potentially occur in the vicinity of the project area are not anticipated. The aforementioned special-status wildlife species are unlikely to occur on the project site; however, avian species may occasionally forage or occur on the project site as transients. In order to avoid, reduce, and mitigate potential effects to these species as a result of the proposed project, minimization measures are proposed in Section 9.0.

9.0 Avoidance and Minimization Measures

Although the proposed project is unlikely to result in any adverse temporary or permanent impacts to special-status species, the following general impact avoidance and minimization measures are proposed. The objective of the measures is to avoid, reduce or mitigate potential effects to habitat and special-status species that may occur during the proposed project construction and operational activities:

1. All project activities will be conducted in a manner that avoids take of a listed species. Take is defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Should a listed species enter the project site or become harmed or killed by project activities, the project will be shut down and the USFWS, Bureau and CDFG will be consulted. Impacts to habitat will also be minimized to the maximum possible extent.
2. Listed species including the desert tortoise will not be handled or harassed. Encounters with a listed species will be reported to the CH2MHILL project and BLM Lake Havasu (Bureau) biologists. These biologists will maintain records of all listed species encountered during project activities. This information will include for each individual: the locations (narrative, vegetation type, and maps) and dates of observations; general conditions and health; any apparent injuries and state of healing; and diagnostic markings.
3. To the maximum extent possible, facilities (treatment facility, pipelines, injection wells, and access routes) will be sited within an existing right–of-way (ROW) and previously-disturbed or barren areas to limit new surface disturbance.
4. All PG&E employees and its contractors involved with the proposed project will be required to attend PG&E's threatened and endangered species education program prior to initiation of activities. New employees will receive formal, approved training prior to working on-site.
5. Existing routes of travel to and from the proposed project site will be used. Cross-country use of vehicles and equipment will be prohibited.
6. Trash and food items will be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as common ravens (*Corvus corax*), coyotes (*Canis latrans*), and feral dogs.
7. To minimize effects, lights will be angled toward the ground, reduced in intensity to levels compatible with safety concerns, and limited in duration of usage.
8. Employees will not bring pets to the project site.
9. Firearms will be prohibited from the proposed project site.

10. Employees will be required to check under their equipment or vehicle before it is moved. If a desert tortoise is encountered, the vehicle is not to be moved until the animal has voluntarily moved to a safe distance away from the parked vehicle.

11. Upon project completion, all unused material and equipment will be removed from the site. This condition does not apply to fenced sites.

12. Upon locating an individual of a dead or injured listed species, PG&E will make initial notification to the Bureau and US Fish and Wildlife Service (Service) within three working days of its finding. The notification must be made in writing to the Service's Division of Law Enforcement in Torrance (370 Amapola Avenue, Suite 114, Torrance, California 90501; (310) 328-1516) and by telephone and writing to the Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003; (805) 644-1766). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities will be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the CDFG and the Bureau will be contacted for final disposition of the animal.

13. The biologist will be responsible for assisting crews in compliance with the minimization measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist will be implemented for special-status wildlife species in impact areas immediately prior to initiation of ground-disturbing activities. The inspection will provide 100 percent coverage of the area within the project limits. All desert tortoise burrows and pallets outside of, but near, the project footprint will be flagged at that time so that they may be avoided during work activities. At the conclusion of work activities, all flagging will be removed.

14. Preconstruction surveys for avian nesting pairs, nests, and eggs will occur in areas proposed for any vegetation removal and active nesting areas flagged. If nesting birds are detected, vegetation removal will be avoided during the nesting season (generally February to August for most birds). All construction activity within 200 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests.

15. Palo verde, ocotillo, mesquite, cat-claw, smoke tree, and cacti species are considered sensitive by the BLM. To the extent practicable, these species will be avoided. If avoidance is not possible, these species will be transplanted when practical. Should any of the aforementioned plants be destroyed, they will be replaced.

16. PG&E will designate a field contact representative (FCR) who will be responsible for overseeing compliance with the minimization measures. The FCR must be onsite during all construction activities. The FCR will have authority to halt all activities that are in violation of the minimization measures and/or pose a danger to listed species. The FCR will have a copy of all minimization measures when work is being conducted on the site. The FCR may be a project manager, PG&E representative, or a biologist.

17. The area of disturbance will be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public

health and safety, and other limiting factors. As needed, work area boundaries will be delineated with flagging or other marking to minimize surface disturbance associated with vehicle straying.

18. All activities will be restricted to a pre-determined corridor. If unforeseen circumstances require project expansion, the potential expanded work areas will be surveyed for listed species prior to use of the area. All appropriate minimization measures will be implemented within the expanded work areas based on the judgment of the agencies and the project biologist. Work outside of the original ROW will proceed only after receiving written approval from the Bureau, Service and CDFG describing the exact location of the expansion.

19. PG&E has the option of erecting desert tortoise fencing in lieu of inspection of open trenches. If the trench is short, personnel may monitor the trench. All open holes and trenches will be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum. During excavation of trenches or holes, earthen ramps will be provided to facilitate the escape of any wildlife species that may inadvertently become entrapped. If desert tortoises are trapped, the project biologist will be notified immediately. The desert tortoise will be allowed to escape before work continues in that location. A final inspection of the open trench segment will also be made immediately before back filling. All open pipe segments will be covered when work activity is not occurring at the site. Trenches must meet the safety requirements of the Occupational Safety and Health Administration before personnel enter open trenches to remove wildlife.

20. All construction vehicles and equipment will be periodically checked to ensure proper working condition and to ensure that there is no potential for fugitive emissions of oil, hydraulic fluid or other hazardous products. The Bureau will be informed of any hazardous spills.

21. Workers will exercise caution when traveling to and from the project area. To minimize the likelihood for vehicle strikes of listed species, speed limits when commuting to project areas on ROW roads will not exceed 20 miles per hour.

22. Intentional killing or collection of either plant or wildlife at construction sites and surrounding areas will be prohibited. The Bureau will be notified of any such occurrences.

23. The Bureau will endeavor to place the remains of intact listed species with educational or research institutions holding the appropriate state and federal permits per their instructions. If such institutions are not available or the animal's remains are in poor condition, the information noted above will be obtained and the carcass left in place. If the animal is a desert tortoise, the Bureau should consider marking the carcass in a manner that would not be toxic to other wildlife to ensure that it would not be re-recorded in the future. Arrangements regarding proper disposition of potential museum specimens will be made with the institution by the Bureau through a biologist prior to implementation of the action.

24. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E will notify the Bureau within 48 hours. As a part of this emergency response, the Bureau may require specific measures to protect listed species. During cleanup and repair, the agencies may also require measures to recover damaged habitats.

25. Once the treatment facility is no longer needed, PG&E will be required to restore disturbed areas in a manner that will assist in the re-establishment of biological values within the disturbed ROW. Methods of such restoration will include the reduction of erosion, re-spreading of the top two inches of soil, planting with appropriate native shrubs, and scattering of bladed vegetation and rocks across the ROW, depending upon the appropriateness or effectiveness in a given area.

26. Within 60 days of completion of construction activities, the FCR and biologist will prepare a brief report for the Bureau documenting the effectiveness and practicality of the minimization measures and making recommendations for modifying the measures to enhance species protection. The report will also provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.

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Appendix A

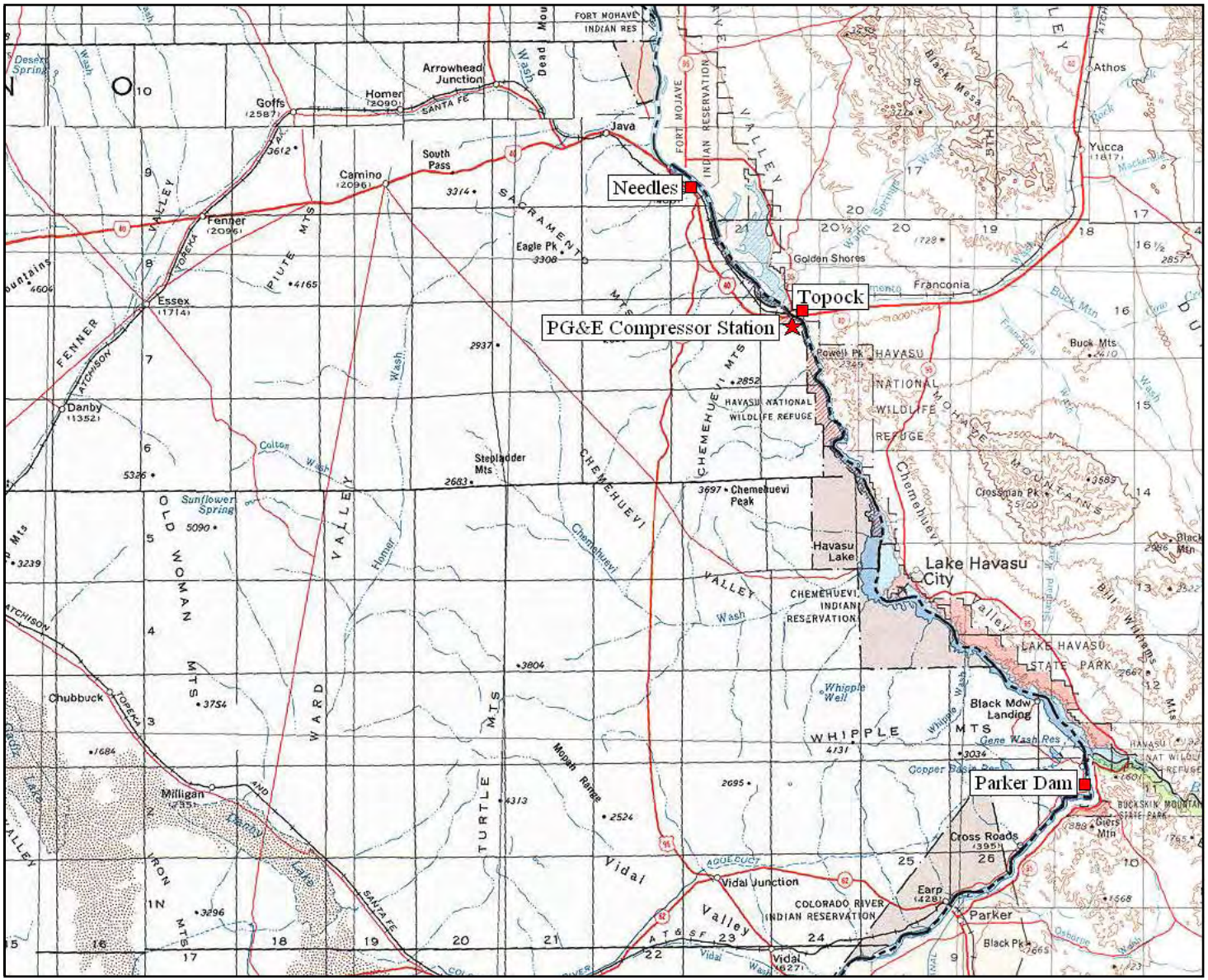


Figure 1
Site Location Map

PG&E Topock Compressor Station

CH2MHILL

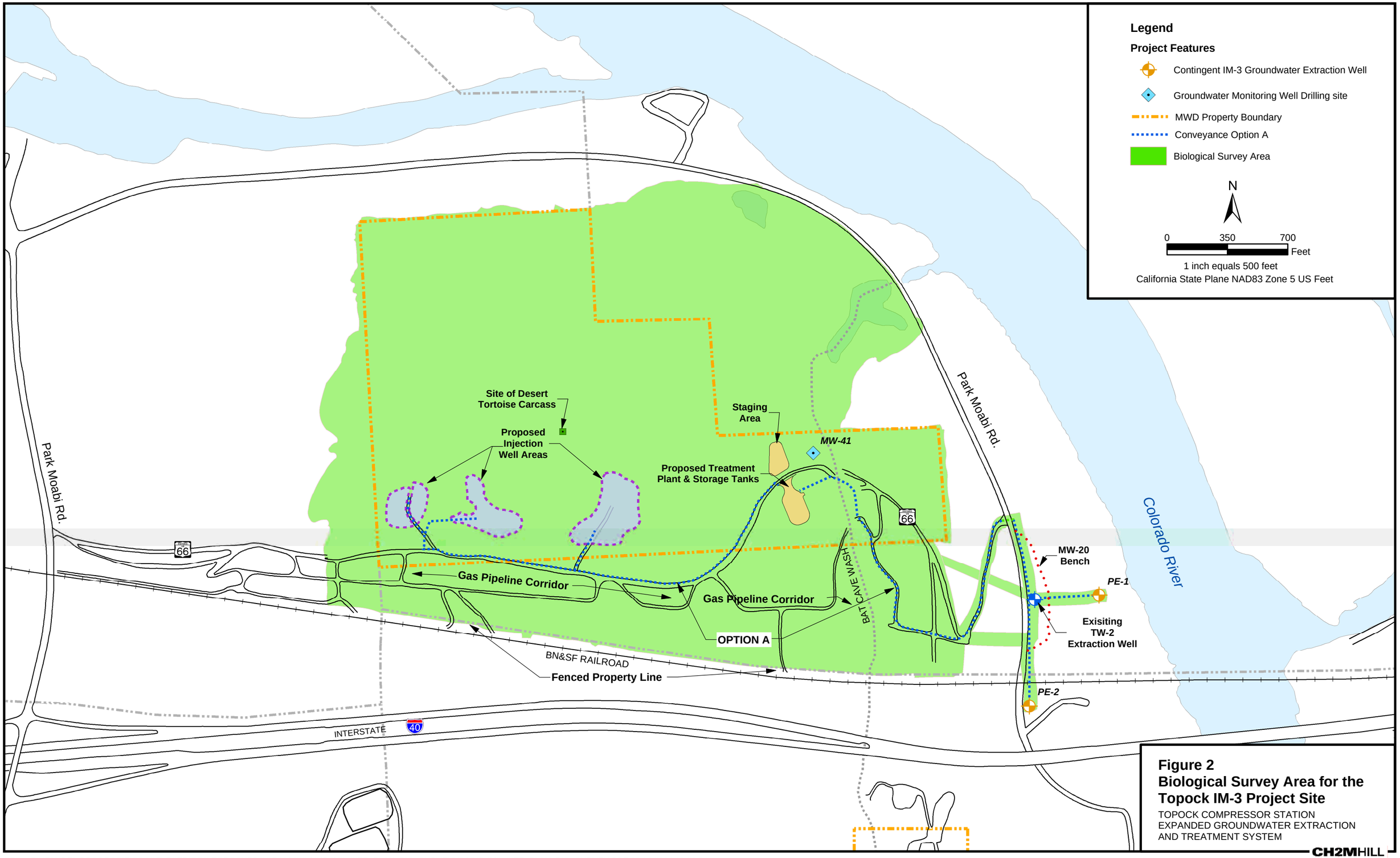
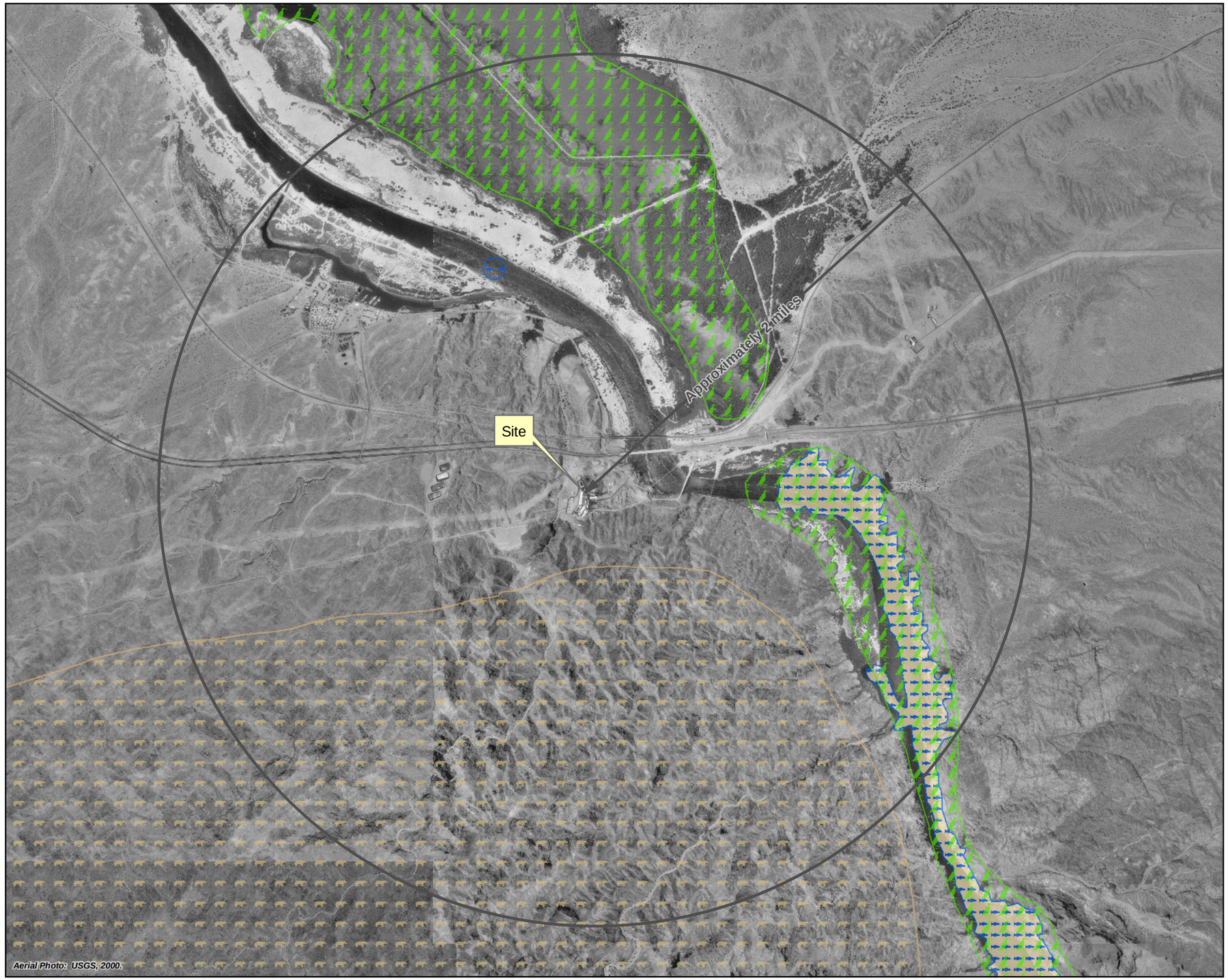


Figure 2
Biological Survey Area for the Topock IM-3 Project Site

TOPOCK COMPRESSOR STATION
EXPANDED GROUNDWATER EXTRACTION
AND TREATMENT SYSTEM

CH2MHILL



N

2,500 1,250 0 2,500
Feet

Legend

- Nelson's Bighorn Sheep
- Yuma Clapper Rail
- Bonytail
- Flannelmouth and Razorback Suckers

Note: CNDDB Data from the Topock and Whale Mountain USGS Quads was used.

Source: CNDDB, 2003.

Figure 3

Special Status Species Potentially Occurring in the Project Vicinity

CH2MHILL

November 25, 2003

GIS1 on 'Galt\Topock\Plots\Figure03PotentialOcc_111903.mxd User: TFaludy

Appendix B

TABLE 1
Potentially-occurring Special-status Species Within the Vicinity of the Project Site

Species	Status [a] (Federal/State)	Habitat Present within the Project Impact Area	Potential for Occurrence in Area of Potential Effects	Habitat Requirements
Mammals				
Nelson's Bighorn Sheep *Ovis canadensis nelsoni*	**-- / --**	No	Low	Open, rocky, steep areas with available water and herbaceous forage.
Birds				
Burrowing Owl *Athene cunicularia*	**FSC / CSC**	No	Low	Open grasslands and agricultural fields with burrowing mammal populations.
Ferruginous Hawk *Buteo regalis*	**--- / CSC**	No	Low	Winter visitor and migrant to open grasslands and agricultural areas in the desert.
Le Conte's Thrasher *Toxostoma lecontei*	**FSC / CSC**	No	Low	Desert resident; primarily of open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub habitats.
Loggerhead Shrike *Lanius ludovicianus*	**FSC / CSC**	No	Low	Broken woodlands, savannah, pinyon-juniper, joshua tree, and riparian woodlands, desert oases, desert scrub & washes. Prefer open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.
Prairie Falcon *Falco mexicanus*	**--- / CSC**	No	Low	Inhabits dry, open terrain, either level or hilly.
Southwestern Willow Flycatcher *Empidonax traillii extimus*	**FE / ---**	No	Low	Occur in dense riparian habitats along streams, rivers, and other wetlands. Inhabiting low elevations, the Flycatcher breeds in stands of dense cottonwood, willow, and tamarisk thickets.
Yuma Clapper Rail *Rallus longirostris yumanensis*	**FE / ST**	No	Low	Nests in freshwater marshes with stands of cattails and tules dissected by narrow channels of flowing water.
Reptiles				

TABLE 1
Potentially-occurring Special-status Species Within the Vicinity of the Project Site

Species	Status [a] (Federal/State)	Habitat Present within the Project Impact Area	Potential for Occurrence in Area of Potential Effects	Habitat Requirements
Desert Tortoise *Gopherus agassizii*	**FT / ST**	Poor	Low	Common in desert scrub, desert wash, and joshua tree habitats. Requires friable soils required for burrow and nest construction. Also requires creosote bush habitat with large annual wildflower blooms for foraging.
Fish				
Bonytail *Gila elegans*	**FE / SE**	No	Unlikely	Occupy lacustrine habitat; usually found in areas over a clean, sandy bottom with reverse eddy current.
Flannelmouth Sucker *Catostomus latipinnis*	**-- / --**	No	Unlikely	Found in the Colorado River Bordering California.
Razorback Sucker *Zyrauchen texanus*	**FE / SE**	No	Unlikely	Adapted for swimming in swift currents, but also need quite waters. Spawn in areas of sand / gravel / rocks in shallow water.

Notes:
[a] Key to status designations.

Federal Designations:
(FE) federally endangered, (FT) federally threatened, (FPE) Federally Proposed Endangered, (FPT) Federally Proposed Threatened, (FSC) Species of Concern, (FC) Candidate.

State Designations:

(SE) State Endangered, (ST) State Threatened, (SR) State Rare, (CSC) Species of Concern, (CFP) Fully Protected Species.

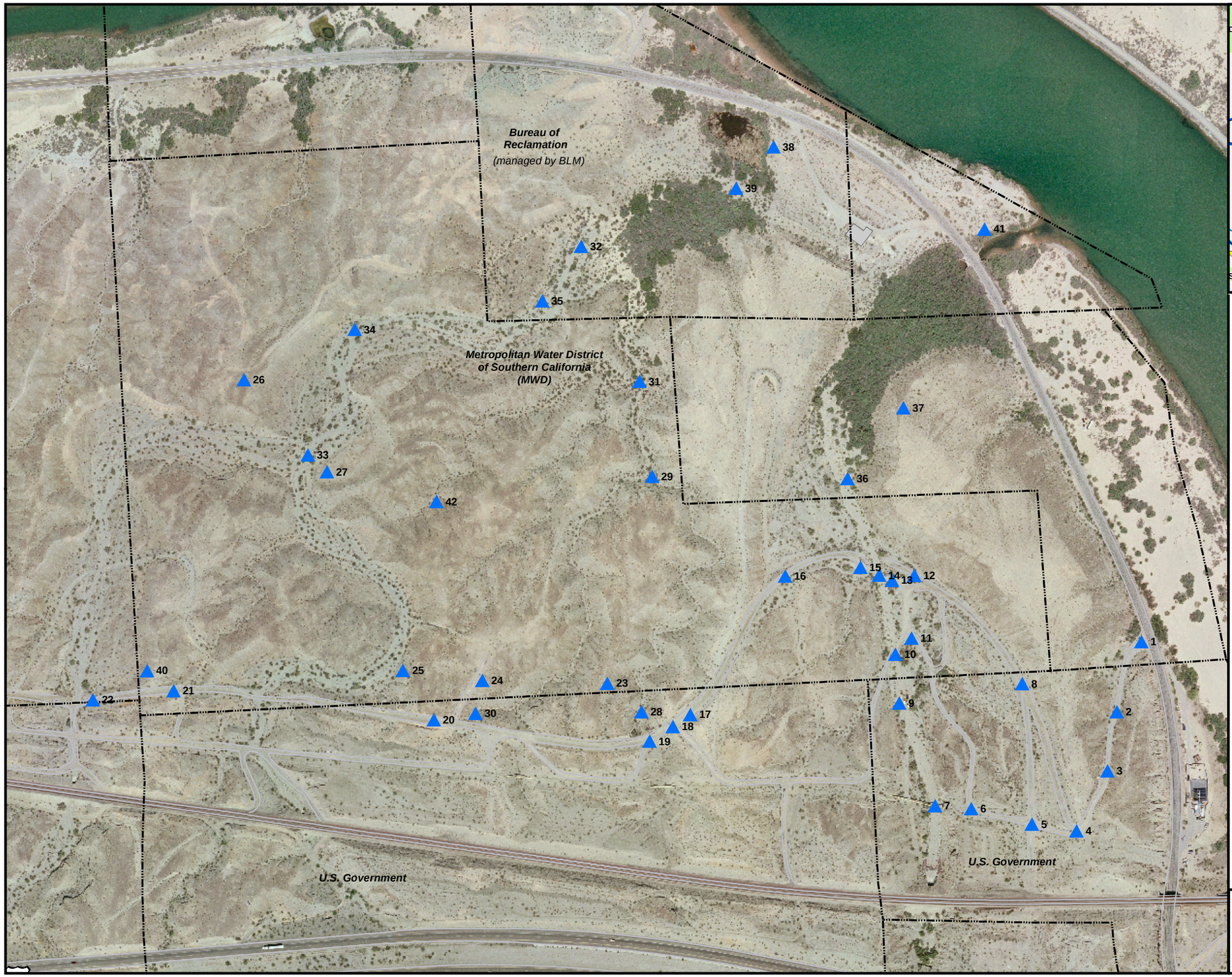
TABLE 2
List of Observed Plants and Wildlife Incidental to the Survey

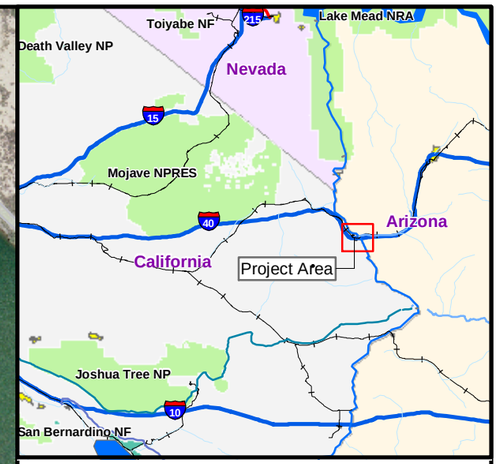
Common Name	Scientific Name
Plants	
Allscale saltbush	*Atriplex polycarpa*
Beavertail cactus	*Opuntia basilaris*
Brittlebush	*Encelia farinosa*
Burrobush	*Ambrosia dumosa*
Catclaw	*Acacia greggii*
Creosote bush	*Larrea tridentata*
Dalea	*Dalea mollisma*
Desert trumpet	*Eriogonum inflatum*
Fishhook cactus	*Mammillaria* sp.
Jumping cholla	*Opuntia bigelovii*
Mesquite	*Prosopis* sp
Ocotillo	*Fonquieria splendens*
Palo verde	*Ceridium* sp
Saltcedar	*Tamarix* sp
Smoke tree	*Dalea spinosa*
Spineflower	*Chorizanthe* sp.
Sweetbush	*Bebbia juncea*
Birds	
Ash-throated flycatcher	*Myiarchus cinerascens*
Canyon wren	*Catherpes mexicanus*
Cliff swallow	*Hirundo pyrrhonota*
Common poorwill	*Phalaenoptilus nuttallii*
Gambel's quail	*Callipepla gambelii*
Great-tailed grackle	*Quiscalus mexicanus*
Lesser nighthawk	*Chordeiles acutipennis*
Mourning dove	*Zenaida macroura*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Phainopepla	*Phainopepla nitens*
Turkey vulture	*Cathartes aura*

TABLE 2
List of Observed Plants and Wildlife Incidental to the Survey

Common Name	Scientific Name
Reptiles	
Desert tortoise (carcass)	*Gopherus agassizii*
Coachwhip	*Masticophis flagellum*
Desert iguana	*Dipsosaurus dorsalis*
Western whiptail	*Cnemidophorus tigris*
Mammals	
Black-tailed jackrabbit	*Lepus californicus*
Coyote	*Canis latrans*
Northern river otter	*Lutra canadensis*

Appendix C





Legend

- Photo Locations
- Property Boundaries

N

0 175 350 700 Feet

1 inch equals 350 feet

Photographic Point Location Map of MDW Parcel

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

SFO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\MAY04_MWD_PHOTO_LOCATIONS.MXD MAY04_MWD_PHOTO_LOCATIONS.PDF 07/12/2004 15:28:35

Photo Point 1: Viewing southeast from photo point location.

Photo Point 2: Viewing northeast from photo point location.

Photo Point 2: Viewing southwest from photo point location.

Photo Point 3: Viewing northeast from photo point location.

Photo Point 3: Viewing southwest from photo point location.

Photo Point 4: Viewing northeast from photo point location.

Photo Point 4: Viewing northwest along Historic Route 66 from photo point location.

Photo Point 4: Viewing west from photo point location.

Photo Point 5: Viewing north from photo point location.

Photo Point 6: Viewing north from photo point location.

Photo Point 7: Viewing north from photo point location within Batcave Wash.

Photo Point 7: Viewing south from photo point location within Batcave Wash.

Photo Point 8: Viewing southeast from photo point location along Historic Route 66.

Photo Point 9: Viewing northwest from photo point location along Historic Route 66.

Photo Point 9: Viewing north from photo point location within Batcave Wash.

Photo Point 9: Viewing south from photo point location within Batcave Wash.

Photo Point 10: Viewing north from photo point location within Batcave Wash.

Photo Point 10: Viewing south from photo point location within Batcave Wash.

Photo Point 11: Viewing northwest from photo point location.

Photo Point 12: Viewing southeast from photo point location.

Photo Point 12: Viewing southeast from photo point location.

Photo Point 13: Viewing northwest from photo point location.

Photo Point 14: Viewing north from photo point location with Batcave Wash.

Photo Point 14: Viewing south from photo point location within Batcave Wash.

Photo Point 15: Viewing southeast from photo point location.

Photo Point 16: Viewing northwest from photo point location.

Photo Point 16: Viewing northeast from photo point location.

Photo Point 16: Viewing southeast from photo point location.

Photo Point 16: Viewing south from photo point location.

Photo Point 16: Viewing northwest from photo point location along Historic Route 66.

Photo Point 17: Viewing northeast from photo point location along Historic Route 66.

Photo Point 17: Viewing southwest from photo point location along Historic Route 66.

Photo Point 18: Viewing southeast from photo point location at pipeline maintenance road.

Photo Point 19: Viewing southwest from photo point location at pipeline maintenance road.

Photo Point 20: Viewing east from photo point location along Historic Route 66.

Photo Point 20: Viewing west from photo point location along Historic Route 66.

Photo Point 21: Viewing east from photo point location along Historic Route 66.

Photo Point 21: Viewing west from photo point location along Historic Route 66.

Photo Point 22: Viewing east from photo point location along Historic Route 66.

Photo Point 22: Viewing west from photo point location along Historic Route 66.

Photo Point 23: Viewing northeast from photo point location.

Photo Point 23: Viewing west from photo point location.

Photo Point 23: Viewing south from photo point location.

Photo Point 23: Viewing southeast from photo point location.

Photo Point 23: Viewing east from photo point location.

Photo Point 24: Viewing west from photo point location.

Photo Point 24: Viewing northwest from photo point location.

Photo Point 24: Viewing north from photo point location.

Photo Point 24: Viewing northeast from photo point location.

Photo Point 25: Viewing southwest from photo point location.

Photo Point 25: Viewing northwest from photo point location.

Photo Point 25: Viewing north from photo point location.

Photo Point 25: Viewing east from photo point location.

Photo Point 26: Viewing south from photo point location.

Photo Point 26: Viewing southeast from photo point location.

Photo Point 26: Viewing east from photo point location.

Photo Point 27: Viewing southeast from photo point location.

Photo Point 27: Viewing east from photo point location.

Photo Point 27: Viewing north from photo point location.

Photo Point 28: Viewing south from photo point location.

Photo Point 29: Viewing southeast from photo point location.

Photo Point 29: Viewing west from photo point location.

Photo Point 30: Viewing south from photo point location.

Photo Point 31: Viewing west from photo point location.

Photo Point 32: Viewing east from photo point location.

Photo Point 32: Viewing southeast from photo point location.

Photo Point 32: Viewing south from photo point location.

Photo Point 33: Viewing west from photo point location.

Photo Point 33: Viewing northeast from photo point location.

Photo Point 33: Viewing southeast from photo point location.

Photo Point 34: Viewing south from photo point location.

Photo Point 35: Viewing southwest from photo point location.

Photo Point 36: Viewing north from photo point location within Batcave Wash.

Photo Point 37: Viewing south from photo point location.

Photo Point 37: Viewing north from photo point location.

Photo Point 38: Viewing west from photo point location.

Photo Point 38: Viewing southwest from photo point location.

Photo Point 39: Viewing south from photo point location.

Photo Point 40: Viewing east from photo point location.

Photo Point 40: Viewing south from photo point location.

Photo Point 40: Viewing southwest from photo point location.

Photo Point 40: Viewing west from photo point location.

Photo Point 40: Viewing northwest from photo point location.

Photo Point 40: Viewing north from photo point location.

Photo Point 40: Viewing northeast from photo point location.

Photo Point 41: Viewing northeast from photo point location.

Photo Point 41: Viewing south from photo point location.

Photo Point 42: Looking at desert tortoise carcass observed within a small desert wash, tributary to large unnamed wash.

Photo Point 42: Viewing downstream at desert tortoise carcass observed within a small desert wash, tributary to large unnamed wash.

Photo Point 42: Viewing upstream at desert tortoise carcass observed within a small desert wash, tributary to large unnamed wash.

Desert Tortoise Protocol Survey
Technical Memorandum for Interim Measures No. 3
Topock Compressor Station
Expanded Groundwater Extraction and Treatment System
San Bernardino County, California

PREPARED FOR: Mark Howell/Bureau of Land Management - Lake Havasu Field Office

PREPARED BY: Ray Romero/CH2M HILL

DATE: September 30, 2004

Introduction

This technical memorandum serves as an addendum to the report entitled *Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System, San Bernardino, California* dated September 2004. This memorandum documents the desert tortoise protocol level survey performed for the western segment of the old Route 66 near the Park Moabi Road intersection, immediately north of Interstate 40. This report summarizes the survey findings, assesses potential impacts to resources, and proposes to implement the Interim Measures (IM) No. 3 Bureau of Land Management-approved measures to avoid, reduce and mitigate potential impacts during project activity.

As described in the Biological Resources Investigations for IM No. 3 report, access to the site is available from the Park Moabi Road interchange with Interstate 40. Internal portions of the project site may be accessed from the west at the intersection of Park Moabi Road and old Route 66 ("western access route"); access from the east is provided from Park Moabi Road ("eastern access route") and the proposed pipeline access roads. Construction activities on the eastern access route include road widening and trenching to install conveyance piping to the planned treatment facilities. A second site access route (from the west) is necessary to accommodate construction, concurrent well installations and support during operation of the treatment facility. In addition, the second route will meet San Bernardino County Fire Department requirements that at least two access routes be provided to the site. As described below, the western access route crosses previously disturbed and fragmented desert tortoise (*Gopherus agassizii*) habitat.

Methodology

CH2MHILL senior wildlife biologist Ray Romero performed a U.S. Fish and Wildlife Service (USFWS) protocol level survey for the desert tortoise on September 28 and 30, 2004. The objective of the survey was to determine presence/absence of the desert tortoise along the proposed western access route. The survey focused on the detection of any live desert tortoises or other indications of presence such as carcasses, shell fragments, burrows, scat, courtship rings, tracks, egg shell fragments, etc.

A full coverage survey was conducted along the old Route 66, south of the road to the Burlington Northern Santa Fe railroad tracks, and an area extending 100 feet north of the road. Additionally, zone of influence transects at distances of 300, 600, and 1200 feet north of the road were conducted. The 2400 foot transect north of the road was not performed because it lies within the waters of the Colorado River and this area is considered unsuitable habitat for the desert tortoise. Zone of influence transects were not performed south of the road due to the railroad tracks and I-40 freeway running parallel and adjacent to the road. The tracks and freeway are considered barriers for the desert tortoise. All belt transects were 30 feet wide and terminated at Park Moabi Road to the west and the original survey area at the unnamed wash to the east. The area surveyed in accordance with USFWS protocol is shown on the attached figure.

Results

The landscape in the vicinity of the western route is fragmented and significantly disturbed by construction of I-40 Highway, Park Moabi Road, old Route 66, several dirt roads, gas pipeline corridors, and the Burlington Northern Santa Fe Railway (shown on attached figure). In addition, significant amounts of litter and several illegal dump sites were observed along the roadways and railroad tracks.

The terrain is a series of terraces divided by dry desert washes. The landscape within the proposed project area is considerably eroded and can be described most suitably as badlands. The lands are made up of small- to moderately-sized terraces with very steep slopes potentially cut by historic flash flood events. For the most part, terraces occurring on site are homogeneous, comprising rocky soils with very sparse vegetation, mostly resembling creosote bush desert scrub plant community.

Microhabitat requirements for the desert tortoise are very limited at the site and in the general vicinity. The site is previously disturbed and fragmented, providing poor quality habitat for this species. Poor quality habitat at the project site is defined as follows:

- Habitat fragmentation from man-made and natural barriers such as I-40 Highway, Park Moabi Road, railroad tracks, Colorado River, and Sacramento Mountains.
- Previous disturbance from dirt roads, natural gas pipeline corridor, and illegal dumping.
- Lack of friable soils. Soils are predominately rocky and are not conducive to burrow construction.

- Low abundance of vegetation providing little to no forage (annual grasses and forbs) and cover (perennial shrubs).

Live desert tortoises and evidence of their presence were not detected during the protocol level survey. Based on the lack of any evidence of presence and poor habitat conditions, there is a very low probability for this species to occur within or adjacent to the project site.

Impact Assessment

The site consists of poor habitat for the desert tortoise. Additionally, evidence of desert tortoise use along the western access route was not detected during the survey. No vegetation will be affected as a result of traveling along the pre-existing western access road. Vegetation will not be removed or crushed. Other than traveling on the existing dirt road with vehicles and equipment, no other ground disturbing activities, such as grading, will occur along the road. Vehicles will be restricted to old Route 66 to access the site from the west. This would further reduce the likelihood of any potential impacts to this species. Therefore, potential impacts are not considered adverse and traveling along the western access route during construction and operation of the IM No. 3 project is anticipated to have no effect on the desert tortoise.

Avoidance and Minimization Measures

Although traveling along the western access route is unlikely to result in any adverse temporary or permanent impacts to the desert tortoise, the following general impact avoidance and minimization measures are proposed. These measures are identical to those that have been approved previously by the Bureau of Land Management for the IM No. 3 project. Besides the desert tortoise, the specific measures include those for other sensitive species. The primary objective of the measures is to avoid, reduce or mitigate potential effects to desert tortoises and their habitat that may occur while traveling on the western route during project construction and operational activities:

1. All project activities will be conducted in a manner that avoids take of a desert tortoise. Take is defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure a desert tortoise by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Should a desert tortoise enter the project site or become harmed or killed by project activities, the project will be shut down and the USFWS, Bureau and CDFG will be consulted. Impacts to habitat will also be minimized to the maximum possible extent.

2. The desert tortoise will not be handled or harassed. Encounters with a desert tortoise will be reported to the CH2MHILL project and BLM Lake Havasu (Bureau) biologists. These biologists will maintain records of all desert tortoises encountered during project activities. This information will include for each individual: the locations (narrative, vegetation type, and maps) and dates of observations; general conditions and health; any apparent injuries and state of healing; and diagnostic markings.

3. To the maximum extent possible, facilities (treatment facility, pipelines, injection wells, and access routes) will be sited within an existing right–of-way (ROW) and previously-disturbed or barren areas to limit new surface disturbance.

4. All PG&E employees and its contractors involved with the proposed project will be required to attend PG&E's threatened and endangered species education program prior to initiation of activities. New employees will receive formal, approved training prior to working on-site.

5. Existing routes of travel to and from the proposed project site will be used. Cross-country use of vehicles and equipment will be prohibited.

6. Trash and food items will be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as common ravens (*Corvus corax*), coyotes (*Canis latrans*), and feral dogs.

7. To minimize effects, lights will be angled toward the ground, reduced in intensity to levels compatible with safety needs, and limited in duration of usage. The hue of lighting will be that which is most compatible with and least disturbing to wildlife.

8. Employees will not bring pets to the project site.

9. Firearms will be prohibited on the proposed project site.

10. Employees will be required to check under their equipment or vehicle before it is moved. If a desert tortoise is encountered, the vehicle is not to be moved until the animal has voluntarily moved to a safe distance away from the parked vehicle.

11. Upon project completion, all unused material and equipment will be removed from the site. This condition does not apply to fenced sites.

12. Upon locating an individual of a dead or injured desert tortoise, PG&E will make initial notification to the Bureau and US Fish and Wildlife Service (Service) within three working days of its finding. The notification must be made in writing to the Service's Division of Law Enforcement in Torrance (370 Amapola Avenue, Suite 114, Torrance, California 90501; (310) 328-1516) and by telephone and writing to the Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003; (805) 644-1766). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities will be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the CDFG and the Bureau will be contacted for final disposition of the animal.

13. The biologist will be responsible for assisting crews in compliance with the minimization measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist will be implemented for desert tortoises in impact areas immediately prior to initiation of ground-disturbing activities. The inspection will provide 100 percent coverage of the area within the project limits. All desert tortoise burrows and pallets outside of, but near, the project footprint will be flagged at that time so that they may be avoided during work activities. At the conclusion of work activities, all flagging will be removed.

14. Preconstruction surveys for avian nesting pairs, nests, and eggs will occur in areas proposed for any vegetation removal and active nesting areas will be flagged. If nesting birds are detected, vegetation removal will be avoided during the nesting season (generally February to August for most birds). All construction activity within 200 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests.

15. Palo verde, ocotillo, mesquite, cat-claw, smoke tree, and cacti species are considered sensitive by the BLM. To the extent practicable, these species will be avoided. If avoidance is not possible, these species will be transplanted when practical. Should any of the aforementioned plants be destroyed, they will be replaced.

16. PG&E will designate a field contact representative (FCR) who will be responsible for overseeing compliance with the minimization measures. The FCR must be onsite during all construction activities. The FCR will have authority to halt all activities that are in violation of the minimization measures and/or pose a danger to listed species. The FCR will have a copy of all minimization measures when work is being conducted on the site. The FCR may be a project manager, PG&E representative, or a biologist.

17. The area of disturbance will be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors. As needed, work area boundaries will be delineated with flagging or other marking to minimize surface disturbance associated with vehicle straying.

18. All activities will be restricted to a pre-determined corridor. If unforeseen circumstances require project expansion, the potential expanded work areas will be surveyed for listed species prior to use of the area. All appropriate minimization measures will be implemented within the expanded work areas based on the judgment of the agencies and the project biologist. Work outside of the original project site will proceed only after receiving written approval from the Bureau, Service and CDFG describing the exact location of the expansion.

19. PG&E has the option of erecting desert tortoise fencing in lieu of inspection of open trenches. If the trench is short, personnel may monitor the trench. All open holes and trenches will be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum. During excavation of trenches or holes, earthen ramps will be provided to facilitate the escape of any wildlife species that may inadvertently become entrapped. If desert tortoises are trapped, the project biologist will be notified immediately. The desert tortoise will be allowed to escape before work continues in that location. A final inspection of the open trench segment also will be made immediately before backfilling. All open pipe segments will be covered when work activity is not occurring at the site. Trenches must meet the safety requirements of the Occupational Safety and Health Administration before personnel enter open trenches to remove wildlife.

20. All construction vehicles and equipment will be periodically checked to ensure proper working condition and to ensure that there is no potential for fugitive emissions of oil,

hydraulic fluid or other hazardous products. The Bureau will be informed of any hazardous spills.

21. Workers will exercise caution when traveling to and from the project area. To minimize the likelihood for vehicle strikes of listed species, speed limits within project areas will not exceed 20 miles per hour.

22. Intentional killing or collection of either plant or wildlife at construction sites and surrounding areas will be prohibited. The Bureau will be notified of any such occurrences.

23. The Bureau will endeavor to place the remains of intact listed species with educational or research institutions holding the appropriate state and federal permits per their instructions. If such institutions are not available or the animal's remains are in poor condition, the information noted above will be obtained and the carcass left in place. If the animal is a desert tortoise, the Bureau should consider marking the carcass in a manner that would not be toxic to other wildlife to ensure that it would not be re-recorded in the future. Arrangements regarding proper disposition of potential museum specimens will be made with the institution by the Bureau through a biologist prior to implementation of the action.

24. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E will notify the Bureau within 48 hours. As a part of this emergency response, the Bureau may require specific measures to protect listed species. During cleanup and repair, the agencies may also require measures to recover damaged habitats.

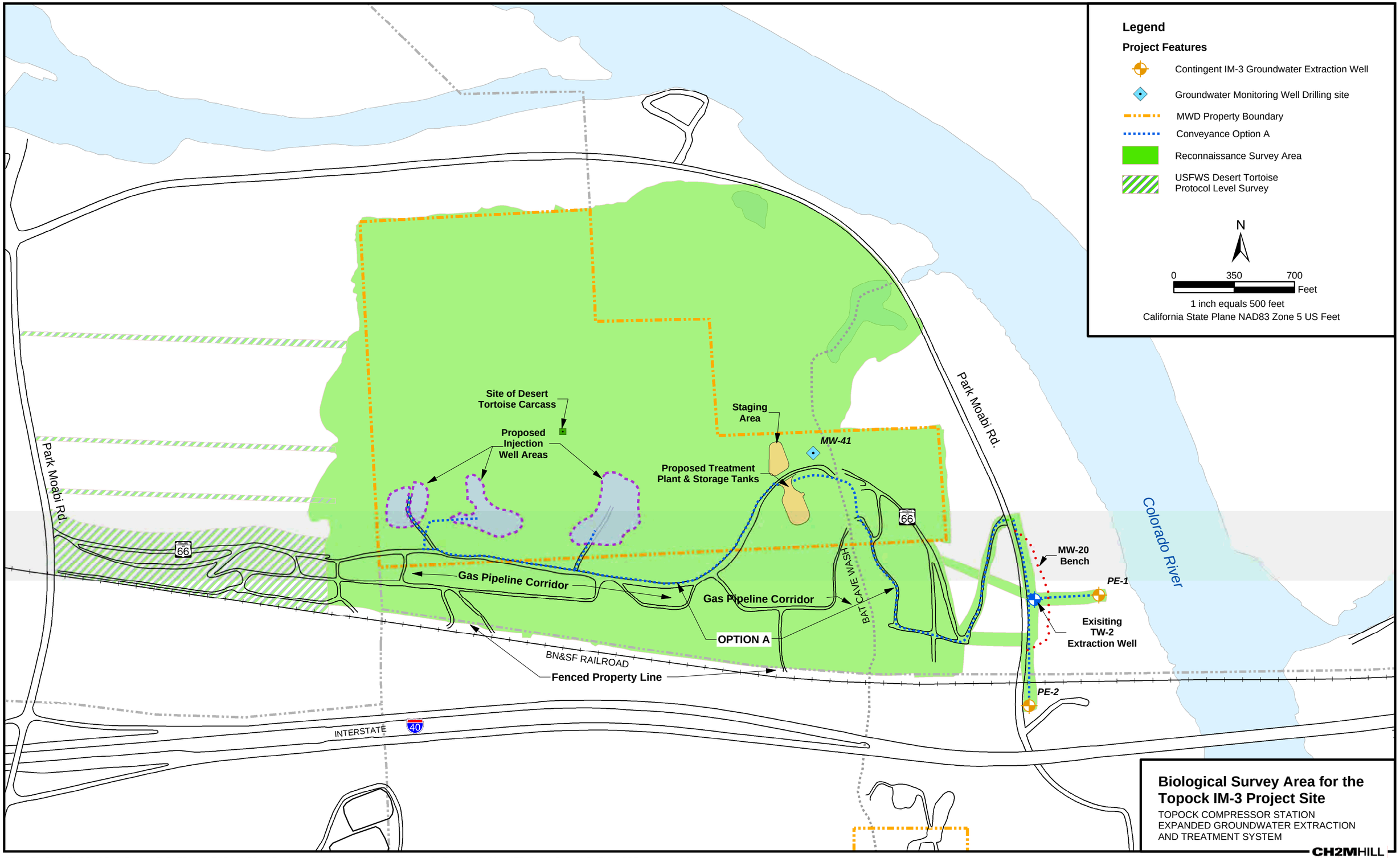
25. Once the treatment facility is no longer needed, PG&E will be required to restore disturbed areas in a manner that will assist in the re-establishment of biological values within the disturbed project site. Methods of such restoration will include the reduction of erosion, re-spreading of the top two inches of soil, planting with appropriate native shrubs, and scattering of bladed vegetation and rocks across the project site, depending upon the appropriateness or effectiveness in a given area.

26. Within 60 days of completion of construction activities, the FCR and biologist will prepare a brief report for the Bureau documenting the effectiveness and practicality of the minimization measures and making recommendations for modifying the measures to enhance species protection. The report will also provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.

27. All areas within the proposed action area and within the potential impact of the action will be monitored semiannually during the active period for tortoise by a biologist knowledgeable of desert tortoise ecology. Surveys will be completed throughout the duration of the action to verify the presence or absence of desert tortoise and reports will be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.

28. Riparian areas surrounding the proposed action site will be surveyed for southwestern willow flycatchers according to the protocol established by the U. S. Fish and Wildlife Service. These surveys will be completed each year by a biologist permitted by the U. S.

Fish and Wildlife Service to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports will be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.



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Desert Tortoise Protocol Survey Technical Memorandum for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino County, California

PREPARED FOR: Mark Howell/Bureau of Land Management - Lake Havasu Field Office

PREPARED BY: Ray Romero/CH2M HILL

DATE: October 12, 2004

Introduction

This technical memorandum serves as Addendum No. 2 to the report entitled *Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino, California* dated September 2004. This memorandum documents the desert tortoise protocol level survey performed for the Interim Measures No. 3 (IM-3) project site located 15 miles southeast of Needles, CA. This technical memorandum summarizes the survey findings, assesses potential impacts to resources, and proposes to implement measures to avoid, reduce and mitigate potential impacts during IM-3 project activity, which have been previously approved by the U.S. Bureau of Land Management (BLM).

As described in the September 2004 Biological Resources Investigations, access to the site is available from the Park Moabi Road interchange with Interstate 40. Internal portions of the project site may be accessed from the west at the intersection of Park Moabi Road and old Route 66; access from the east is provided from Park Moabi Road and the proposed pipeline access roads. Project activities include installation of a treatment facility, pipelines, well injection fields, and monitoring wells.

Methodology

CH2MHILL senior wildlife biologist Ray Romero performed a U.S. Fish and Wildlife Service (USFWS) protocol level survey for the desert tortoise on October 8 and 11, 2004. The objective of the survey was to determine presence/absence of the desert tortoise at the project site. The survey focused on the detection of any live desert tortoises or other indications of presence such as carcasses, shell fragments, burrows, scat, courtship rings, tracks, egg shell fragments, etc.

Polygons encompassing the well fields, treatment facility/staging area, and access/egress route as well as the accompanying zone of influence transects were overlaid on an aerial photograph of the project site. The three polygons and associated zone of influence transects were color coded to eliminate confusion. The map was used to maintain transect integrity while performing the protocol level survey. A full coverage survey was repeated within the three polygons. The zone of influence survey methodology was modified to include transects at distances of 100, 300, 600, and 1200 feet. The 2400 foot transects were not performed because they lie within or outside natural or man-made barriers for the desert tortoise. These barriers include Interstate 40, Park Moabi Road, Burlington Northern Santa Fe Railway (BNSF), and the Colorado River. Additionally, transects that intersected Park Moabi Road or the railway were terminated at those junctions. All belt transects were 30 feet wide. The methodology was approved by the BLM Lake Havasu Field Office prior to conducting the survey. The area surveyed in accordance with USFWS protocol is shown on the attached figure.

Results

As shown in the attached figure and observed during the survey, the habitat at the project site is fragmented and disturbed by past construction of the Interstate 40, Park Moabi Road, old Route 66, various unimproved access roads, a gas pipeline corridor, and the BNSF railway. The project area is bound by paved roads, the BNSF railway, and Colorado River. Substantial amounts of litter and several debris sites were observed along the roads and railway.

The terrain is a series of terraces divided by dry desert washes. The terrain within the proposed project area is considerably eroded and can most suitably be described as badlands. The lands are made up of small- to moderately-sized terraces with steep slopes potentially cut by historic flash flood events. The terraces occurring on site are homogeneous, comprising rocky soils with very sparse vegetation resembling creosote bush desert scrub plant community.

Microhabitat requirements for the desert tortoise are very limited at the site and in the general vicinity. The site provides poor quality habitat for this species. Poor quality habitat at the project site is defined as follows:

- Immediate proximity to the Colorado River Floodplain that is considered unsuitable habitat.
- Lack of friable soils. Soils are predominately rocky and not conducive to burrow construction.
- Low abundance of vegetation providing little to no forage (annual grasses and forbs) and cover (perennial shrubs).
- Steep rocky terraces with a greater than 20% slope making it very difficult for the species to negotiate.
- Habitat fragmentation from man-made and natural barriers such as the Interstate 40, Park Moabi Road, BNSF railway, Colorado River, and Sacramento Mountains.

- Previous disturbance from dirt roads including old Route 66, natural gas pipeline corridor, and litter and debris.

Live desert tortoises and other evidence of their presence were not detected during the protocol level survey. Although evidence of presence was not observed during the protocol level survey, a weathered desert tortoise plastron, thought to be deposited onsite by a flash flood event, was previously observed outside the project area during the reconnaissance field survey. This observation was documented in the September 2004 Biological Resources Investigations for IM-3, to which this technical memorandum serves as an addendum. Based on the lack of any other evidence of presence during the protocol level survey and poor habitat conditions, there is a very low probability for this species to occur within or adjacent to the project site.

Impact Assessment

Several creosote bushes will be removed from the areas identified for the eastern access route/conveyance pipeline and treatment facility/staging area. Creosote bushes located within the well fields may be crushed by the drilling equipment. A preconstruction survey of the sites was performed to avoid direct impacts to the desert tortoise. There is no evidence of desert tortoise presence directly within the project site. This further reduces the likelihood of any potential impacts to this species. Therefore, potential impacts are not considered adverse and construction and operational activities for the IM-3 project are anticipated to have no affect on the desert tortoise.

Avoidance and Minimization Measures

Although the project is unlikely to result in any adverse temporary or permanent impacts to the desert tortoise, the following impact avoidance and minimization measures are proposed. These measures are identical to those that have been previously approved by the BLM for the IM-3 project. Besides the desert tortoise, the specific measures include those identified for other sensitive species. The primary objective of the measures is to avoid, reduce or mitigate potential effects to desert tortoises and their habitat that may occur during project construction and operational activities:

1. All project activities will be conducted in a manner that avoids take of a desert tortoise. Take is defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure a desert tortoise by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Should a desert tortoise enter the project site or become harmed or killed by project activities, the project will be shut down and the USFWS, Bureau and CDFG will be consulted. Impacts to habitat will also be minimized to the maximum possible extent.

2. The desert tortoise will not be handled or harassed. Encounters with a desert tortoise will be reported to the CH2MHILL project and BLM Lake Havasu (Bureau) biologists. These biologists will maintain records of all desert tortoises encountered during project activities. This information will include for each individual: the locations (narrative,

vegetation type, and maps) and dates of observations; general conditions and health; any apparent injuries and state of healing; and diagnostic markings.

3. To the maximum extent possible, facilities (treatment facility, pipelines, injection wells, and access routes) will be sited within an existing right–of-way (ROW) and previously-disturbed or barren areas to limit new surface disturbance.

4. All PG&E employees and its contractors involved with the proposed project will be required to attend PG&E's threatened and endangered species education program prior to initiation of activities. New employees will receive formal, approved training prior to working on-site.

5. Existing routes of travel to and from the proposed project site will be used. Cross-country use of vehicles and equipment will be prohibited.

6. Trash and food items will be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as common ravens (*Corvus corax*), coyotes (*Canis latrans*), and feral dogs.

7. To minimize effects, lights will be angled toward the ground, reduced in intensity to levels compatible with safety concerns, and limited in duration of usage. The hue of lighting will be that which is most compatible with and least disturbing to wildlife.

8. Employees will not bring pets to the project site.

9. Firearms will be prohibited from the proposed project site.

10. Employees will be required to check under their equipment or vehicle before it is moved. If a desert tortoise is encountered, the vehicle is not to be moved until the animal has voluntarily moved to a safe distance away from the parked vehicle.

11. Upon project completion, all unused material and equipment will be removed from the site. This condition does not apply to fenced sites.

12. Upon locating an individual of a dead or injured desert tortoise, PG&E will make initial notification to the Bureau and US Fish and Wildlife Service (Service) within three working days of its finding. The notification must be made in writing to the Service's Division of Law Enforcement in Torrance (370 Amapola Avenue, Suite 114, Torrance, California 90501; (310) 328-1516) and by telephone and writing to the Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003; (805) 644-1766). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities will be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the CDFG and the Bureau will be contacted for final disposition of the animal.

13. The biologist will be responsible for assisting crews in compliance with the minimization measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist will be implemented for desert tortoises in impact areas immediately prior to initiation of ground-disturbing activities. The inspection will provide 100 percent coverage of the

area within the project limits. All desert tortoise burrows and pallets outside of, but near, the project footprint will be flagged at that time so that they may be avoided during work activities. At the conclusion of work activities, all flagging will be removed.

14. Preconstruction surveys for avian nesting pairs, nests, and eggs will occur in areas proposed for any vegetation removal and active nesting areas flagged. If nesting birds are detected, vegetation removal will be avoided during the nesting season (generally February to August for most birds). All construction activity within 200 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests.

15. Palo verde, ocotillo, mesquite, cat-claw, smoke tree, and cacti species are considered sensitive by the BLM. To the extent practicable, these species will be avoided. If avoidance is not possible, these species will be transplanted when practical. Should any of the aforementioned plants be destroyed, they will be replaced.

16. PG&E will designate a field contact representative (FCR) who will be responsible for overseeing compliance with the minimization measures. The FCR must be onsite during all construction activities. The FCR will have authority to halt all activities that are in violation of the minimization measures and/or pose a danger to listed species. The FCR will have a copy of all minimization measures when work is being conducted on the site. The FCR may be a project manager, PG&E representative, or a biologist.

17. The area of disturbance will be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors. As needed, work area boundaries will be delineated with flagging or other marking to minimize surface disturbance associated with vehicle straying.

18. All activities will be restricted to a pre-determined corridor. If unforeseen circumstances require project expansion, the potential expanded work areas will be surveyed for listed species prior to use of the area. All appropriate minimization measures will be implemented within the expanded work areas based on the judgment of the agencies and the project biologist. Work outside of the original ROW will proceed only after receiving written approval from the Bureau, Service and CDFG describing the exact location of the expansion.

19. PG&E has the option of erecting desert tortoise fencing in lieu of inspection of open trenches. If the trench is short, personnel may monitor the trench. All open holes and trenches will be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum. During excavation of trenches or holes, earthen ramps will be provided to facilitate the escape of any wildlife species that may inadvertently become entrapped. If desert tortoises are trapped, the project biologist will be notified immediately. The desert tortoise will be allowed to escape before work continues in that location. A final inspection of the open trench segment will also be made immediately before back filling. All open pipe segments will be covered when work activity is not occurring at the site. Trenches must meet the safety requirements of the Occupational Safety and Health Administration before personnel enter open trenches to remove wildlife.

20. All construction vehicles and equipment will be periodically checked to ensure proper working condition and to ensure that there is no potential for fugitive emissions of oil, hydraulic fluid or other hazardous products. The Bureau will be informed of any hazardous spills.

21. Workers will exercise caution when traveling to and from the project area. To minimize the likelihood for vehicle strikes of listed species, speed limits when commuting to project areas on ROW roads will not exceed 20 miles per hour.

22. Intentional killing or collection of either plant or wildlife at construction sites and surrounding areas will be prohibited. The Bureau will be notified of any such occurrences.

23. The Bureau will endeavor to place the remains of intact listed species with educational or research institutions holding the appropriate state and federal permits per their instructions. If such institutions are not available or the animal's remains are in poor condition, the information noted above will be obtained and the carcass left in place. If the animal is a desert tortoise, the Bureau should consider marking the carcass in a manner that would not be toxic to other wildlife to ensure that it would not be re-recorded in the future. Arrangements regarding proper disposition of potential museum specimens will be made with the institution by the Bureau through a biologist prior to implementation of the action.

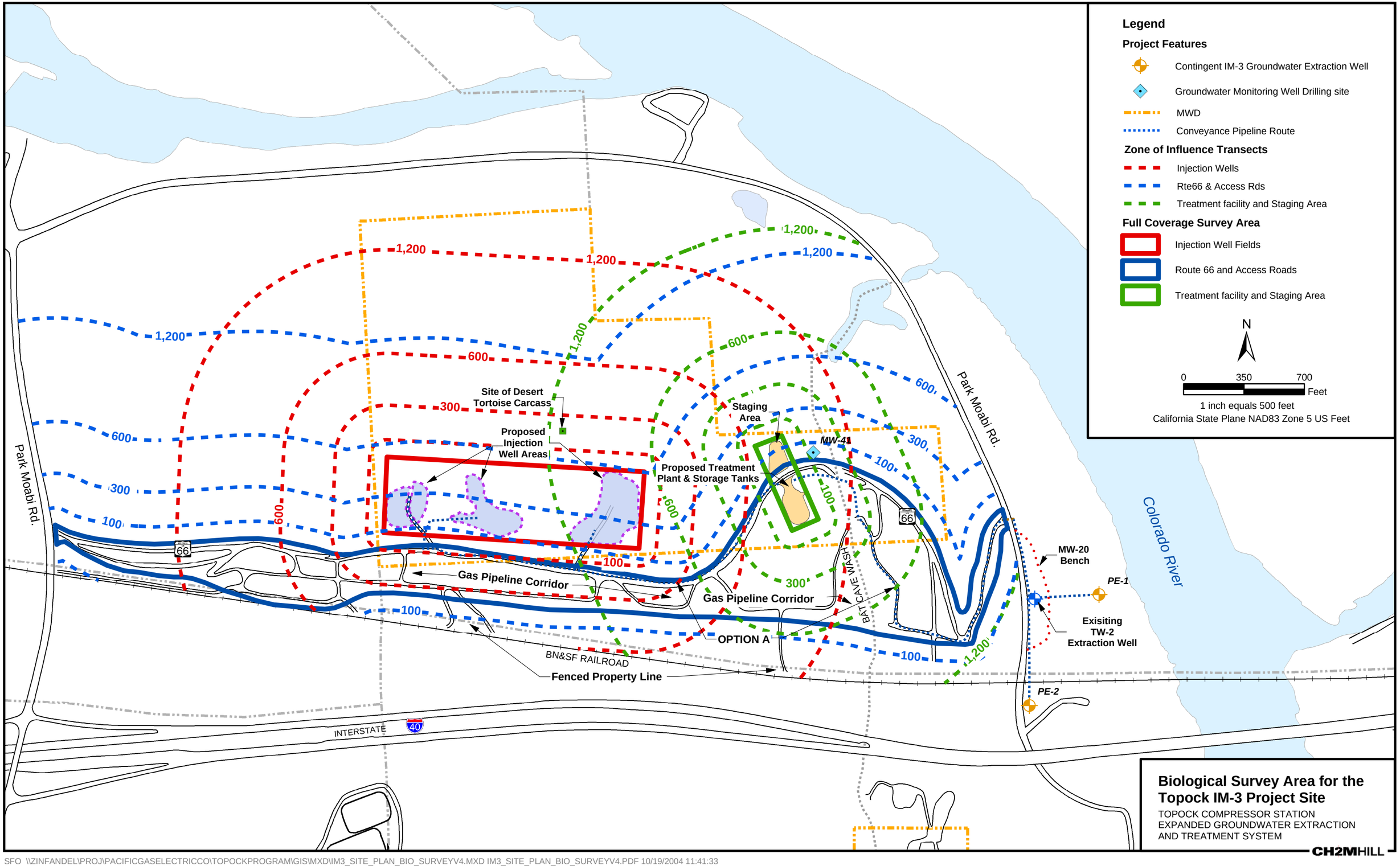
24. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E will notify the Bureau within 48 hours. As a part of this emergency response, the Bureau may require specific measures to protect listed species. During cleanup and repair, the agencies may also require measures to recover damaged habitats.

25. Once the treatment facility is no longer needed, PG&E will be required to restore disturbed areas in a manner that will assist in the re-establishment of biological values within the disturbed ROW. Methods of such restoration will include the reduction of erosion, re-spreading of the top two inches of soil, planting with appropriate native shrubs, and scattering of bladed vegetation and rocks across the ROW, depending upon the appropriateness or effectiveness in a given area.

26. Within 60 days of completion of construction activities, the FCR and biologist will prepare a brief report for the Bureau documenting the effectiveness and practicality of the minimization measures and making recommendations for modifying the measures to enhance species protection. The report will also provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.

27. All areas within the proposed action area and within the potential impact of the action will be monitored semiannually during the active period for tortoise by a biologist knowledgeable of desert tortoise ecology. Surveys will be completed throughout the duration of the action to verify the presence or absence of desert tortoise and reports will be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.

28. Riparian areas surrounding the proposed action site will be surveyed for southwestern willow flycatchers according to the protocol established by the U. S. Fish and Wildlife Service. These surveys will be completed each year by a biologist permitted by the U. S. Fish and Wildlife Service to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports will be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.



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Biological Survey Technical Memorandum for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino County, California

PREPARED FOR: Mark Howell/Bureau of Land Management - Lake Havasu Field Office

PREPARED BY: Ray Romero/CH2M HILL

DATE: November 4, 2004

Introduction

This technical memorandum serves as Addendum No. 3 to the report entitled *Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino, California* dated September 2004. This memorandum documents a biological survey performed for activities associated with the Interim Measures No. 3 (IM-3) project site, located 15 miles southeast of Needles, CA. Specifically, this memorandum assesses potential impacts to biological resources resulting from the installation and operation of up to seven compliance monitoring wells (CMW's). In addition, measures are provided to avoid, reduce and mitigate potential impacts associated with the proposed CMW's.

The proposed CMW's were required by the Colorado River Basin Regional Water Quality Control Board as a provision of the IM-3 groundwater injection system discharge permit. The CMW's are designed to provide additional site characterization and baseline groundwater quality data prior to injection of treated water and to meet the Waste Discharge Requirements for a compliance monitoring program.

The location of the proposed CMW's and access routes to each are shown on the attached figure. Access to the IM-3 project site is available from the Park Moabi Road interchange with Interstate 40. Internal portions of the project site may be accessed from the west at the intersection of Park Moabi Road and old Route 66; access from the east is provided from Park Moabi Road and IM-3 pipeline access roads.

Methodology

CH2M HILL senior wildlife biologist Ray Romero performed a biological survey on October 28, 2004. The objective of the survey was to determine presence/absence of sensitive biological resources at the proposed CMW sites. The survey included the detection of any live desert tortoises or other indications of presence such as carcasses, shell fragments,

burrows, scat, courtship rings, tracks, egg shell fragments, etc. The survey area is shown on the attached figure.

CMW sites J and O are located on an undisturbed mesa. The embankment along the old Route 66 shoulder will need to be modified to gain access to the site. A trail to the CMW sites is expected to form over time. As shown on the attached figure, a full coverage survey consisting of 30 foot wide pedestrian transects was performed along the entire mesa between the washes and old Route 66. The survey area encompassed the CMW sites, access route, and buffer.

CMW sites P and Q are located in previously disturbed areas between old Route 66 and the gas pipeline corridor. Site P is located within a dirt road and Site Q is located within a barren area. Pre-existing roads will be used to access these sites. A full coverage survey of sites P and Q was performed, consisting of 30 foot wide pedestrian transects between the road and pipeline corridor. The survey area encompassed the CMW sites, access route, and buffer.

CMW sites D, L, and M are located within an unnamed vegetated wash. The CMW locations are sited on the periphery of the wash, outside the main channel, and above normal flow levels. The pre-existing road to the west mesa will be used to gain access to the wash leading to site M. A temporary access route is proposed to gain access to sites D and L. An earthen ramp may be placed at the road crossing the western portion of the wash to allow access to the sites. A road will not be constructed directly within the wash. However, a trail to the sites is expected to form over time. A full coverage survey consisting of 30 foot wide pedestrian transects was performed along the entire wash bed and between the wash banks. The survey area encompassed the CMW sites, access route, and buffer.

Results

As shown in the attached figure and as observed during the survey, the habitat at the CMW sites is fragmented and disturbed by past construction of Interstate 40, Park Moabi Road, old Route 66, various unimproved access roads, a gas pipeline corridor, and the BNSF railway. The project area is bound by paved roads, the BNSF railway, and Colorado River. Substantial amounts of litter and debris were observed along the roads and railway.

The terrain is a series of terraces divided by dry desert washes. The terrain within the proposed project area is considerably eroded and can most suitably be described as badlands. The lands are made up of small- to moderately-sized terraces with steep slopes potentially cut by historic flash flood events. The terraces occurring on site are homogeneous, comprising rocky soils with very sparse vegetation resembling creosote bush desert scrub plant community.

Microhabitat requirements for the desert tortoise are very limited at the site and in the general vicinity. The site provides poor quality habitat for this species. Poor quality habitat at the project site is defined as follows:

- Immediate proximity to the Colorado River Floodplain that is considered unsuitable habitat.

- Lack of friable soils. Soils are predominately rocky and not conducive to burrow construction.
- Low abundance of vegetation providing sparse forage (annual grasses and forbs) and cover (perennial shrubs).
- Steep rocky terraces with a greater than 20% slope making it very difficult for the species to negotiate.
- Habitat fragmentation from man-made and natural barriers such as Interstate 40, Park Moabi Road, BNSF railway, Colorado River, and Sacramento Mountains.
- Previous disturbance from dirt roads including old Route 66, natural gas pipeline corridor, and litter and debris dumping.

Live desert tortoises and other evidence of their presence were not detected during this survey. Although evidence of presence was not observed during this survey, a weathered desert tortoise plastron, thought to be deposited onsite by a flash flood event, previously was observed outside of the CMW sites during the reconnaissance field survey. This observation was documented in the September 2004 Biological Resources Investigations for IM-3, to which this technical memorandum serves as an addendum. Based on the lack of any other evidence of presence during this survey and poor habitat conditions, there is a very low probability for this species to occur within or adjacent to the CMW sites.

Impact Assessment

Sites J and O are located on a sparsely vegetated mesa. The mesa contains creosote bushes and beavertail cactus. A few creosote bushes may be crushed during drilling operations or removed to gain access to the site. The cactus will be avoided. A trail will be created to gain access to the site. Drill equipment and vehicles are expected to disturb the ground surface which may lead to fugitive dust. If needed, a water truck will be used to reduce emissions.

Sites P and Q are located in previously disturbed areas that are sparsely vegetated with creosote bushes. A few creosote bushes may be crushed during drilling operations. Drill equipment and vehicles are expected to further disturb the ground surface which may lead to fugitive dust. If needed, a water truck will be used to reduce emissions.

Sites D, L, and M are located within a large moderately vegetated wash that may be used as a wildlife corridor to the Colorado River. A few creosote bushes and other common shrubs may be crushed to gain access to the site and during drilling operations. Several sensitive plant species also occur within the wash including Palo Verde, catclaw, beavertail cactus, and golden cholla. A temporary trail will be created within the wash due to vehicle and equipment access.

Besides those measures previously approved by BLM (identified below under the avoidance and minimization measures section) the following additional measures will be implemented for the CMW's within the wash.

- To minimize soil and vegetation disturbance within the wash, a drill rig with either rubber tracks or balloon tires will be used to install the wells.
- To further minimize disturbance to the wash, the CMW locations will be sited on the periphery of the wash, outside the main channel, and above normal flow levels.

- A biologist in coordination with the archaeologist will delineate and mark with staking and/or flagging an access route to avoid any impacts to sensitive plant species. Where feasible, the scoured unvegetated portion of the wash will be traveled.
- Vehicles traveling within the wash will be limited to the drill rig and support equipment. The drill rig will be escorted in and out of the CMW sites by a biologist on the ground.
- Drilling activities will be monitored by a biologist full-time while working within the wash.
- The importance of avoiding sensitive vegetation including native trees will be stressed to the drill crew.
- During operations, a quad runner with a small trailer in tow will be used to access the CMW sites for water sampling.

Therefore, potential impacts to sensitive biological resources including the desert tortoise and native trees within the wash are not considered adverse. Construction and operational activities for the CMW's are anticipated to have no affect on the desert tortoise.

Avoidance and Minimization Measures

Although the project is unlikely to result in any adverse temporary or permanent impacts to the desert tortoise, the following impact avoidance and minimization measures are proposed. These measures are identical to those that have been previously approved by the BLM for the overall IM-3 project. Besides the desert tortoise, the specific measures include those identified for other sensitive species. The primary objective of the measures is to avoid, reduce or mitigate potential effects to desert tortoises and their habitat that may occur during project construction and operational activities:

1. All project activities will be conducted in a manner that avoids take of a desert tortoise. Take is defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure a desert tortoise by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Should a desert tortoise enter the project site or become harmed or killed by project activities, the project will be shut down and the USFWS, Bureau and CDFG will be consulted. Impacts to habitat will also be minimized to the maximum possible extent.

2. The desert tortoise will not be handled or harassed. Encounters with a desert tortoise will be reported to the CH2MHILL project and BLM Lake Havasu (Bureau) biologists. These biologists will maintain records of all desert tortoises encountered during project activities. This information will include for each individual: the locations (narrative, vegetation type, and maps) and dates of observations; general conditions and health; any apparent injuries and state of healing; and diagnostic markings.

3. To the maximum extent possible, facilities (treatment facility, pipelines, injection wells, and access routes) will be sited within an existing right–of-way (ROW) and previously-disturbed or barren areas to limit new surface disturbance.

4. All PG&E employees and its contractors involved with the proposed project will be required to attend PG&E's threatened and endangered species education program prior

to initiation of activities. New employees will receive formal, approved training prior to working on-site.

5. Existing routes of travel to and from the proposed project site will be used. Cross-country use of vehicles and equipment will be prohibited.

6. Trash and food items will be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as common ravens (*Corvus corax*), coyotes (*Canis latrans*), and feral dogs.

7. To minimize effects, lights will be angled toward the ground, reduced in intensity to levels compatible with safety concerns, and limited in duration of usage. The hue of lighting will be that which is most compatible with and least disturbing to wildlife.

8. Employees will not bring pets to the project site.

9. Firearms will be prohibited from the proposed project site.

10. Employees will be required to check under their equipment or vehicle before it is moved. If a desert tortoise is encountered, the vehicle is not to be moved until the animal has voluntarily moved to a safe distance away from the parked vehicle.

11. Upon project completion, all unused material and equipment will be removed from the site. This condition does not apply to fenced sites.

12. Upon locating an individual of a dead or injured desert tortoise, PG&E will make initial notification to the Bureau and US Fish and Wildlife Service (Service) within three working days of its finding. The notification must be made in writing to the Service's Division of Law Enforcement in Torrance (370 Amapola Avenue, Suite 114, Torrance, California 90501; (310) 328-1516) and by telephone and writing to the Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003; (805) 644-1766). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities will be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the CDFG and the Bureau will be contacted for final disposition of the animal.

13. The biologist will be responsible for assisting crews in compliance with the minimization measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist will be implemented for desert tortoises in impact areas immediately prior to initiation of ground-disturbing activities. The inspection will provide 100 percent coverage of the area within the project limits. All desert tortoise burrows and pallets outside of, but near, the project footprint will be flagged at that time so that they may be avoided during work activities. At the conclusion of work activities, all flagging will be removed.

14. Preconstruction surveys for avian nesting pairs, nests, and eggs will occur in areas proposed for any vegetation removal and active nesting areas flagged. If nesting birds are detected, vegetation removal will be avoided during the nesting season (generally

February to August for most birds). All construction activity within 200 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests.

15. Palo verde, ocotillo, mesquite, cat-claw, smoke tree, and cacti species are considered sensitive by the BLM. To the extent practicable, these species will be avoided. If avoidance is not possible, these species will be transplanted when practical. Should any of the aforementioned plants be destroyed, they will be replaced.

16. PG&E will designate a field contact representative (FCR) who will be responsible for overseeing compliance with the minimization measures. The FCR must be onsite during all construction activities. The FCR will have authority to halt all activities that are in violation of the minimization measures and/or pose a danger to listed species. The FCR will have a copy of all minimization measures when work is being conducted on the site. The FCR may be a project manager, PG&E representative, or a biologist.

17. The area of disturbance will be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors. As needed, work area boundaries will be delineated with flagging or other marking to minimize surface disturbance associated with vehicle straying.

18. All activities will be restricted to a pre-determined corridor. If unforeseen circumstances require project expansion, the potential expanded work areas will be surveyed for listed species prior to use of the area. All appropriate minimization measures will be implemented within the expanded work areas based on the judgment of the agencies and the project biologist. Work outside of the original ROW will proceed only after receiving written approval from the Bureau, Service and CDFG describing the exact location of the expansion.

19. PG&E has the option of erecting desert tortoise fencing in lieu of inspection of open trenches. If the trench is short, personnel may monitor the trench. All open holes and trenches will be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum. During excavation of trenches or holes, earthen ramps will be provided to facilitate the escape of any wildlife species that may inadvertently become entrapped. If desert tortoises are trapped, the project biologist will be notified immediately. The desert tortoise will be allowed to escape before work continues in that location. A final inspection of the open trench segment will also be made immediately before back filling. All open pipe segments will be covered when work activity is not occurring at the site. Trenches must meet the safety requirements of the Occupational Safety and Health Administration before personnel enter open trenches to remove wildlife.

20. All construction vehicles and equipment will be periodically checked to ensure proper working condition and to ensure that there is no potential for fugitive emissions of oil, hydraulic fluid or other hazardous products. The Bureau will be informed of any hazardous spills.

21. Workers will exercise caution when traveling to and from the project area. To minimize the likelihood for vehicle strikes of listed species, speed limits when commuting to project areas on ROW roads will not exceed 20 miles per hour.

22. Intentional killing or collection of either plant or wildlife at construction sites and surrounding areas will be prohibited. The Bureau will be notified of any such occurrences.

23. The Bureau will endeavor to place the remains of intact listed species with educational or research institutions holding the appropriate state and federal permits per their instructions. If such institutions are not available or the animal's remains are in poor condition, the information noted above will be obtained and the carcass left in place. If the animal is a desert tortoise, the Bureau should consider marking the carcass in a manner that would not be toxic to other wildlife to ensure that it would not be re-recorded in the future. Arrangements regarding proper disposition of potential museum specimens will be made with the institution by the Bureau through a biologist prior to implementation of the action.

24. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E will notify the Bureau within 48 hours. As a part of this emergency response, the Bureau may require specific measures to protect listed species. During cleanup and repair, the agencies may also require measures to recover damaged habitats.

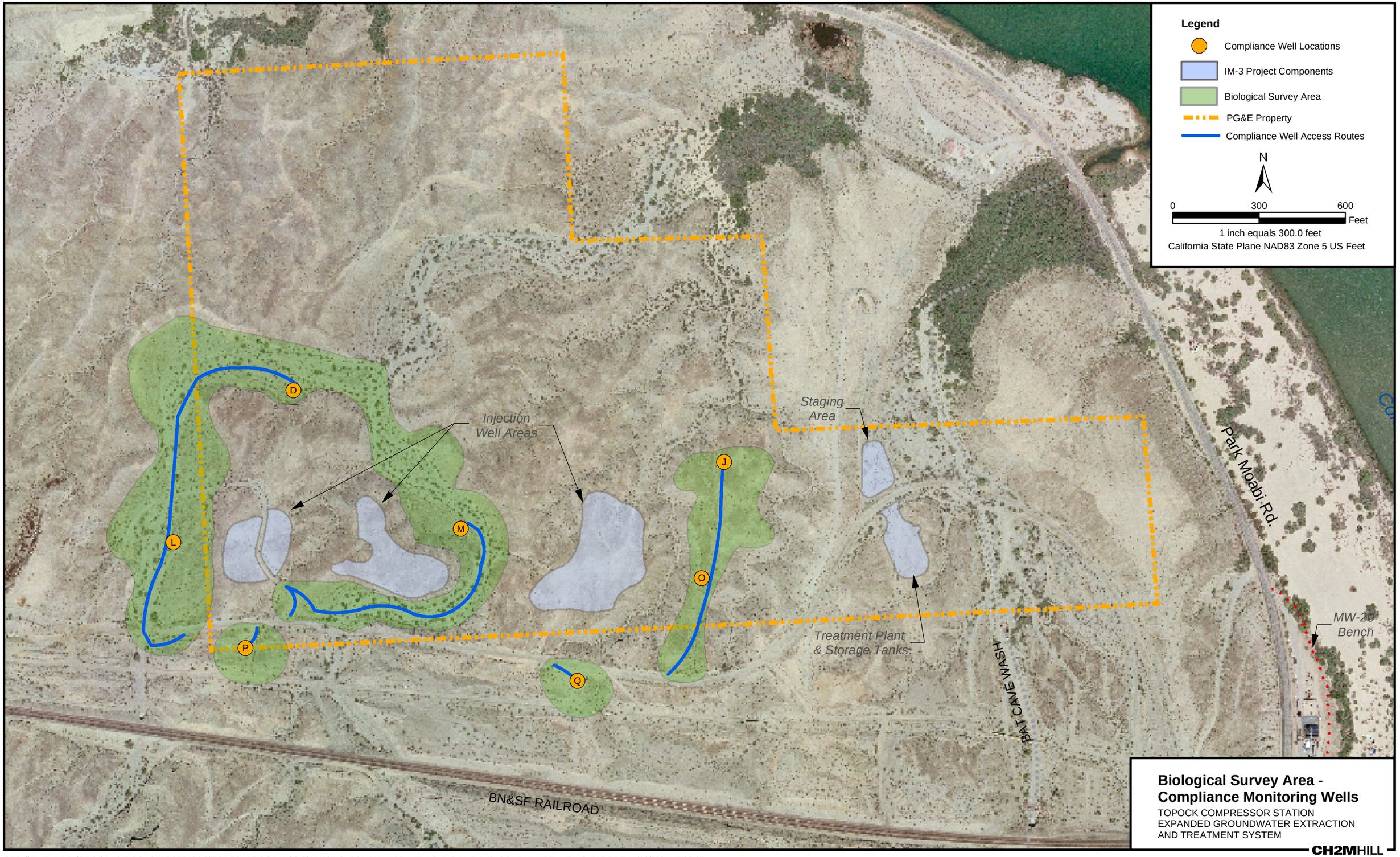
25. Once the treatment facility is no longer needed, PG&E will be required to restore disturbed areas in a manner that will assist in the re-establishment of biological values within the disturbed ROW. Methods of such restoration will include the reduction of erosion, re-spreading of the top two inches of soil, planting with appropriate native shrubs, and scattering of bladed vegetation and rocks across the ROW, depending upon the appropriateness or effectiveness in a given area.

26. Within 60 days of completion of construction activities, the FCR and biologist will prepare a brief report for the Bureau documenting the effectiveness and practicality of the minimization measures and making recommendations for modifying the measures to enhance species protection. The report will also provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.

27. All areas within the proposed action area and within the potential impact of the action will be monitored semiannually during the active period for tortoise by a biologist knowledgeable of desert tortoise ecology. Surveys will be completed throughout the duration of the action to verify the presence or absence of desert tortoise and reports will be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.

28. Riparian areas surrounding the proposed action site will be surveyed for southwestern willow flycatchers according to the protocol established by the U. S. Fish and Wildlife Service. These surveys will be completed each year by a biologist permitted by the U. S. Fish and Wildlife Service to carry out flycatcher surveys until the action has been

completed and all facilities have been removed. Reports will be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.



Biological Survey Area - Compliance Monitoring Wells

TOPOCK COMPRESSOR STATION
EXPANDED GROUNDWATER EXTRACTION
AND TREATMENT SYSTEM

CH2MHILL

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Technical Memorandum for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino County, California

PREPARED FOR: Mark Howell/Bureau of Land Management - Lake Havasu Field Office

PREPARED BY: Ray Romero/CH2M HILL

DATE: November 15, 2004

This technical memorandum serves as Addendum No. 4 to the report entitled *Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino, California* dated September 2004. The purpose of this memorandum is to document a desert tortoise carcass that was recently observed outside the PG&E Topock Interim Measures No. 3 (IM-3) project site, located 15 miles southeast of Needles, CA.

On 5 November 2004, Mr. Chad Smith (Native American Monitor) observed a desert tortoise carcass near the construction site for the PG&E Topock treatment facility. On 8 November 2004, Mr. Smith reported the sighting and escorted Mr. Ray Romero (Wildlife Biologist) to the carcass location. On 9 November 2004, Mr. Romero verbally reported the desert tortoise carcass to Mr. Mark Howell (Wildlife Biologist) with the Bureau of Land Management Lake Havasu Office.

The desert tortoise carcass was located on the mesa between Bat Cave Wash and Park Moabi Road. The topography is described as badlands comprising of river terraces from the Colorado River. The substrate consists of gravel to cobble sized stones at the surface with alluvial sediments immediately below the rocky surface. The plant community is sparse creosote bush scrub. The carcass is located on a northerly slope of approximately 3-5%. The site was flagged and a Global Positioning System (GPS) unit was employed to obtain the location. The Universal Transverse Mercator (UTM) coordinates were NAD 27 11S 0729574E 3844885N. This location was plotted on the enclosed map.

The desert tortoise carcass was disarticulated and partially buried in the substrate. The plastron was buried with a few portions of the carapace intact and remaining upright. The remainder of the carapace was disarticulated and exposed at the ground surface nearby. Only shell bones with no scutes were observed. The bone was no longer white in color, did not appear to be bleached by direct sun exposure, and showed signs of mineralization. Therefore, the bone was tan in color and matched the color of the surrounding substrate. The bone appeared to be well preserved as though it was entombed at one time. The desert

tortoise may have died within its burrow explaining the relatively good condition of the bone. South of the carcass was an area showing evidence of soil erosion due to rainfall events and past vehicle activity in the area. A burrow may have existed in the area and as a result of the soil erosion is no longer detectable. The erosion leads into a small wash heading northeast toward the Colorado River. The desert tortoise cause of death could not be determined. Time since death appeared to be several decades. The desert tortoise carcass and surrounding area was photographed (see enclosed).

Should you have any questions or request further details, please contact me on my cell phone at 661-609-7257.

Photo 1. Looking north at desert tortoise carcass located between Mr. Ray Romero (Wildlife Biologist) and Mr. Chad Smith (Native American Monitor).

Photo 2. Looking down at buried desert tortoise carcass. Note quarter placed in middle of shell.

Appendix C7:
IM No. 3 Completion Report

Biological Resources Completion Report for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System

Needles, California

Prepared for

United States Bureau of Land Management

on behalf of

Pacific Gas and Electric Company

September 2005

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, California 94612

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Acronyms and Abbreviations

BLM	United States Bureau of Land Management
BOR	United States Bureau of Reclamation
CDFG	California Department of Fish and Game
CFR	Code of Federal Regulations
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
CWA	Clean Water Act
DTSC	California Department of Toxic Substances Control
FCR	field contact representative
FESA	Federal Endangered Species Act
GIS	geographic information system
GPS	global positioning system
HDPE	high- density polyethylene
IM	Interim Measure
msl	mean sea level
MW	monitoring well
MWD	Metropolitan Water District of Southern California
No.	number
PE	potential extraction well
PG&E	Pacific Gas and Electric Company
RO	reverse osmosis
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SWPPP	Storm Water Pollution Prevention Plan
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). In a letter dated June 30, 2004, DTSC directed PG&E to implement Interim Measures (IM) for hydraulic control of the plume boundaries in the Colorado River floodplain and management of extracted groundwater. The groundwater extraction, treatment, and injection systems collectively are referred to as Interim Measure No. 3 (IM No. 3). The IM No. 3 project components include a groundwater extraction system, groundwater treatment plant, piping to convey the water from the extraction wells to the treatment facility, and an injection well field for the discharge of treated groundwater.

Recognizing the time-critical nature of its directive, DTSC prepared a California Environmental Quality Act Notice of Exemption pursuant to §21080(b)(4) of the Public Resources Code for the IM No. 3 project. Also, the United States Bureau of Land Management (BLM) authorized PG&E to conduct time-critical removal actions by two Action Memoranda, dated March 3, 2004 and May 20, 2004, issued pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. §§9601 et seq.

The purpose of this report is to fulfill Condition 26 of the BLM Lake Havasu Field Office Wildlife and Threatened and Endangered Species Stipulations for the IM3 Project (Appendix A). This Condition states that within 60 days of completion of construction activities, the field contact representative (FCR) and biologist will prepare a brief report documenting the effectiveness and practicality of the minimization measures and making recommendations for modifying the measures to enhance species protection. The report also provides information on survey and monitoring activities, observed listed species, and the actual acreage used by the project. With a construction completion date of July 28, 2005, this completion report has been prepared for submittal to BLM by September 28, 2005.

1.1 Regional Environmental Setting

The project site is located near Needles, California. Agriculture and public lands along the surrounding landscape dominate the area. Access to the project site is via I-40 that links Barstow, California and Topock, Arizona. The project site is bordered to the east by the Colorado River, to the north by Historic Route 66, to the south by the railroad and I-40, and to the west by the Sacramento Mountains. Topography is abrupt, rising from around 450 feet above mean sea level (msl) at the Colorado River to over 1,200 feet above msl within one mile to the south and southwest. Slopes encountered west of the river reflect a series of ancient river terraces.

1.2 Project Location

The project site includes the 100-acre property owned by PG&E (San Bernardino County Assessor's Parcel No. 650-151-06). Surrounding land is also owned and managed by a number of federal and regional agencies including the BLM, United States Fish and Wildlife Service (USFWS), United States Bureau of Land Management (BOR), and San Bernardino County. The general vicinity of the project site is depicted in Figure 1 of Appendix B.

2.0 Project Description

The project consisted of several elements which include well installation, piping and conveyance, treatment facilities, and management of the treated water. The treatment facility is a closed system. Therefore, untreated water is not exposed to the environment that may potentially impact biological resources.

Access to the site is available from the Park Moabi Road interchange with Interstate 40. Internal portions of the project site are accessed from the east at the intersection of Park Moabi Road and old Route 66. These existing access roads also served as the main piping and conveyance alignment.

Each project element is described in the following sections. The project site and associated facilities are depicted in Figure 2 of Appendix B.

2.1 Drilling and Investigation Activities

The IM No. 3 project included drilling and well installations on BLM-managed property. Activities included the installation of a new extraction well to support the existing pumping operations and monitoring wells for further characterization of chromium concentrations in groundwater. These wells were addressed in a separate report entitled *Land Area Subject to Groundwater Well Installation Biological Resource Monitoring – Completion Report Topock Project Site Needles, California (*CH2M HILL, 2005b*).* This report was submitted to the agencies in April 2005.

2.2 Piping and Conveyance System

The piping and conveyance alignment for the project followed existing access roads and was designed to avoid or minimize impacts to natural resources. The piping and conveyance system for IM No. 3 consists of the following:

- Influent lines are double-contained high-density polyethylene (HDPE), and effluent lines are single-contained HDPE.
- Underground influent and effluent piping and electrical conduit exist between the MW-20 bench and the PG&E treatment facility. Influent piping conveys extracted untreated groundwater to the treatment facility. Effluent piping conveys reverse osmosis (RO) brine back to the monitoring well (MW)-20 bench from the treatment facility.
- Aboveground effluent piping and electrical conduit exist between the treatment facility and injection well field. The piping and conduit were placed aboveground along the northern shoulder of old Route 66 to avoid any potential impacts to this historic roadway.

2.2.1 Piping between the MW-20 Bench and Treatment Facility

This portion of the water conveyance system delivers (1) untreated water from the extraction wells on the MW-20 bench to the treatment facility; and (2) RO brine and treated water (as needed) from the treatment facility back to the MW-20 bench. From the MW-20 bench to the PG&E treatment facility, piping and electrical conduit were buried in a trench located within a pre-existing approximately 12-foot-wide graded access road. Two subsurface influent pipelines and two subsurface effluent pipelines were placed in a common trench running between the MW-20 bench and treatment facility. The trench was excavated approximately 700 feet north of the MW-20 bench along the eastern shoulder of Park Moabi Road. At this point, a trench was cut across Park Moabi Road to the eastern dirt access road. By following this existing access road, the alignment of the conveyance system avoids an abandoned segment of old Route 66. The trench was constructed approximately 1,700 feet on BLM land within this existing access road. The trench then crossed onto Parcel 650-151-06, and was routed to the treatment facility location. Trenching along the existing roadway avoided and minimized potential impacts to natural resources.

2.2.2 Piping between the Treatment Facility and the Injection Well Fields

Piping was installed to deliver treated water from the PG&E treatment facility to the injection well field. From the PG&E treatment facility, treated water will be pumped through a 4-inch diameter single wall pipeline that has been jacked and bored beneath old Route 66 from the south to the north shoulder. Along the north shoulder of old Route 66, the pipe was constructed in an aboveground alignment to the injection well fields. The aboveground alignment was constructed in order to minimize disturbance to old Route 66.

2.3 Grading and Construction-Related Activities

In support of the treatment facility, well installation, and pipeline construction activities, PG&E has performed grading and other construction-related activities which include the following:

- Improve existing access roads and place road base material to finish the surface
- Perform earth work involving cut and fill activities for the treatment facility and temporary staging and parking area
- Trench and install conveyance pipeline and electrical conduit
- Construct treatment facility and provide electrical supply
- Install culverts at wash crossings
- Place rip-rap and other material to control soil erosion at the treatment facility and along the access road
- As further protection of Historic Route 66, a fabric and gravel blanket was placed over the roadway – this blanket was not included as IM-3 construction use because it is mitigation and the blanket is removable.

3.0 Regulations and Stipulations

3.1 Federal Regulations and Standards

The following are the various federal and state regulations and policies, provided here for general information purposes.

- Federal Endangered Species Act (FESA), including the coordination requirement of Section 7 (16 USC §§1531 *et seq.*; 50 Code of Federal Regulations [CFR] Part 402). Section 9 of FESA prohibits the "take" of species federally listed as threatened or endangered. "Take" is further defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Take" incidental to otherwise lawful activities can be authorized under Section 7 of FESA, where a federal agency is involved.
- Migratory Bird Treaty Act (16 USC 703-712; 50 CFR 10). The federal Migratory Bird Treaty Act prohibits the "take" of migratory birds, unless permitted. The definition of 'take', as defined by 50 CFR 10.12, means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound kill, trap, capture, or collect migratory birds (or parts thereof).

3.2 State Regulations and Standards

- California Endangered Species Act (California Fish and Game Code §§2050 *et seq.*). Section 2050 of the California Fish and Game Code prohibits any activities that would jeopardize or "take" a species listed as threatened or endangered within the state. CDFG Code §86 'Take' is defined as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill. Projects that have the potential to impact species listed as threatened or endangered by the state might require an Incidental Take Permit from the California Department of Fish and Game (CDFG) under Section 2081 of the Fish and Game code.
- CDFG Code 1600 – Streambed Alteration Agreements (California Fish and Game Code §1600). Section 1600 of the Fish and Game Code regulates the alteration of the bed, bank, or channel of a stream, river, or lake, including dry washes. Generally, CDFG asserts jurisdiction up to the top of significant bank cuts or to the outside of any riparian vegetation associated with a water course. Activities that have the potential to affect jurisdictional areas can be authorized through issuance of a Streambed Alteration Agreement (SAA).
- California Fully-protected Wildlife Species Provisions (California Fish and Game Code §§3511, 4700, 5050, and 5515). These provisions prohibit the taking of fully-protected birds, mammals, amphibians, and fish.

- Birds of Prey Protection Provision (California Fish and Game Code § 3503.5). This provision prohibits the taking of birds of prey, including any birds of the order Falconiformes or Strigiformes, and including nests or eggs of such birds.

4.0 Awareness Training

Awareness training focused on the desert tortoise and southwestern willow flycatcher for activities in the upland and floodplain project areas, respectively. CH2M HILL provided training to all onsite personnel prior to initiating work activities. New personnel were identified at safety meetings each morning before work. Training included a discussion of species description, habitat, natural history, threats, protection under the Endangered Species Act(s), potential penalties, current survey findings, management, and protection measures. Appropriate measures identified in the BLM Action Memoranda were reviewed with staff. Attendance was documented on sign-in sheets which are provided in Appendix C.

5.0 Pre-Activity Surveys

Prior to activity, sites were surveyed for sensitive resources. No live desert tortoises or southwestern willow flycatchers were observed during the pre-activity surveys. In accordance with the BLM stipulations, sensitive vegetation was excavated from the project footprint and transplanted away from construction activity. The transplanted vegetation was identified to species, an identification (ID) number was assigned, a Global Positioning System (GPS) unit (Trimble Geo XT) was used to document the relocation site, the site was distinguished between public (BLM) and private (PG&E) land, and the survival status was determined (Table 1). The locations of the transplanted vegetation with the corresponding ID number may be found in Appendix E. The vegetation that did not survive will be replaced during future restoration activities. Flora and fauna observed during the pre-activity surveys and construction monitoring are listed below in Table 2.

TABLE 1
Status of Vegetation Transplanted During Construction Activities

Common Name	Scientific Name	ID#	Coordinates	Public/Private Land	Survive (Y/N)
Cat claw	*Acacia greggii*	CC-1	N:2103083.272 E: 7615600.188	Public	N
Palo Verde	*Cercidium microphyllum*	PV-1	N:2102808.147 E:7615864.244	Public	N
Palo Verde	*Cercidium microphyllum*	PV-2	N: 2103484.261 E: 7614625.225	Private	N
Cooper's wolfberry	*Lycium cooperi*	CW-1	N: 2103491.398 E: 7614625.139	Private	N
Cooper's wolfberry	*Lycium cooperi*	CW-2	N: 2103526.425 E: 7614611.02	Private	N
Smoke tree	*Dalea spinosa*	ST-1	N: 2103432.649 E: 7614688.521	Private	N
Beavertail cactus	*Opuntia basilaris*	BC-1	N:2102372.404 E:7615171.547	Public	Y
Beavertail cactus	*Opuntia basilaris*	BC-2	N: 2102327.454 E:7615177.267	Public	Y
Beavertail cactus	*Opuntia basilaris*	BC-3	N: 2103112.973 E: 7614254.654	Private	Y
Beavertail cactus	*Opuntia basilaris*	BC-4	N: 2102771.881 E: 7613785.76	Private	Y
Beavertail cactus	*Opuntia basilaris*	BC-5	N: 2102941.523 E: 7613685.225	Private	Y
Beavertail cactus	*Opuntia basilaris*	BC-6	N: 2102975.585 E: 7613685.451	Private	Y

TABLE 1
Status of Vegetation Transplanted During Construction Activities

Common Name	Scientific Name	ID#	Coordinates	Public/Private Land	Survive (Y/N)
Beavertail cactus	*Opuntia basilaris*	BC-7	N: 2103273.655 E: 7613730.519	Private	Y
Beavertail cactus	*Opuntia basilaris*	BC-8	N: 2103353.723 E: 7613756.595	Private	Y
Beavertail cactus	*Opuntia basilaris*	BC-9	N: 2103120.718 E: 7613828.897	Private	Y
Beavertail cactus	*Opuntia basilaris*	BC-10	N: 2103006.292 E: 7613766.775	Private	Y
Beavertail cactus	*Opuntia basilaris*	BC-11	N: 2102932.932 E: 7613724.44	Private	Y
Beavertail cactus	*Opuntia basilaris*	BC-12	N: 2102914.762 E: 7613375.512	Public	Y
Jumping cholla	*Opuntia bigelovii*	C-1	N: 2102843.966 E: 7613949.319	Public	Y

TABLE 2
List of Observed Plants and Wildlife Incidental to Pre-activity Surveys and Daily Monitoring

Common Name	Scientific Name
Plants	
Allscale saltbush	*Atriplex polycarpa*
Beavertail cactus	*Opuntia basilaris*
Brittlebush	*Encelia farinosa*
Burrobush	*Ambrosia dumosa*
Catclaw	*Acacia greggii*
Creosote bush	*Larrea tridentata*
Dalea	*Dalea mollisma*
Desert trumpet	*Eriogonum inflatum*
Fishhook cactus	*Mammillaria* sp.
Honey mesquite	*Prosopis glandulosa*
Jumping cholla	*Opuntia bigelovii*
Lycium	*Lycium sp.*
Ocotillo	*Fonquieria splendens*
Palo verde	*Ceridium* sp
Saltcedar	*Tamarix* sp
Screwbean mesquite	*Prosopis pubescens*

TABLE 2
List of Observed Plants and Wildlife Incidental to Pre-activity Surveys and Daily Monitoring

Common Name	Scientific Name
Smoke tree	*Dalea spinosa*
Spineflower	*Chorizanthe* sp.
Sweetbush	*Bebbia juncea*
Reptiles	
Desert tortoise (carcass)	*Gopherus agassizii*
Coachwhip	*Masticophis flagellum*
Desert iguana	*Dipsosaurus dorsalis*
Sagebrush lizard	*Sceloporus graciosus*
Side-blotched lizard	*Uta stansburiana*
Western diamondback rattlesnake	*Crotalus atrox*
Western patchnose snake	*Salvadora hexalepus*
Western whiptail	*Cnemidophorus tigris*
Birds	
Abert's towhee	*Pipilo aberti*
American coot	*Fulica americana*
American kestrel	*Falco sparverius*
American white pelican	*Pelicanus erythrorhynchos*
Anna's hummingbird	*Calypte anna*
Ash-throated flycatcher	*Myiarchus cinerascens*
Bewick's wren	*Thryomanes bewickii*
Black-necked stilt	*Himantopus mexicanus*
Black phoebe	*Sayornis nigricans*
Blue-gray gnatcatcher	*Polioptila caerula*
Brewer's blackbird	*Euphagus cyanocephalus*
Canada goose	*Branta canadensis*
Canyon wren	*Catherpes mexicanus*
Clark's grebe	*Aechmophorus clarkia*
Cliff swallow	*Hirundo pyrrhonota*
Common moorhen	*Gallinula chloropus*
Common poorwill	*Phalaenoptilus nuttallii*
Common raven	*Corvus corax*
Cooper's hawk	*Accipiter cooperii*

TABLE 2
List of Observed Plants and Wildlife Incidental to Pre-activity Surveys and Daily Monitoring

Common Name	Scientific Name
Double-crested cormorant	*Phalacrocorax auritus*
Gambel's quail	*Callipepla gambelii*
Great-blue heron	*Ardea herodias*
Great egret	*Ardea alba*
Great-tailed grackle	*Quiscalus mexicanus*
Greater roadrunner	*Geococcyx californianus*
Killdeer	*Charadrius vociferus*
Lesser nighthawk	*Chordeiles acutipennis*
Loggerhead shrike	*Lanius ludovicianus*
Marbled godwit	*Imosa fedoa*
Mourning dove	*Zenaida macroura*
Northern harrier	*Circus cyaneus*
Northern mockingbird	*Mimus polyglottos*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Phainopepla	*Phainopepla nitens*
Rock dove	*Columba livia*
Snowy egret	*Egretta thula*
Turkey vulture	*Cathartes aura*
Verdin	*Auriparus flaviceps*
Violet-green swallow	*Tachycineta thalassina*
Western bluebird	*Sialia mexicana*
Mammals	
Black-tailed hare	*Lepus californicus*
Cottontail rabbit	*Sylvilagus audubonii*
Raccoon	*Procyon lotor*
Coyote	*Canis latrans*
Desert woodrat	*Neotoma lepida*
Northern river otter	*Lutra canadensis*
White-tailed antelope squirrel	*Ammospermophilus leucurus*

6.0 Compliance Monitoring

Biologists were onsite full-time during all construction and ground disturbing activity to ensure compliance with BLM stipulations. The first day of full-time monitoring started on September 27, 2004 and was completed on July 27, 2005. A standardized field form was completed on a daily basis. Two incidents were reported and resolved:

- On December 6, 2004, excavated soils from trenching activities were placed into Bat Cave Wash and a small unnamed wash to the west. The Storm Water Pollution Prevention Plan (SWPPP) was reviewed and it was determined that the placement of soil stockpiles into any wash was not acceptable. The construction manager and construction personnel were briefed on the appropriate placement of the soil stockpiles. By December 10, 2004, both spoil piles were removed from the washes and placed at least 50-feet from washes in compliance with the SWPPP.
- On March 19, 2005, a crew from the City of Needles (the local electric utility) came to the project area to work on their electric facilities. The project contractors believed that the City's work would be done in the City's right-of-way. The project biological monitors, who were regularly on-site on weekdays and were available on weekends, were not informed that work would be done on Saturday March 19, 2005. Biologists were not on site on March 19 when the City's crew worked on their electrical facilities. The City's crew drove on roads, when available, to accomplish this work, and also went off-road to get to the City's facilities. As a result, several native plants such as creosote bush, saltbush and beavertail cactus were affected. There were no observable direct impacts to wildlife. The City of Needles was contacted and briefed on the appropriate procedures for any future visits. Also, corrective action measures including replacement, revegetation and protection have been proposed.

All activities occurring within the project site have been documented on Daily Construction Monitoring Logs (Appendix D).

7.0 Land Use

To assess the area of use associated with IM-3, a survey using Global Positioning System (GPS) technology was conducted to delineate the sub-areas subject to ground-use construction activities. Such activities include grading associated with the IM-3 treatment plant, staging area, injection wells, conveyance piping, monitoring wells, and access roads (Figure 3 of Appendix B).

Various past activities have resulted in previous disturbance of the area where the IM-3 construction is occurring. The area is traversed by a major railway line, several gas pipelines, historic U.S. Route 66, and the National Old Trails Highway. Portions of the area were disturbed by a former gravel quarry, roadside debris piles, World War II era military training exercises, and a former roadhouse/restaurant adjacent to the IM-3 project site boundary. During design of the IM-3 facilities, much care was taken to utilize these previously disturbed areas wherever possible. Trenching was routed along existing roadways and pipeline right of ways. The treatment plant and staging area were located in the area previously disturbed by gravel quarrying during the construction of the former U.S. Route 66 Highway. To minimize disturbance of that historic roadway pursuant to the requirements of BLM, above-ground piping was installed to convey treated water from the treatment plant to the injection wells. As further protection of that resource, a fabric and gravel blanket was placed over the historic roadway. In calculating the areas used by the IM-3 construction, previously disturbed ground was distinguished from ground that did not appear to be disturbed previously.

Data collected during the GPS survey was imported into the geographic information system (GIS) maintained for the IM-3 project. Polygons were defined for each sub-area used as a result of IM-3 construction activities. In addition, polygons were defined for those areas determined to be previously disturbed. The acreage of each of the polygons was determined, and the total (net) area of use resulting from IM-3 was calculated by subtracting the previously disturbed acreage from the gross acreage used during IM-3 construction.

The assessment of IM-3 ground use also includes an estimate of use associated with IM-3 compliance monitoring wells. Four compliance monitoring wells were installed in the vicinity of the eastern injection well field. Access routes were provided to three of the four compliance monitoring wells. These are not constructed roadways, but rather just tracks of vehicles driving over the ground surface, and are included as "used area". In addition, the area used for installation of a potential extraction well (PE-1) was calculated and included.

Table 3 summarizes the total area of use related to IM-3. Sub-totals are provided for each sub-area associated with IM-3 (e.g., treatment plant site, staging area, injection well areas, etc.). The summary table provides sub-totals for private (PG&E) and public (BLM) lands to reflect land ownership. The total area used includes all areas used by the construction activities, regardless of the prior condition of the ground. Also shown in the table is the area of ground that did not appear to be significantly disturbed previously and which was used by the construction activities.

TABLE 3
Ground Use Associated with IM-3

IM-3 Sub-Area	Public Land		Private Land		Total Public and Private Land
	Total Area Used by IM-3 (acres)	Previously Undisturbed Ground[1] Used by IM-3 (acres)	Total Area Used by IM-3 (acres)	Previously Undisturbed Ground[1] Used by IM-3 (acres)	Previously Undisturbed Ground Used by IM-3 (acres)
West Mesa	NA	NA	0.57	0.33	0.33
East Mesa	0.15	0.11	1.28	0.84	0.95
Staging Area	NA	NA	0.95	0.16	0.16
Treatment Facility	NA	NA	1.11	0.38	0.38
Pipeline Trench[2]	1.91	0.84	0.89	0.51	1.36
Compliance Monitoring Wells and PE-1	0.37	0.22	0.72	0.72	0.94
Total	**2.43**	**1.17**	**5.52**	**2.94**	**4.11**

Notes:
NA – Not Applicable
[1] Does not include acreage affected by prior ground-disturbing activities unrelated to IM-3 (e.g., roadways, pipelines, etc.). Land noted as being "previously undisturbed" did not appear to be disturbed at the time of the construction of IM-3, but, in fact, may have been subject to prior disturbance.
[2] The acreage calculation for the pipeline trench includes the area used during improvement of the eastern access road.

The total area of use resulting from construction of the IM-3 facilities is approximately 8.0 acres. Of these 8.0 acres, approximately 3.9 acres are on ground that was previously disturbed. Thus, the net area of ground which was used, and which did not appear to be disturbed previously, is about 4.1 acres. Approximately 1.2 acres of such area is located on public (BLM) land and 2.9 acres are located on private (PG&E) land.

Post-construction photographs were taken from the identical photo point locations identified in the photo index prepared for the report entitled *Final Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino County, California (*CH2M HILL, 2004*).* Photographs documenting pre- and post-IM3 conditions and the photo index are presented in Appendix E.

8.0 Conclusion

Construction of IM-3 facilities was approved by the county, state and federal regulatory agencies. In conformance with BLM's stipulations, preconstruction surveys were conducted of all areas subject to construction use. Under the terms of the BLM approval, all construction work was conducted in areas where significant biological resources were not present. In addition, appropriate physical barriers were placed and construction activities were continuously monitored by qualified professional staff to ensure the protection of nearby of biological resources.

The minimization measures were effective and met the requirements of the BLM. There are no recommendations for modifying the measures to enhance species protection. The project was conducted under a determination of "no effect"; in compliance with this determination, there was no "take" of any listed species.

9.0 References

CH2M HILL. 2004. *Final Biological Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino County, California.* September.

_____. 2005a. *Work Plan for Special Status Species Survey within the Area of Potential Effect (APE), Topock Compressor Station, Needles, California.* March.

_____. 2005b. *Land Area Subject to Groundwater Well Installation Biological Resources Monitoring – Completion Report Topock Project Site, Needles, California.* April.

U.S. Bureau of Land Management. 2000. *Biological Opinion for Maintenance Activities on the Pacific Gas and Electric Company Gas Pipeline System in the California Desert* (6840, CA-063.50) (1-8-99-F-71).

_____.2004. *Action Memorandum for the Time Critical Removal Action No. 3, Pacific Gas and Electric Topock Compressor Facility.* September.

U.S. Fish and Wildlife Service. 2000. *Biological Opinion for Maintenance Activities on the Pacific Gas and Electric Company Gas Pipeline System in the California Desert* (6840, CA-063.50) (1-8-99-F-71) .

Appendix A
BLM Lake Havasu Stipulations

LAKE HAVASU FIELD OFFICE WILDLIFE

AND

THREATENED OR ENDANGERED SPECIES STIPULATIONS

1. All project activities will be conducted in a manner that avoids take of a listed species. Take is defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Should a listed species enter the project site or become harmed or killed by project activities, the project will be shut down and the USFWS, Bureau and CDFG will be consulted. Impacts to habitat will also be minimized to the maximum possible extent.
2. Listed species including the desert tortoise will not be handled or harassed. Encounters with a listed species will be reported to the CH2MHILL project and BLM Lake Havasu (Bureau) biologists. These biologists will maintain records of all listed species encountered during project activities. This information will include for each individual: the locations (narrative, vegetation type, and maps) and dates of observations; general conditions and health; any apparent injuries and state of healing; and diagnostic markings.
3. To the maximum extent possible, facilities (treatment facility, pipelines, injection wells, and access routes) will be sited within an existing right–of-way (ROW) and previously-disturbed or barren areas to limit new surface disturbance.
4. All PG&E employees and its contractors involved with the proposed project will be required to attend PG&E's threatened and endangered species education program prior to initiation of activities. New employees will receive formal, approved training prior to working on-site.
5. Existing routes of travel to and from the proposed project site will be used. Cross-country use of vehicles and equipment will be prohibited.
6. Trash and food items will be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as common ravens (*Corvus corax*), coyotes (*Canis latrans*), and feral dogs.
7. To minimize effects, lights will be angled toward the ground, reduced in intensity to levels compatible with safety concerns, and limited in duration of usage. The hue of lighting will be that which is most compatible with and least disturbing to wildlife.
8. Employees will not bring pets to the project site.
9. Firearms will be prohibited from the proposed project site.
10. Employees will be required to check under their equipment or vehicle before it is moved. If a desert tortoise is encountered, the vehicle is not to be moved until the animal has voluntarily moved to a safe distance away from the parked vehicle.
11. Upon project completion, all unused material and equipment will be removed from the site. This condition does not apply to fenced sites.

12. Upon locating an individual of a dead or injured listed species, PG&E will make initial notification to the Bureau and US Fish and Wildlife Service (Service) within three working days of its finding. The notification must be made in writing to the Service's Division of Law Enforcement in Torrance (370 Amapola Avenue, Suite 114, Torrance, California 90501; (310) 328-1516) and by telephone and writing to the Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003; (805) 644-1766). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities will be transported to a qualified veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the CDFG and the Bureau will be contacted for final disposition of the animal.

13. The biologist will be responsible for assisting crews in compliance with the minimization measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist will be implemented for special-status wildlife species in impact areas immediately prior to initiation of ground-disturbing activities. The inspection will provide 100 percent coverage of the area within the project limits. All desert tortoise burrows and pallets outside of, but near, the project footprint will be flagged at that time so that they may be avoided during work activities. At the conclusion of work activities, all flagging will be removed.

14. Preconstruction surveys for avian nesting pairs, nests, and eggs will occur in areas proposed for any vegetation removal and active nesting areas flagged. If nesting birds are detected, vegetation removal will be avoided during the nesting season (generally February to August for most birds). All construction activity within 200 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests.

15. Palo verde, ocotillo, mesquite, cat-claw, smoke tree, and cacti species are considered sensitive by the BLM. To the extent practicable, these species will be avoided. If avoidance is not possible, these species will be transplanted when practical. Should any of the aforementioned plants be destroyed, they will be replaced.

16. PG&E will designate a field contact representative (FCR) who will be responsible for overseeing compliance with the minimization measures. The FCR must be onsite during all construction activities. The FCR will have authority to halt all activities that are in violation of the minimization measures and/or pose a danger to listed species. The FCR will have a copy of all minimization measures when work is being conducted on the site. The FCR may be a project manager, PG&E representative, or a biologist.

17. The area of disturbance will be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors. As needed, work area boundaries will be delineated with flagging or other marking to minimize surface disturbance associated with vehicle straying.

18. All activities will be restricted to a pre-determined corridor. If unforeseen circumstances require project expansion, the potential expanded work areas will be surveyed for listed species prior to use of the area. All appropriate minimization measures will be implemented within the expanded work areas based on the judgment of the agencies and the project

biologist. Work outside of the original ROW will proceed only after receiving written approval from the Bureau, Service and CDFG describing the exact location of the expansion.

19. PG&E has the option of erecting desert tortoise fencing in lieu of inspection of open trenches. If the trench is short, personnel may monitor the trench. All open holes and trenches will be inspected for trapped desert tortoises at the beginning, middle, and end of the work day, at a minimum. During excavation of trenches or holes, earthen ramps will be provided to facilitate the escape of any wildlife species that may inadvertently become entrapped. If desert tortoises are trapped, the project biologist will be notified immediately. The desert tortoise will be allowed to escape before work continues in that location. A final inspection of the open trench segment will also be made immediately before back filling. All open pipe segments will be covered when work activity is not occurring at the site. Trenches must meet the safety requirements of the Occupational Safety and Health Administration before personnel enter open trenches to remove wildlife.

20. All construction vehicles and equipment will be periodically checked to ensure proper working condition and to ensure that there is no potential for fugitive emissions of oil, hydraulic fluid or other hazardous products. The Bureau will be informed of any hazardous spills.

21. Workers will exercise caution when traveling to and from the project area. To minimize the likelihood for vehicle strikes of listed species, speed limits when commuting to project areas on ROW roads will not exceed 20 miles per hour.

22. Intentional killing or collection of either plant or wildlife at construction sites and surrounding areas will be prohibited. The Bureau will be notified of any such occurrences.

23. The Bureau will endeavor to place the remains of intact listed species with educational or research institutions holding the appropriate state and federal permits per their instructions. If such institutions are not available or the animal's remains are in poor condition, the information noted above will be obtained and the carcass left in place. If the animal is a desert tortoise, the Bureau should consider marking the carcass in a manner that would not be toxic to other wildlife to ensure that it would not be re-recorded in the future. Arrangements regarding proper disposition of potential museum specimens will be made with the institution by the Bureau through a biologist prior to implementation of the action.

24. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E will notify the Bureau within 48 hours. As a part of this emergency response, the Bureau may require specific measures to protect listed species. During cleanup and repair, the agencies may also require measures to recover damaged habitats.

25. Once the treatment facility is no longer needed, PG&E will be required to restore disturbed areas in a manner that will assist in the re-establishment of biological values within the disturbed ROW. Methods of such restoration will include the reduction of erosion, re-spreading of the top two inches of soil, planting with appropriate native shrubs, and scattering of bladed vegetation and rocks across the ROW, depending upon the appropriateness or effectiveness in a given area.

26. Within 60 days of completion of construction activities, the FCR and biologist will prepare a brief report for the Bureau documenting the effectiveness and practicality of the

minimization measures and making recommendations for modifying the measures to enhance species protection. The report will also provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.

27. All areas within the proposed action area and within the potential impact of the action will be monitored semiannually during the active period for tortoise by a biologist knowledgeable of desert tortoise ecology. Surveys will be completed throughout the duration of the action to verify the presence or absence of desert tortoise and reports will be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.

28. Riparian areas surrounding the proposed action site will be surveyed for southwestern willow flycatchers according to the protocol established by the U. S. Fish and Wildlife Service. These surveys will be completed each year by a biologist permitted by the U. S. Fish and Wildlife Service to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports will be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.

Appendix B
Figures

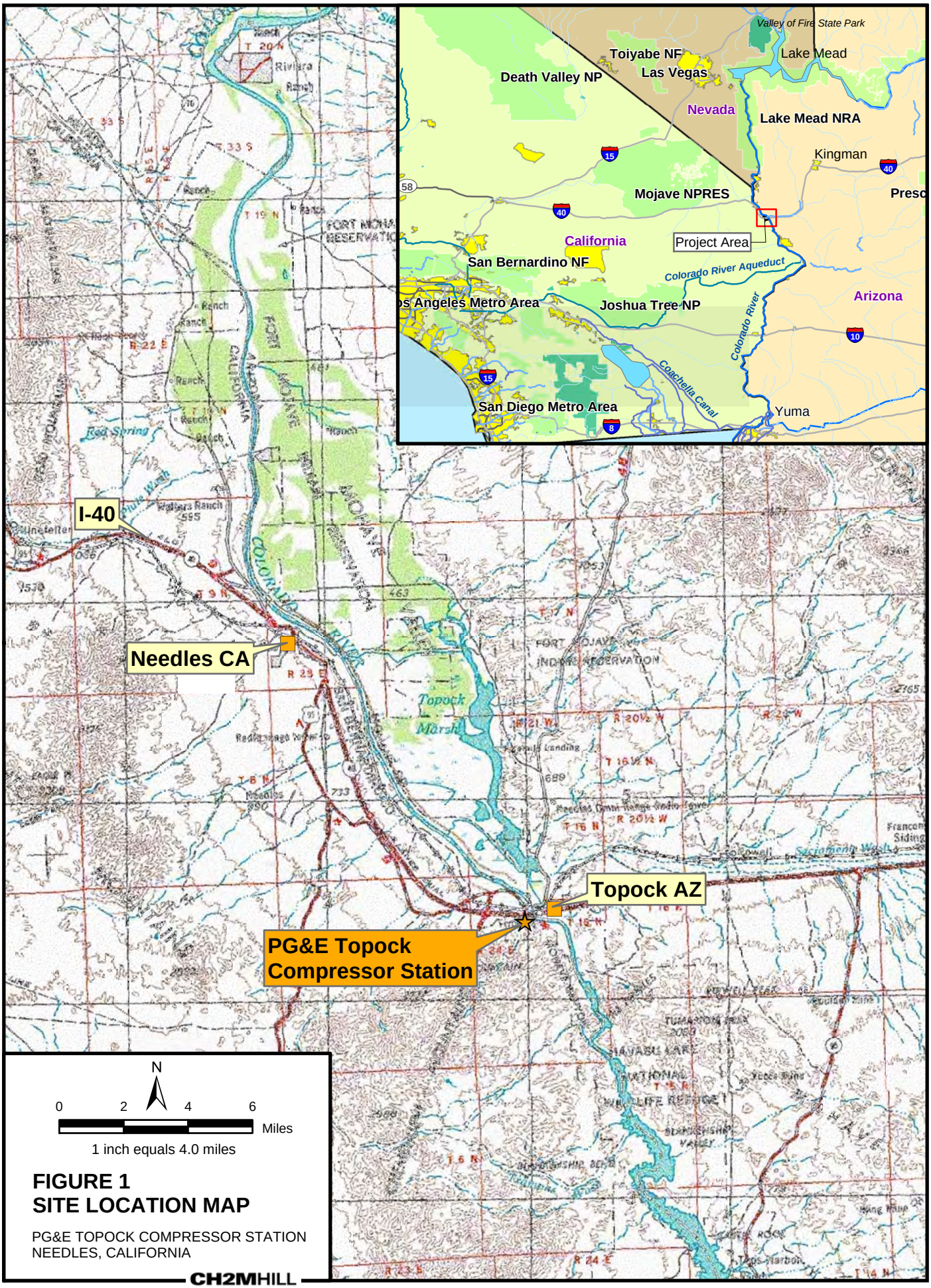

FIGURE 1
SITE LOCATION MAP

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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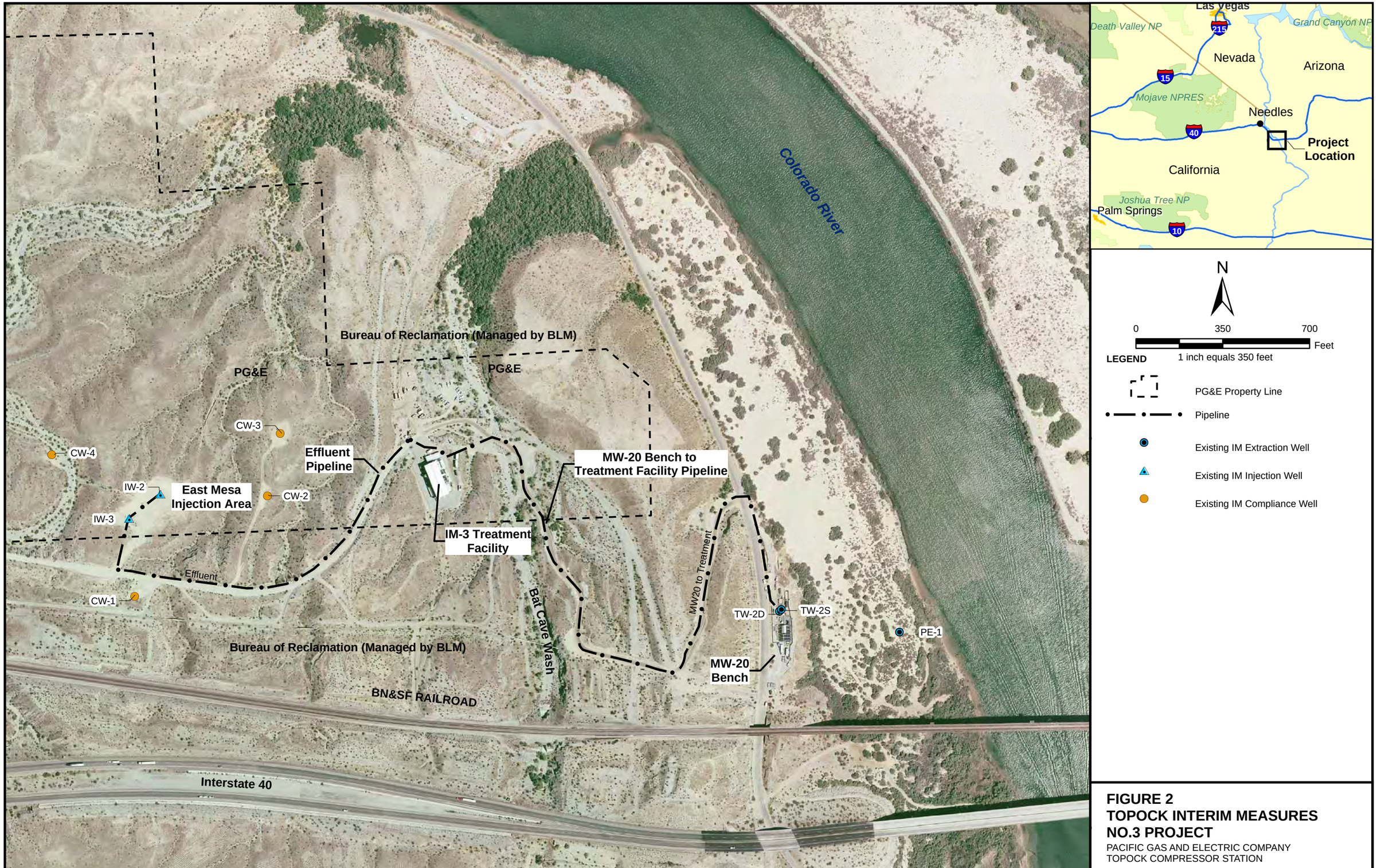
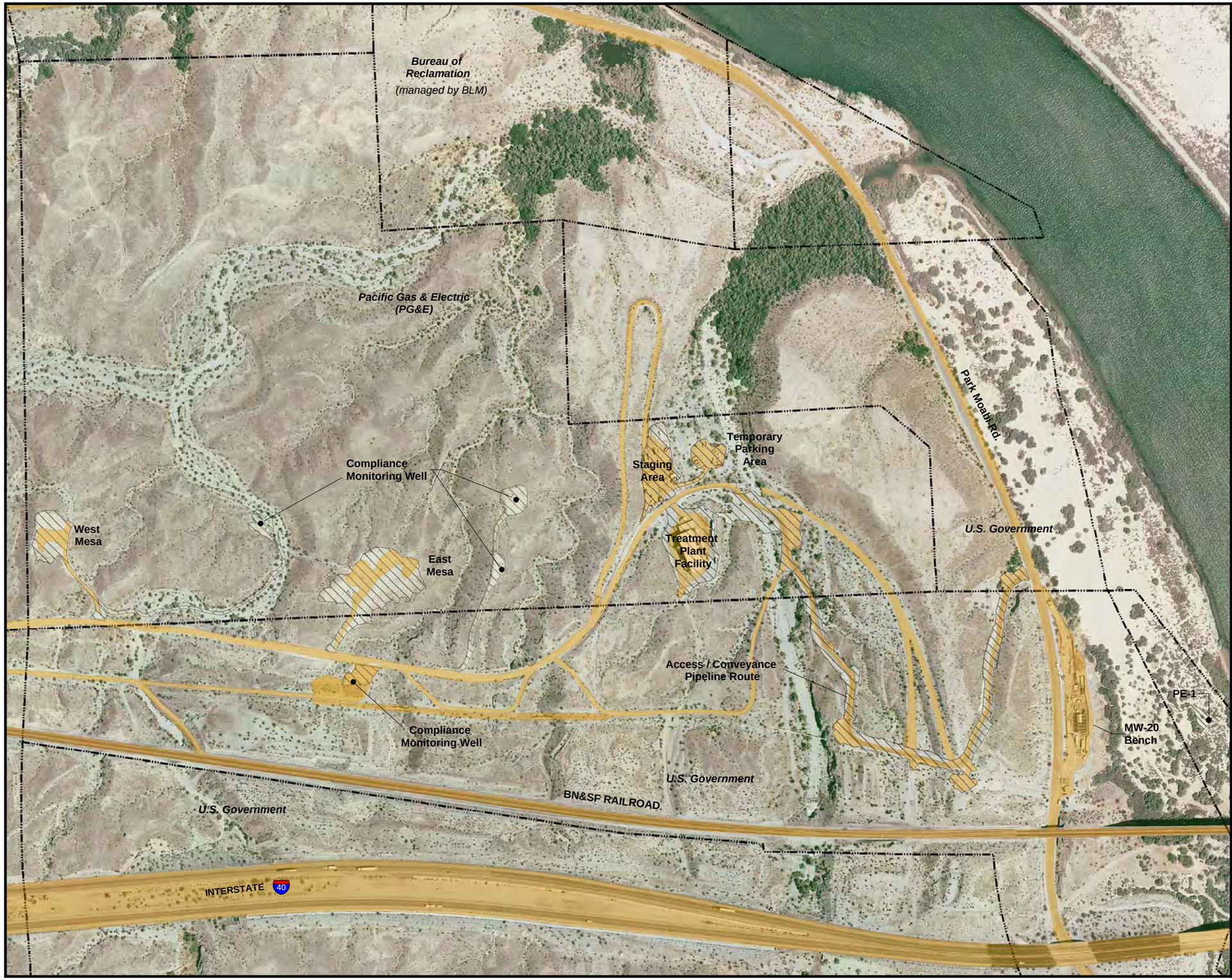
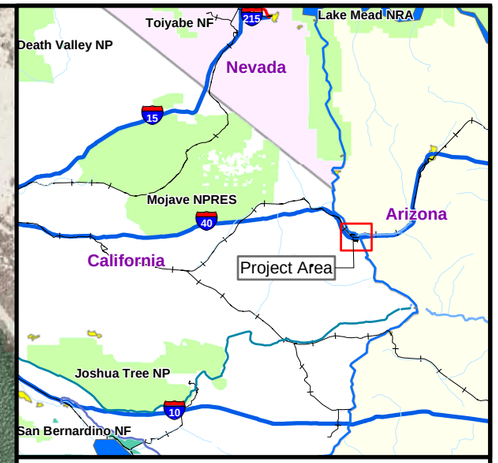


FIGURE 2
TOPOCK INTERIM MEASURES NO.3 PROJECT
PACIFIC GAS AND ELECTRIC COMPANY
TOPOCK COMPRESSOR STATION

CH2MHILL

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2005\EWS_JULY05_LOCS_IM3_FACILITIES.MXD EWS_JULY05_LOCS_IM3_FACILITIES.PDF 9/26/2005 16:32:12





N

0 175 350 700 Feet

1 inch equals 350 feet

LEGEND

- Property Boundaries
- Previously Disturbed Area
- Area Used* for IM-3

*The significance of the term "use" for IM-3 means only that some activity has taken place over such land. It does NOT signify that any land has been harmed or that any other adverse effects on the land have occurred as a result of the activity.

Sources: San Bernardino County Assessor, Parcel quest, State Board of Equalization, Pacific Gas and Electric Company, and Plat maps provided by BLM.

FIGURE 3
TOPOCK IM3 PROJECT
LAND USE MAP
JULY 2005

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2005\IM3_LANDUSE_UPDATE.MXD IM3_LANDUSE_UPDATE.PDF 9/28/2005 10:18:53

Appendix C
Sign In Sheets

Biological Resources Awareness Training Attendance Sheet
Pacific Gas and Electric Topock IM-3 Project

Your signature constitutes an agreement to abide by the biological resources avoidance and minimization measures presented in this training.

Date	Name (print)	Company	Telephone	Signature
9/21/04	John Lueck	CH2M HILL	530 229-3355	John Lueck
9/21/04	Shivani Saxena	CH2M HILL	714 435 6137	Shivani Saxena
9-21-04	Kate Ebel	CH2M HILL	650 464 1566	Kate Ebel
9/21/04	Ben Moayyad	CH2M Hill	916 761-2997	
9/21/04	Erica Nathews	CH2M Hill	(702)953-1203	E Mathews
9-21-04	Juan M. Osorio	StrongArm	(562) 787 3165	
9-21-04	Jeff KRAUSS	STRONGARM	562-787-3164	Jeffrey S Krauss
9-21-04	DARREN ZUIDEMA	STRONGARM	562-787-3164	Darren Zuidema
9-21-04	Francisco Rodriguez	SETS	562-787-3157	Fran Rod

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Date	Name (print)	Company	Telephone	Signature
Sept 27, 04	Mathew Klein	DenBeste Trans		
9/27/04	Phil Schoenecke	CH2M Hill	(704) 904-1831	
9/27/04	Duane Boyd	CH2M Hill	(425) 922-2078	
9-27-04	DAN HEATH	DENBESTE	707 975 0327	
9-27-04	FRANK JACKSON	Philip-DenBeste	408-761-5243	

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Date	Name (print)	Company	Telephone	Signature
9/28/04	DAVID Rubio	W.D.C	909/840-0575	
9/28/04	Jesse Love	WDC	(916) 529-2343	
9/28/04	Steve Andrus	WDC	(775) 777-2688	
9-28-04	T. Everette	AE	(909) 266-3135	
9/28/04	Jim Weigel	CH2M Hill	801 450-2871	
9-28-04	RICK Delejon	CH2M Hill	210-240-0209	
9-29-04	Chad Smith	Consultant	(760) 272-4864	
9-30-04	Tony Keith	~~Consultant~~ AE	541-929-5487	
9-30-04	Scott M. Payton	DenBeste	928 768-4403	
9/30/04	PAT O'HARA	DENBESTE	928 533 0077	
9/30/04	Chon Espinza	Phillips Const	760-326-2527	
10/4/04	Steve Soares	Contractor Dunbar	408 591 3792	
10/4/04	ROBERT FERNANDO	CH2M HILL	323 440 9416	
10/4-04	MARK WILLIAMS	DenBeste	707 975-0440	

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Date	Name (print)	Company	Telephone	Signature
10-4-04	Mike Williamson	WDC	530-687-0097	
10-9-04	SAM RIVERA	WDC		
10/18-04	Armando mota	Concrete constuctor		Armando mota
10-18-04	Gene Brown	"	760-256-0707	
10-18-04	John C Siembab	"	"	
10-14-04	DEVIN SIEMBAB	" "	" "	
10-19-04	SANTIAGO RIOS	" "	" " "	
10-18-04	Jorge Cisneros	Concrete Const.	(760) 253-3827	
10-19-04	Jake Valdes	CH2M HILL	915)	
10.22.04	Melissa Gonzales	CH2M HILL	210-860-1944	
10-25-04	S. BRADEN	SHIPLEY	909 662 1495	
10.25.04	Anthony Quesnel	Shipley	909 415 1414	
10-25-04	Bill Yates	Shipley	760 244 4836	
10-26-04	Mark Hagstrom	Robinson Electric	702-299-0043	
10-26-04	Robin McClure	Robinson Electric	702 299 0043	Robin McClure
11-1 04	Ruben Gomez			
11-01-04	ROGER HOLLER	Robinson Electric	928-303-6023	
11-01-04	Andy Holler	Robinson Electric	928-299-0043	

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Date	Name (print)	Company	Telephone	Signature
11/2/04	Shane Brown	Comick Const.	760 256-0707	
11-2-04	Jake Harmon	"	"	
11-2-04	Carlo N Massimini	"	"	
11-02-04	Jimmy Messick	"	"	
11-02-04	JASON Herrera	M.E.C		
11-2-04			760-256-2068	
11-2-04	CHRIS GREEN	CH2MHill	416-801-3762	
11-4-04	Mario Macias	Concrete Const	928-208-1480	
11-10-04	DEREK PADDOCK	CONCRETE CON.	928 201-6889	
11/10/04	JESS Burch	Concrete Con.	928 768 7162	
10/10/04	LARRY Hook	Walenco	64-301-4109	
11/10/04	JAY PIPER	CH2M	702 525 1137	
11/10/04	Mitch Tullis	Walenco	661-301-4107	
11/11/04	DERICK BRADY	WDC	661-363-6803	
11/11/04	STEVEN ODOM	WDC	505-991-1281	
11/11/04	WERNER L. WINKLER	WDC	(909) 931-4014	
11/11/04	David Thomas	CH2M HILL	510 220-4449	
11-12-04	John L. Phillips	Phillips Const.	760-326-2527	

Biological Resources Awareness Training Attendance Sheet
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Date	Name (print)	Company	Telephone	Signature
11/15/04	STEVE REPP	ISCO INDUSTRIES	209-605-2125	
11-15-04	Rick Corrales	ISCO INDUSTRIES	559-647-5850	
11-15-04	Tim Kulinski	ARB INC	760-275-0401	
11-15-04	John DELEON	ARB	760-275-0401	
11-15-04	DANIEL ROMO	ARB INC	760-275-0401	
11-15-04	STEVE HOLTT	ISCO	256-603-3237	
11-15-04	Steve Mellon	CH2M	713-462-0161	
11-16-04	Alfred BANKS	WDC	209-575-3102	
11-16-04	MICHAEL D. GODWIN	CH2M/CCI	707-246-5781	
11-19-04	Chuck Weller	Continental Supply	(530) 681-9312	
11-19-04	Neil Davis	WDC	909-917 9298	
11-22-04	Tim Smith	DenBeste	(661) 343-1453	
11-22-04	Ron SWEARER	DenBest	768-3487	
12-6-04	Bryan Mull	DenBest	(702) 308-7350	

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Pacific Gas and Electric Topock IM-3 Project

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Date	Name (print)	Company	Telephone	Signature
11/30/04	Kathryn Brown	CH2M HILL	530 604 4901	
11/30/04	Nathan Brown	CH2M HILL	530 604 4903	
11/30/04	Duane Mannens	WDC	505 801 0844	
11/30/04	John Brunson	WDC	505 285-3373	
12/2/04	DARRELL FARLEY	ARB	760 343 1180	
12/6/04	EVAN GRAM	CH2M HILL	206·369·3477	
12/8/04	Mitchel Daniels	WDC	602·721-8455	
12/15/04	William Tom Minor	WDC	320·980·2183	

Biological Resources Awareness Training Attendance Sheet
Pacific Gas and Electric Topock IM-3 Project

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Date	Name (print)	Company	Telephone	Signature
12-16-04	Chad Osborn	Robinson elect.	754-1007	
12-16-2004	Cy Simons	Robinson Elec.	758-2493	

Biological Resources Awareness Training Attendance Sheet
Pacific Gas and Electric Topock IM-3 Project

Your signature constitutes an agreement to abide by the biological resources avoidance and minimization measures presented in this training.

Date	Name (print)	Company	Telephone	Signature
01/03/05	JAMES AUDIEGO	LOCKWOOD	623-703-4127	[illegible]
1/04/05	JON AREND	WDC GREENE	612 432 5802	[illegible]
01.04.05	JUAN FRANK GUTIERREZ	WDC	909 475 1092	[illegible]
1/7/05	TSGR WOM	CH2MHill	805 895 9380	[illegible]
1-8-05	Bob McCarty	WDC	214-500-7707	Bob McCarty
1-10-05	Joe Muxlow	DenBeste	661-201-4395	[illegible]
1-10-05	José A MUNGUIA	PROSONIC	NA	José A. Munguia
1/12/05	Doug Bobinski	Welenco	661.834-8100	[illegible]

Biological Resources Awareness Training Attendance Sheet
Pacific Gas and Electric Topock IM-3 Project

Your signature constitutes an agreement to abide by the biological resources avoidance and minimization measures presented in this training.

Date	Name (print)	Company	Telephone	Signature
1-10-05	RAY Reece	Prosonic	9167163633	
1-10-05	JOEL HALLOWELL	"	740 581-0203	
1-10-05	Denzil Roberts	Prosonic	740 236 0741	
1-10-05	BRYAN [illegible]	"	740-350-2078	
1-14-05	Brent Blakemore	"	503 [illegible]-9911	
1-15-05	Charles Dougherty	CH2M Hill	918-583-3057	
1-16-05	DUSTIN KNUTSON	PROSONIC	740-236-0741	
1-17-5	Michael Miller	DENBESTE	(619) 203-2664	
1-20-05	Richard Van Horn	ROBINSON	702 299-0043	
1-25-05	Danny Vigil	CCI	928-788-2337	
1-25-05	Raul Miranda	CCI	(760) 912-1933	
1-27-05	CRAIG ROARK	ISCO	(661) 393-5499	
1-27-05	Armand Fitzgerald	Denbeste	(661) 201-7332	
1-27-05	Theo Welch	J Roach Surveying	928 486-3245	
1-27-05	TOM A RENNELL	J ROACH SURVEYING	" " "	
1-27-05	Oscar Castillo	AYALA BORING	(909) 997-5304	
1-27-05	ANTONIO SOTO	AYALA B.	909 357-1884	
1-27-05	EVERARDO TERRERO	"	(909) 938-5026	

Biological Resources Awareness Training Attendance Sheet
Pacific Gas and Electric Topock IM-3 Project

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Date	Name (print)	Company	Telephone	Signature
Jan. 31, 2005	Alan McElyea	ISCO	(256) 851-6000	[illegible]
Feb 9 2005	Ring Bailey	DemBeste	951 328 4678	[illegible]
2-21-05	Habacuc Estrada	concrete constructor		[illegible]
2-21-05	CHRIS SMITH	PG&E	918-645-8294	[illegible]
3-1-05	JAMES WADE	Robinson		J.R. WADE
3/9/05	Matt Ringier	CH2M Hill	925-595-6200	[illegible]
3/9/05	Jeff KRAUSS	SEFS	562-787-3164	[illegible]
3/9/05	Daniel Cichy	CH2M HILL	303-883-0138	[illegible]
3-9-05	DARREN ZUDEMA	SEFS	562-787-3161	[illegible]
3-9-05	Juan M. Osorio	SEFS	562-7273165	[illegible]
3-9-05	Casey Crosby	STRONGARM ENV.	562-787-3163	[illegible]
3-9-05	John LUECK	CH2M HILL	530/945 2245	[illegible]
3/9/05	KENNETH W DORMAN	CH2M HILL	(916) 806-9280	[illegible]
3/9/05	Audie Martin	CH2M Hill	530-229-3461	Audie Martin
3/19/05	Victor Martinez	CH2M Hill	(472) 820-2188	[illegible]
3/14/05	Chuck Hastings	LGE		[illegible]
3-14-05	Kevin Stanton	Robinson Electric		[illegible]
3-14-05	TOM QUEST	ROBINSON ELECTRIC		[illegible]

Biological Resources Awareness Training Attendance Sheet
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Date	Name (print)	Company	Telephone	Signature
2-2-05	WILLIAM ZAMOW	WDC		[illegible]
2-7-05	Shain Bowman	Robinson	758-9647	Shain Bowman
2-7-05	Rich Ricks	CH2M Hill	916-716-7970	[illegible]
2-8-05	Joey Wade	Robinson	760 326 2497	Joey Wade
2-9-05	Clark Rein	CH2M Hill	713-516-0351	Wm. Clark Rein
2-9-05	Clayton Dillard	Prosonic Corp.	N/A	[illegible]
2/21/05	Allen Erickson	CH2M HILL	602-312-5895	[illegible]
2-21-05	THOMAS LAE	CH2M Hill	916 296 0897	[illegible]
2/21/05	Joe Sawvel	CH2M Hill	480 282 8565	[illegible]
3-7-05	Robert King	G+W Builders	714 529-9935	Robert King
3 7 05	Enzo Quez	G+W Builders	714-529 9955	[illegible]
3-7-05	John Wilcher	" "	" "	[illegible]
3-7-05	Tom Adams	LG	623-434-0808	[illegible]
3-7-05	Jon Potts	G+W Bldrs.	909-731-8185	Jon Potts

Biological Resources Awareness Training Attendance Sheet
Pacific Gas and Electric Topock IM-3 Project

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Date	Name (print)	Company	Telephone	Signature
3/28/05	GREG GUERRERO	G&W		[illegible]
3-29-05	Rick Koresen	G&W		[illegible]
3-29-05	martin lopez	G&W		[illegible]

Biological Resources Awareness Training Attendance Sheet
Pacific Gas and Electric Topock IM-3 Project

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Date	Name (print)	Company	Telephone	Signature
4-4-05	Raymond Locke	Concrete Construction	256-0707	[illegible]
4-4-05	Manuel Guerrero	G&W Builders	661-978-7401	[illegible]
4-4-05	Sergio Giron	G&W Builders	661-979-9854	[illegible]
4-4-05	Carlos Chavez	G&W Builders	661-599 0387	[illegible]
04.07.05	Robert Hopps	Robinson		[illegible]
04-18-05	Bobby Horan	CH2MHill	949 456-1125	[illegible]
4-18-05	Mike Pool	Gul Branson	928-757-4379	[illegible]
4-18-05	Chad Petersen	Gulbranson	928-757-4379	[illegible]
4/22/05	Robert Rockwood	Robison		[illegible]
04/25/05	Brian Maynard	Robinson Elect Inc	705-769-1595	[illegible]
05/02/05	DEREK HERNANDEZ	Derek Hernandez C.C.	(760) 253-4748	Derek Hernandez
05/04/05	Ken Mayeux	CH2MHILL	720 286 5810	Ken Mayeux
05 May 2005	Jamieson Gallagher	Lockwood Greene	706 724 8225	[illegible]
5/5/05	STEVEN KIDDER	F.I.C.	(714) 598 6606	[illegible]
5/5/05	Troy Areolo	FIC	(714) 686 7047	[illegible]
5/23/05	Rick Hernandez	WDC	909 503 6157	[illegible]
5-24-05	Nick Ruiz	ARB	805 368 6283	[illegible]

Biological Resources Awareness Training Attendance Sheet
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Date	Name (print)	Company	Telephone	Signature
5/4/05	DOUG LANDFEAR	CH2M HILL	510 587 7713	
5/4/05	TERRY DEBIASE	CH2M HILL	510-587-7686	
5/4/05	Kevin Sullivan	CH2M	925-975-3473	
5/4/05	Curtis Smith	PG&E	918-645-8294	
5/4/05	KEN MARTINS	CH2M HILL	714-435-6284	
5/4/05	Jeff Minor	CH2M HILL	714-436-6164	
5/4/05	CURT Peterson	DSC	925-934-5600	
5/4/05	DENNIS FINK	CH2M Hill	510-520-6017	
6-16-05	Ricardo Hernandez	OSS int.	510-222-2005	
6-16-05	Nicolas de la cruz	OSS int.	510-222-2005	
6-16-05	Matthew Ash	OSS INT.	510-222-2005	
6-16-05	Joshua Edma	OSS INT.	510-222-2005	
6-16-05	GLENN DAGGS	OSS INTERNATIONAL	510.455-0354	
6-16-05	MICHAEL TAYLOR	OSS " "	510-455-0354	
20 JUNE 05	CARLOS SAUCHELLI	WAC EXCAVATION	505-991-3576	
6/21/05	SCOTT BORRELL	MOHR POWER SOLAR	951 736 2000	
6/21/05	Shane Mohr	Mohr Power Solar	951-736-2000	
6/21/05	Mike Mohr	Mohr Power Solar	951-736-2000	

ORIGINAL

Biological Resources Awareness Training Attendance Sheet
Pacific Gas and Electric Topock IM-3 Project

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Date	Name (print)	Company	Telephone	Signature
JUNE 11, 2005	JEFFREY WIMAR			
June 11, 05	Wayne Merritt	ElRod	201 3191	
JUNE 11, 05	[illegible]	ELROD	201 3191	
JUNE 11.05	LEE KEELING	ELROD	[illegible] 3191	
June 22-05	Thomas Dehon	City of Needles	326-5700	
June 22-05	Justin Scott	City of Needles	326-5700	
JUNE 22/05	JOHN THOMAS	CITY of NEEDLES	326-5700	
JUNE 25/05	John Currier	Ellis fence		
June 25/05	Duane Brown	Ellis fence		
June 25-05	Wayne Ellis	Ellis Fence	1-760-963-2158	
June 25-05	GREG Berndt	Ellis Fence		
JUNE 27-05	Kevin [illegible]	BRAND SCAFFOLD	562) 529-7777	
JUNE 27-05	ROB KIM	FARWEST	(310) 344 7053	
June 27-05	ANTHONY LUCERO	BRAND	310) 505 8042	
JUNE 27-05	ANTWAN JERDON	BRAND	(323) 220-3547	
WAYNE MAY	June 27-05	FARWEST	(714) 520-7219	
June 28-05	Michael Mendoza	BRAND		
June 28-05	J.A. "Rita" Becker	BRAND	310 505 8097	
June 29, 05	AMEL AMO	FIC		

Biological Resources Awareness Training Attendance Sheet
Pacific Gas and Electric Topock IM-3 Project

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Date	Name (print)	Company	Telephone	Signature	
6-30-05	KEN LAUENMAN	SEFS	562 489-5507		SWFL
6-30-05	JEFF KRAUSS	SEFS	562-787-3164		SWFL
6-30-05	Ryan McClellan	CH2M	720-273-8931		SWFL
7-5-05	David Covela	CCI	760-256-2374		
7-7-05	KENNETH FLAGG	ELTON	928 758 7997		
7-7-05	MIKE LADEAU	CH2M HILL	714-227-3324		SWFL
7-7-05	ERIC HERRERA	SEFS	562-644-5753		SWFL
7-12-05	Robert Jazeris	Farwest			
7-12-05	David Rogers	Farwest			
7-12-05	Lance Hanners	OMI	478-827-0998		
7/12/05	KEN DITTO	CAE/CH2M	770-833-5359		
7/12/05	Manuel Quijada	OMI	661 978-2545		
7/12/05	Bob Trebbe	CH2M HILL			SWFL
7/12/05	John Dallapiazza	CH2M Hill	303 250 3761		SWFL
7/12/05	Brad Shearer		530 945 6387		SWFL
7-12-05	Jerry Anderson	Northstar	714-856-1839		SWFL
7/18/05	Isaac Wood	CH2M Hill	805 895 7380		SWFL
7/18/05	Erica Mathews	CH2M Hill	(702)683-4006		SWFL
7-18-05	Juan M. Ocaria	StrongArm	-		SWFL

Biological Resources Awareness Training Attendance Sheet
Pacific Gas and Electric Topock IM-3 Project

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Date	Name (print)	Company	Telephone	Signature
7-8-05	Shawn Ledbetter	OMI		
7-8-05	CHRIS KNIGHT	OMI		
7-8-05	BRIAN DOUGS	OMI		
7-8-05	MELVIN LANPHAR	OMI		
7-8-05	David Chaney	OMI		
7/21/05	TINA TEANSTROM	STRONGARM ENVIRONMENTAL		
7-25-05	Kate Ebel	CH2M HILL		
7/25/05	Brian Hughes	CH2M Hill		
7/25/05	GARY SIBBLE	STRONGARM ENVIRONMENTAL		
7/27/05	ANDREW ACOSTA	OSS		
8/15/05	Laura Elliott	CH2M Hill		
8/15/05	Matt Ringler	EZ		
9-1-05	ERIK MILLER	STRONGARM ENV		

SWFL IDT
SWFL IDT
SWFL IDT
SWFL IDT

Appendix D
Daily Monitoring Logs

Daily Construction Monitoring Log

0700 — 1800

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 9/27/04 START/END TIME: ~~0530 — 1630~~

WEATHER: Clear skies, slight breeze, hot

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	Daily safety mtg. 1st day of const. activities for treatment facilit
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	N/A
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Approved to widen road (east access) & remove veg. ~20 ft wide corridor.
Were access roads watered?	☐Yes ☑No	H_2O truck scheduled to come out on Tues
Site checked for biota prior to construction?	☑Yes ☐No	Resurveyed east access road & west mesa
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Trained supervisors/managers, See attendance sheet
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
1000 ~~0630~~	East access	road blading	Activity performed all day. Resurveyed	
1800 ~~0700~~	west mesa	well drilling	Surveyed area.	
			Monitored crews throughout day.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	~~N/A~~ None	
	Daily safety mtg.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 9/28/04 START/END TIME: 0530 - 1800

WEATHER: Clear, slight breeze, hot

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	N/A
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	~~Relocated/transplanted Acacia tree (~4 ft tall)~~ Approved east access widening. Some veg removed.
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630 ~~0530~~	east access	road blading	D-5 dozer leveling/widening road	
			Activity performed all day.	
1230	west access	presurvey	DT protocol survey of west portion of Route 66.	
			Monitored work crews.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	None	
	Daily safety mtg @ 0530.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecker 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 9/29/04 START/END TIME: 0600 – 1800

WEATHER: Clear, sunny, slight breeze, hot

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	N/A
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Minor hydraulic spill – 3 oz at west mesa. Spill by well drillers.
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Road widening. Some creosote removed.
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☑Yes ☐No	Contacted BLM on hydraulic fluid leak/spill.

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	access road	D-5 leveling road		
1115	east access	"	BLM onsite inspecting area. Sally (Arch) & Mark (Bio) looking over site. Looked for tortoise foot. Could not find just NW of BCW. BLM pleased with compliance.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	None	
	Daily safety mtg @ 0600.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecker 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 9/30/04 START/END TIME: 0600 – 1300

WEATHER: Clear, sunny, slight breeze, hot

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	N/A
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Approved road widening. Some veg removed.
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Trained 4 new workers. See attendance sheet
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	accessroad	road grading	Marked/flagged palo verde trees.	
1030	westaccess	DT placed survey	Surveyed west access road, Produced tech memo for BLM approval.	
			Sent memo to Terri & Steve.	
			Terri sent to BLM.	
			Monitoring work crews.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	None	
	Daily safety mtg @ 0600.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 10/1/04 START/END TIME: 0600 – 1500

WEATHER: Clear, sunny, breeze, hot

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	N/A
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	started clear & grub & treatment facility w/ dozer
Were access roads watered?	☑Yes ☐No	All roads watered. Even well sites,
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	accessroad	loading	Completed portion of road work to treatment facility.	
1100	treatment facility	clear & grub	Dozer at treatment facility cutting pad. Planned work activity throughout day.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	None.	
	Daily Safety mtg @ 0600.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/4/04 START/END TIME: 0600 – 1630

WEATHER: Clear, Sunny, Breezy, hot

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Hay bales at treatment facility for SWPP
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Agrved clear & grub at facility, started staging area,
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Trained Robert H. & new operator – Steve Also trained Mark – now be Weste foreman Jaque F & Yvonne M. onsite.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	treatment facility	clear/grub/leveling	side-blotched lizards, common raven	
145	staging area	clear & grub	skip loader at staging area.	
			Workers laid out fabric & placed road base at entrance to treatment facility.	
			Jaque Forrest onsite w/ Phil.	
			Yvonne Meeks onsite.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	None	
	Daily safety mtg @ 0600.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): ROBERT HERNANDEZ DATE: 10-4-04 START/END TIME: 0600 – 1600

WEATHER: _____

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☒No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	NA
Material stored within approved locations?	☐Yes ☐No	NA
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	NO BIOTA ON WORK SITES
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0700	TREATMENT PLANT PAD	GRADING W/ DOZER.		
0830	ROUTE 66	LAYOUT GEO FABRIC & ROAD BASE NEXT	BAT CAVE WASH. TUVU	
1355	STAGING AREA	CLEAN & GRUB	CORAZ	
1445	TP PAD	GRADING		
1600		END GRADING →	EAGLES OF DOZER.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
NOTE	06000620 - SAFETY BRIEFING FOR CONSTRUCTION CREW	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/5/04 START/END TIME: 0600 — 530

WEATHER: Clear, sunny, slight breeze, hot

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	grubing complete at treatment facility site.
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	Spoke to Yvonne M. about request letter needed for BLM to approve access. Left message for Steves.

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0730	treatment facility	grading site	watering & grading site for pad. Leveling staging area.	
0910	westmesa welldrilling	welldrilling	Crew setting up.	
0930	treatment facility	Compacting site	compacter onsite.	
0920	westmesa	well installation	well crew back onsite	
1130	topock	coord w/ BLM	BLM rec'd bio rpt addendum. Approved rpt.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	None.	
	Yvonne Meeks onsite. Spoke to her about need for formal	
	request letter submitted to BLM. I left message for	
	Steves. to coord w/ Terri to get letter completed per	
	Yvonne.	
	Daily safety mtg @ 0600.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): ROBERT HERNANDEZ DATE: 10-5-04 START/END TIME: 0600 – 1730

WEATHER: SUNNY, ~ 67° @ 0600

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	NA @ T.P. PAD; YES AT WEST MESA
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	NO BIOTA ON WORK SITES
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0730	T.P. PAD	GRADING		
0900	"	"		
1300	W MESA	DRILLING WELL	ONLY 20 FT BEFORE MALFUNCTION.	
1600	"	RIG REPAIRED	BAIL WATER FOR SAMPLE FOR SAMPLE MALFUNCTION	
1730	"	"	TAKE WATER SAMPLE	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	- DRILLERS REMOVED CONTAMINATED SOIL FROM EAST MESA AND CONTAINED.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/6/04 START/END TIME: 0600 – 1800

WEATHER: Sunny, clear, hot, slight to no wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	H2O getting under haybales at drainage near treatment plant Had laborers bury haybales & install fencing.
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Leveling of staging area. Veg removal approved.
Were access roads watered?	☑Yes ☐No	All roads watered including access for drill crew at Westmesa.
Site checked for biota prior to construction?	☑Yes ☐No	0630 Checked site & equipment before work.
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	Conf call w/ agencies

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	East access	tailgate Mtg.	Discussed safety, Nat & Cult reminders.	
0630	treatment plant	leveling/compacting	Dozer grader sheeps foot, frontend loader onsite. Trucks bringing in base for Route 66.	
0830	Topock Station	Conf. Call	Kick-off conf call w/BLM, DTSC, PG&E	
1320	Treatment facility	Site visit	BLM onsite for prelim to State Director onsite tomorrow	
1730	Westmesa	Drill crew	check on crew.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Compacting & leveling for treatment plant, Work started at staging area.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): ROBERT HERNANDEZ DATE: 10-6-04 START/END TIME: 0600

WEATHER: SUNNY, HOT 68 - 100° WIND 5-10MPH SW

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	CHECKED FIRST THING IN THE MORNING
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0822-1610	TP PAD	GRADING & COMPACTING	LEVELING STAGING AREA	
0930-1715	WEST MESA	DRILLING + CORE SAMPLES		
1610	TP PAD		SHUT DOWN + MAINTENANCE	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
NOTE:	SILT FENCE INSTALLED ON EAST SIDE OF TREATMENT PLANT PAD.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/7/04 START/END TIME: 0600 — 1800

WEATHER: Sunny, clear, no-slight breeze, hot

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	fences & haybales in place at treatment facility. Added silt fencing around facility.
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Creosote bush removed during leveling of hill @ eastern access road.
Were access roads watered?	☑Yes ☐No	Hill cut, well watered.
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	BLM onsite @ ~ 1430

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	treatment facility staging area	leveling/compaction	sky loader, grader, dozer & 2 rollers onsite. One rental roller broken down	
0750	"	"	Added silt fencing to site.	
1115	"	"	Emailed bio support overview to BLM	
1430	east access	cutting hill	Creating gentle slope from hill on eastern access road. BLM onsite	
~~1500~~ 1400	West Mesa	well drilling	w/ State Director. Speople total looking at site.	
			→ well drilling shut down — no H_2O.	
1430	East access	leveling	cutting hill & slope for access from East	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	0600 Safety mtg. BLM State Director onsite today after lunch.	
	Heavy equip shifted to cutting hill on eastern access.	
	Leveling & compacting has seized at treatment facility.	
	Well drilling shut down this afternoon — no H_2O.	
	Rec'd protocol survey map. Plan on sending to BLM.	
	Sent BLM bio support overview for Oct 20 kick off mtg.	
	Coord w/ Mark Howell (BLM) on protocol transects, field forms,	
	survey south of I-40, etc. @ end of workday.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): ROBERT HERNANDEZ DATE: 10-7-04 START/END TIME: 0600-1645

WEATHER: SUNNY 75-100° CLEAR.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	NO BIOTA ON WORK SITES.
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630-700	TP PAD	-	CHECK SITE FOR BIOTA.	
0730-0946	W MESA	-	CORE SAMPLE & WATER SAMPLE	
0810-1000	TP PAD	GRADING / COMPACTING		
1017-1400	W MESA	1214 MAINTENANCE - SITE HOUSEKEEPING		

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
NOTE:	- CONSTRUCTION SAFTEY BRIEFING @ 0600-0630	
	- DAILY SITE SAFTEY MEETING @ 0700-0715	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/8/04 START/END TIME: 0600 - ~~05~~ 1730

WEATHER: Sunny, clear, slight breeze, hot

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☑Yes ☑No	loggerhead shrike, northern harrier
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	Treatment facility Well field	leveling & compacting well drilling @ west mesa	Robert monitoring crews while I survey site - zone of influence transects.	
1330	BCW	transects	observed northern harrier flying south over BCW.	
1500	unnamed wash	transects	observed loggerhead shrike perched on powerpole.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	0630 Zone of Influence transects for treatment facility & staging area.	
	1000 completed transects for facility. No DT sign observed.	
	1530 Completed transects for well fields. No DT sign observed.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): ROBERT HERNANDEZ DATE: 10-8-04 START/END TIME: 0600 - 1745

WEATHER: SUNNY, CLEAR 74 - 102 -

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	CHECKED ALL DRILLING / CONSTRUCTION SITES
Special status species observed onsite? Describe.	☒Yes ☐No	LOGGERHEAD SHRIKE ON WEST MESA. PERCHED ON RIG. NO WORK ON SITE YET, FLEW OFF AS APPROACHED. 0700
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0645-1600	TP PAD	COMPACTING & GRADING		
0825-1735	WEST MESA	DRILLING & CORE SAMPLES		
1600-1630	TP PAD	RIG MAINTENANCE → OFFSITE		
1735-1800	WEST MESA	CLEAN UP → OFFSITE		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
NOTE:	0600-0620 CONSTRUCTION SITE SAFTEY BRIEFING	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): ROBERT HERNANDEZ DATE: 10-9-04 START/END TIME: 0630 - 1745

WEATHER: SUNNY, CLEAR, 76-102° VERY WINDY 20-25 MPH GUSTS

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	NA - ONLY MONITORING DRILLING ACTIVITY TODAY.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	→ NO ACCESS + RESTRICTED FROM DRILL SITE
Site checked for biota prior to construction?	☒Yes ☐No	NO BIOTA ON WORK SITES
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0745-1745	WEST MESA	DRILL & CORE SAMPLES	REPAIRS TO CASING	
0900-1035	EAST MESA	PICKUP CEMENT, BENTONITE, & SAND FROM EAST MESA & TRANSPORT TO WEST MESA WITH PICKUPS.		
1745	OFF SITE			

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
NOTE:	SAFETY BRIEFING 0730-0745	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): ROBERT HERNANDEZ DATE: 10-10-04 START/END TIME: 0700 - 1800

WEATHER: SUNNY, CLEAR, 70-100° LITE WIND.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	NA
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	FIRST THING IN MORNING + NO BIOT ON SITE
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0750	WEST MESA	INSTALL PVC WELL		
0900	"	PULL OUT PVC WELL	SCREEN BROKE ABOVE SLITS + FISH OUT	
1515	"	RESUME WELL INSTALATION + ADD MONTEREY SAND		
1945	"	SET BENTONITE SEAL		
1800	"	OFF SITE		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 10/11/04 START/END TIME: 0600 – 1800

WEATHER: Clear, sunny, slight breeze, hot

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	treatment facility near wash. No cut & fill of wash.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	Already removed veg. Veg removed from staging area & treatment facility
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	East access rd	Safety Mtg.		
0900	project site	Bio survey	Conducted zone of influence transects for road.	
1500	"	Bio survey	Completed transects for road.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	No compliance issues.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): ROBERT HERNANDEZ DATE: 10-11-04 START/END TIME: 0600- 1810

WEATHER: SUNNY, HOT 90°

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	NO BIOTA ON WORK SITES
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0645-1600	T.P. PAD	GRADING & COMPACTING		
920-1330	WEST MESA	GROUTING WELL		
1410	WEST MESA	SET UP TO DRILL 2ND WELL ON WEST MESA.		
1725-1745	WEST MESA	DRILL UNTIL H2O RUNS OUT.		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
NOTE:	- SAFETY BRIEFING FOR CONSTRUCTION CREW @ 6:00 AM - 6:20 AM	
	- WDC S.Z SAFETY BRIEFING @ 0715 AM	
	- LUMBER, REBAR, SOIL DELIVERIES THROUGHOUT DAY	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Kelly Daniels DATE: 10/2/09 START/END TIME: 0800 — 1800

WEATHER: Sunny, clear, slight breeze, hot

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	
Decontamination and concrete wash-outs in approved areas?	☐ Yes ☐ No	N/A
Material stored within approved locations?	☑ Yes ☐ No	
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	
Were access roads watered?	☑ Yes ☐ No	
Site checked for biota prior to construction?	☑ Yes ☐ No	
Special status species observed onsite? Describe.	☐ Yes ☑ No	
Crew trained on biological minimization measures?	☑ Yes ☐ No	
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0800	east access	Safety mtg.		
0830	treatment fac	leveling/grading	bringing in fill material between pads & road,	
1400	drill crew	well installation	Site check. Check in w/ Robert.	
0815	well site	drilling	white pelicans observed.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Fill material being brought in from east access road for treatment facility.	
	Material being brought in for concrete work. Start concrete probably on Monday @ treatment facility.	
	working on protocol level survey report. Robert monitoring crews.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): ROBERT HERNANDEZ DATE: 10-12-04 START/END TIME: 0600- 1650

WEATHER: CLEAR, SUNNY 94°-99° WIND 5-10MPH

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	NO BIOTA ON WORK SITES
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0645-1355	T.P. PAD	GRADE, COMPACT,		
0710-1435	W. MESA	WATER DELIVERY.		
1450-1650	"	RESUME DRILLING		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
NOTE	– SAFTEY BRIEFING 4 CONSTRUCTION CREW 0600-0620	
	– SAFTEY BRIEFING 4 WDC 0700-0710	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/13/04 START/END TIME: 0600 – ~~1330~~ 1730

WEATHER: Sunny, clear, windy, mid 90s. Winds in late morning/afternoon.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Near wash, no cut/fill
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	N/A
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	veg already removed at const. site.
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	BLM onsite @ 1025. Field check.

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	East access	safety mtg.		
0700	treatment facility	leveling	Observed flock of ~30 cormorants	southbound
~~[illegible]~~ 1100	Compressor station	DT protocol rpt	Finished rpt & sent to Steve S. in SFO.	
			worked w/ GIS on figure.	
1330	treatment facility	excavation	Working SW corner of area.	
			Bringing in fill material to level	
			area.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	No issues.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): ROBERT HERNANDEZ DATE: 10-13-04 START/END TIME: 0600- 1615

WEATHER: SUNNY, CLEAR, 69-96°, WINDY 20-25 MPH NE

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	EXCAVATOR REMOVING SOIL FROM SOUTH SIDE of PAD → NO FILL
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	NO BIOTA ON SITE
Special status species observed onsite? Describe.	☒Yes ☐No	LOGGERHEAD SHRIKE OBSERVED ~ 900' NW of TP PAD, ON MESA. PERCHED ON CREOSOTE BUSH
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
(PH) 0819-1200	T.P. PAD	SURVEY GRADE		
0835-1100	"	GRADE & COMPACT		
0917-1605	WEST MESA	CORE FOR SAMPLE		
1430-1600	TP PAD	EXCAVATE SOIL ON	SOUTH SIDE of PAD.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
NOTE	- 0600-0620 SAFTEY BRIEFING FOR CONSTRUCTION CREW	
	- 0700-0715 SAFTEY BRIEFING FOR WAC.	
—	SOIL DELIVERY THROUGHOUT DAY.	
—	1025 BLM ONSITE	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/14/04 START/END TIME: 0600 - 1730

WEATHER: Sunny, clear, slight breeze, mid 90s

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑ Yes ☐ No	Near wash - no cut/fill
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	
Material stored within approved locations?	☑ Yes ☐ No	
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	veg already removed
Were access roads watered?	☑ Yes ☐ No	
Site checked for biota prior to construction?	☑ Yes ☐ No	preconsurvey 1st thing in morning
Special status species observed onsite? Describe.	☐ Yes ☑ No	desert iguana & gopher snake (juveniles)
Crew trained on biological minimization measures?	☑ Yes ☐ No	
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	East access	safety mtg.		
0630	treatment plant	excavating/grading		
1040	"	"	relocated desert iguana (juvenile)	
1400	"	compacting	bringing in materials	
1600	"	culverts	installed culverts at entrance to	
			treatment plant. Backfilled trench.	
			observed juvenile gopher snake @ staging area.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	No issues	
	Drillers on 4day leave. Last day today. Back on Tues Oct 19.	
	Robert out for ~4wks. Gabe Valdes will substitute	
	for Robert starting next week.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): ROBERT HERNANDEZ DATE: 10-14-04 START/END TIME: 0600 - 1453

WEATHER: SUNNY CLEAR, 64-98°

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	REMOVING SOIL FROM SOUTH SIDE OF TP PAD NO WORK IN WASH & NO FILL
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	NO BIOTA ON WORK SITES
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0700-	TP PAD	GRADE & COMPACT-$	EXCAVATE SOUTH SIDE OF TP PAD.	
0845-0910	WEST MESA	RESUME DRILLING		
910-1050	"	INSTALL PVC WELL		
1050-1340	"	REMOVE BROKE PVC	PIPE, SHUT DOWN UNTIL QUALITY MATERIALS ARRIVE	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
NOTE	- 0600-0625 SAFTEY BRIEFING FOR CONSTRUCTION CREW	
	- 0715-0725 SAFTEY BRIEFING FOR WJC	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/15/04 START/END TIME: 0600 – 1700

WEATHER: Sunny, clear, no slight breeze, mid 90's

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑ Yes ☐ No	Near wash – no cut/fill
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	
Material stored within approved locations?	☑ Yes ☐ No	
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	clear/grub completed @ TP
Were access roads watered?	☑ Yes ☐ No	
Site checked for biota prior to construction?	☑ Yes ☐ No	Every morning after safety mtg, site & equip checked.
Special status species observed onsite? Describe.	☐ Yes ☑ No	
Crew trained on biological minimization measures?	☑ Yes ☐ No	
Need to contact agencies? Describe.	☐ Yes ☑ No	Cathy Wolfe-White onsite – field visit

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	east access	Safety mtg		
0630	Treatment plant	compacting/grading	placing in rip-rap around drain pipe	
0830	"	"	brought in roll off bin & const. trailer	
1015	"		BLM – Cathy Wolfe-White onsite.	
1045	"		vehicle (offroader) drove through site & around orange fences. Tony (Arch) documented.	
1400	"	riprap	Completed laying out rip rap	
1600	"	grader	Had to repair flat tire on grader.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Cathy mentioned we already have permission to place geo-textile cover over AR66 between TP & property boundary. Approval for western access was approved & sent to PG&E yesterday. This will grant access from West & lay down of material between PG&E property boundary & Park Moabi Rd. Phil will provide Cathy with prints for project. They both made up lists (to do).	
	Equip serviced onsite – filters, etc at staging area & TP.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/18/04 START/END TIME: 0600 - 1730

WEATHER: clear, slight - mod wind, upper 80s to low 90s

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	straw bales @ drainage along HR66 & TP.
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	
Material stored within approved locations?	☑ Yes ☐ No	
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	Veg clear & grub completed @ TP.
Were access roads watered?	☑ Yes ☐ No	
Site checked for biota prior to construction?	☑ Yes ☐ No	Site & equip checked after safety mtg.
Special status species observed onsite? Describe.	☐ Yes ☑ No	
Crew trained on biological minimization measures?	☑ Yes ☐ No	Trained concrete constructors crew
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0730	Treatment plant	Dewaste H2O tank	21K gal tank brought onsite for H2O & fire	
0830	"	Concrete Const.	Provided awareness trng to concrete crew (see sheet)	
1300	"	Monitor	New monitor (Gabe Valdes) replacing Robert	
			Trained & showed Gabe around site.	
1400	" & drillers	concrete pad ~~[illegible]~~	Continue to monitor const activities @	
			TP for concrete pad.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	0600 Safety mtg. Started laying out geo-textile fabric	
	after mtg. Concrete Constructors (Barstow) trained & laying	
	out pad. Materials staged at staging area.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): GV . RR DATE: 10/18/04 START/END TIME: 1:30pm / 4:30

WEATHER: Warm, Sunny, Wind - 10 mph

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	Orientation / training
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	from Ray. Introduced
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No N/A	to site & all workers.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Briefed on Biological
Material stored within approved locations?	☑Yes ☐No	measures and concerns
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Drill crew not working today.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
2:30	Off Rt 66	Laying geotech material over	Rt 66. - No compliance issues.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): GV RR DATE: 10/11/04 START/END TIME: 6:00 am /

WEATHER: Warm / Scattered clouds breezy

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☐Yes ☐No	Attended morning safety meeting. Introduced to dr. 11 crew. Met w/ Jay and R. Romero about SWPPP + Tortoise concerns regarding expansion.
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☐No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	
Material stored within approved locations?	☐Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☐No	
Vegetation impacts w/in CE or outside?	☐Yes ☐No	
Were access roads watered?	☐Yes ☐No	
Site checked for biota prior to construction?	☐Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☐No	
Crew trained on biological minimization measures?	☐Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☐No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
11:30	Const. site	Western Diamondback on site - Removed in box and relocated		
		off site along ~~but~~ cave wash.		
4:30	Const. site	Work ends - No compliance issues.		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/19/04 START/END TIME: 0600 – 1800

WEATHER: cloudy, chance of rain, 80's, slight sprinkles in late afternoon

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	
Material stored within approved locations?	☑ Yes ☐ No	
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	
Were access roads watered?	☑ Yes ☐ No	
Site checked for biota prior to construction?	☑ Yes ☐ No	Site & equip checked after safety mtg. each day.
Special status species observed onsite? Describe.	☐ Yes ☑ No	Relocated diamondback rattlesnake.
Crew trained on biological minimization measures?	☑ Yes ☐ No	
Need to contact agencies? Describe.	☐ Yes ☑ No	Cathy White onsite @ 1100

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0700	TP	excavation	Pits/pad being excavated for treatment plant.	
0700	West Mesa	drillers	Drill crew arrived onsite, start drilling again @ West Mesa.	
0800	TP	drillers	Coord w/ Jay Piper on drilling.	
1115	"	wildlife	Relocated rattlesnake from TP.	
1400	"	pad	Continue to monitor crew laying out pad.	
1730	MW41	Drillers	Coord. w/ drillers on MW41 siting.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Geotextile fabric laid out & road base placed over it.	
	Digging pit for pad – benched for safety. Working on	
	presentation for tomorrow's mtg. w/ BLM, DTSC & PG&E.	
	Gabe monitoring crews.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/20/04 START/END TIME: 0600 - 1730

WEATHER: Cloudy, slight sprinkles, moderate wind, 80s

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Gabe monitoring culvert installation. Will keep track of fill material (10 yds³/truck)
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Straw wattles placed around TP. Hay bales at drai
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	checked after safety mtg & during day for culverts
Special status species observed onsite? Describe.	☐Yes ☑No	Relocated much larger rattlesnake from site (hu
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety mtg	Go over safety & nat/cult	
0700	West washes	culvert installation	Gabe monitoring culvert installation at washes to west crossing Hwy 66.	
0830	TP	electrical pole	Cardon another road access to west mesa. Culvert [illegible] installed at markers.	
1030	"	wildlife	Relocated another rattlesnake from site.	
1200	Topock	lunch mtg	Mtg w/ PG&E.	
1400	Compressor station	DTSC, BLM, NA mtg	Discuss CR & NR issues at mtg.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Straw wattles placed around TP in the morning. Fill material for washes from material dug out for TP pits. Gabe will keep track of fill material at washes for CDFG HCD. Drillers will finish at west mesa probably tomorrow. Rattlesnakes probably coming out due to rainfall.	
	Unnamed wash to far west = 170 yds³ fill in wash.	
	Unnamed wash used for West mesa access = yds³ fill in wash.	
	Both culverts (1 each installed at washes). Fill material brought in to make road to west mesa. Areas were presurveyed.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): GV DATE: 10/20/04 START/END TIME: 6am / 5:00 pm

WEATHER: Cloudy / little rain - Heavy rains later in day

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Installing culverts in each wash (2 washes) for access improvements
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw waddles placed around const. site.
Decontamination and concrete wash-outs in approved areas?	☐Yes ☑No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
11:00 am	const site	Large west. Diamondback on site. Relocated up bat cave wash near RR.		
4:00 pm	const. site	Access Road -	total of 410 cubic yards of	
		fill used for	both washes	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/21/04 START/END TIME: 0600 – 1730

WEATHER: Raining constantly, cloudy, no wind, temp ~70s

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles & hay bales in place.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Drilling decon @ west area on pad.
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Couple of creosote bushes removed during road upgrade & leveling of parking area.
Were access roads watered?	☐Yes ☑No	Rained throughout day. No need for watering.
Site checked for biota prior to construction?	☑Yes ☐No	Pre-survey all sites & equip.
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety mtg.	Raining.	
0700	staging area	dress road	Front end loader upgrading existing road for drill	
"	parking area	level area	D5 dozer leveling previously disturbed area for parking.	
1100	TP	Cast.	Cast crew departing from site due to rain.	
1400	MW41	Drillers	Mobilized equip to MW41 for next wells.	
			Setting up for drilling.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Pre-surveyed access road from staging area to ~~MW40~~ MW41. Dropped in fill material for drilling access. It was a pre-existing road.	
	Pre-surveyed previously disturbed area to level for vehicle parking near BCW.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): GV DATE: 10/21/04 START/END TIME: 6:00am / 5:00 pm

WEATHER: Rain (Heavy at times)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Holding up after rain all night.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	N/A Rain
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
11:00am	Const. site	Finished placing fill on access road for		
		MW-41. stopped work at this time due	to	
		rain and material constraints.		
2:00pm	Drill site	Finished grout. Placing pads around wells	and	
		cleaning. Preparing to move to MW-41		
5:00pm	Drill site	@MW41 - Drill crew set up outside bit cave wash. and		
		packed up For day		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/22/04 START/END TIME: 0600 – 1700

WEATHER: Clear, sunny, no wind,

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	straw bales & wattles in place
Decontamination and concrete wash-outs in approved areas?	☐ Yes ☐ No	N/A
Material stored within approved locations?	☑ Yes ☐ No	
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	
Were access roads watered?	☐ Yes ☑ No	rain kept roads moist
Site checked for biota prior to construction?	☑ Yes ☐ No	checked at start of work day.
Special status species observed onsite? Describe.	☐ Yes ☑ No	
Crew trained on biological minimization measures?	☑ Yes ☐ No	New geologist trained.
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg.		
0700	MWH	Drilling	Started drilling @ MWH. 5 bins onsite	
"	TP	Concrete	Laying out forms for pads	
0900	HR66	Barricades	Barricades placed along rock drainage to HR66	
0930	BCW	Cones/candles	Placed cones along BCW to keep vehicles out	
1630	BCW/TP	Const/drilling	Crew departing site.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	trained new geologist assigned to drillers.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): TV DATE: 10/26/11 START/END TIME: 6:30am / 4:40pm

WEATHER: Sunny / clear

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	MW41 Drilling just outside Bat cave wash. No impacts to wash due to drilling.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	N/A Roads still wet from rain.
Site checked for biota prior to construction?	☑Yes ☐No	No biota observed
Special status species observed onsite? Describe.	☐Yes ☐No	
Crew trained on biological minimization measures?	☑Yes ☐No	Melissa (New Hire) trained by Ray R.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
9:00am	MW 41 -	Caution tape was placed at both ends of		
		bat cave wash to keep out vehicles.		
11:00am	MW 41 —	Crew (const.) smoothed tracks in bat cave wash leading		
		to MW41 with	rakes.	
4:40pm	MW41 →	Drill packed up	due to bad hyd. valve - Stopped to	fix
	const. site -	working on	framing in pit.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/25/04 START/END TIME: 0600 — 1800

WEATHER: Clear, sunny, no wind, upper 70s – low 80s

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	Culverts to the West are installed.
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	Wattles & haybales in place.
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	
Material stored within approved locations?	☑ Yes ☐ No	Materials placed at staging area.
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	Clear & grub complete
Were access roads watered?	☐ Yes ☑ No	roads still moist from recent rain
Site checked for biota prior to construction?	☑ Yes ☐ No	Checked after safety mtg each morning
Special status species observed onsite? Describe.	☐ Yes ☑ No	Common raven observed. Side-blotched lizards
Crew trained on biological minimization measures?	☑ Yes ☐ No	New crew – steel workers laying out rebar were briefed
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0645	TP	Briefing	Rebar steel workers. Placing rebar.	
0740	MW41	Drilling	Place haybales between rig & wash.	
0820	"	"	1st well almost complete.	
1300	"	"	Gabe onsite to monitor crews.	
1800	"	"	Drillers completed work for day.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Steel workers laying out rebar. Plan to pour concrete on	
	thursday. Concrete forms in place. Concrete crew	
	constructing additional forms.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): GV DATE: 10/25/04 START/END TIME: 1:00 pm / 6:00 pm

WEATHER: Sunny / warm

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	By Ray Romero
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☐No	

❑ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
4:30pm	Const. Site:	Finished for day. No non-compliance issues.		
6:00pm	Drill Site:	MW-41 Finished for the day. No non-compliance issues		

❑ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/26/04 START/END TIME: 0630 – 1730

WEATHER: ~~Clear~~ Cloudy, rain fore casted, 70's

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Wattles & haybales in place around site & roads
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	Materials in staging area.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Picked up a Pepsi can at end of day.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	Clear & grub complete.
Were access roads watered?	☐Yes ☑No	Rain fore casted today & tomorrow.
Site checked for biota prior to construction?	☑Yes ☐No	Every morning
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Robinson electric briefed.
Need to contact agencies? Describe.	☐Yes ☑No	BLM onsite – Cathy & Sally

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	TP	Safety Mtg.	Safety & Nat/Cult issues discussed.	
0715	TP	Briefed	Briefed new contractor – Robinson electric	
0830	"	Site visit	BLM onsite for about 2 hrs.	
1200	MW41	Drivers	Drivers on standby.	
1730	TP & MW41	Crews offsite	Work completed for day	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Observed common ravens in area.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): GV DATE: 10/26/04 START/END TIME: 6:30am / 5:00pm

WEATHER: Cloudy / cool

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	Activity stopped at 5:00pm. No compliance issues.
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Electrical crew trained by Ray R.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
11:00am	Drill site	MW-41: Drilling	on hold due to equipment needs.	
	Placing cement pads		@ east mesa instead.	
	Also placed pad at		west mesa.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/27/09 START/END TIME: 0630 – 1300

WEATHER: Rain, Cloudy, cold

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	raining
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Holding up to rain
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	constructed wash out area lined w/plastic in staging area
Material stored within approved locations?	☑Yes ☐No	staging area in order
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	clear/grub complete @ TP
Were access roads watered?	☐Yes ☑No	raining
Site checked for biota prior to construction?	☑Yes ☐No	Every day after safety mtg, & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	TP	rebar/concrete forms	Safety mtg	
0700	"	"	continue laying out site for concrete.	
1300	"	shutdown	Site/construction shut down due to rain.	
1300	MW41	Drillers	shut down early due to rain. Leaving	
			early for days off. Back on Tues.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	No compliance issues.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): GV DATE: 10/27/04 START/END TIME: 6:30 am/ [illegible]

WEATHER: Cloudy / Rain (Heavy at times)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	N/A Heavy Rain
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
	No Drilling today.			
2:00pm	Const.	Site shut down for the day, due to rain.		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/28/09 START/END TIME: 0630

WEATHER: Cloudy, chance of continued rain, cold

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Road base placed along washed out areas
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Wattles & hay bales around worksite & roads
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Pit dug out yesterday & lined for concrete trucks next wee
Material stored within approved locations?	☑Yes ☐No	Stored in staging area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	Rain made for wet conditions
Site checked for biota prior to construction?	☑Yes ☐No	After safety mtg.
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens, canyon wren, sparrows observed
Crew trained on biological minimization measures?	☑Yes ☐No	No new crew members
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	TP	Safety mtg	Discuss safety, nat/cult issues	
0830	Washes ~~[illegible]~~	Survey	Survey addt'l well locations for IM-3 (see map)	
1200	"	"	Completed survey effort. No sensitive species se	
1400	"	"	Coord w/ Steve S. on survey results to pass along	
1500	"	Drainages	Took measurements on washes for CDFG,	
			Needed length & width of fill material for culv	
1710	TP	Const.	Departed site.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Fill measurements for washes – ~~Length 43ft x width 20ft~~	
	western wash = 43ft length x 20 ft width (@ culvert)	
	west mesa access wash = 53ft length x 21 ft width.	
	Lengths @ bank to bank. Width taken over culvert.	
	Measurements provided to Steve S. for emergency	
	notification package for CDFG.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): G DATE: 10/28/04 START/END TIME: 6:30 / 5:00 pm

WEATHER: cloudy / cool

Condition	*Y/N*	*Comments*
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	N/A Muddy from yesterdays rain
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	*Location*	*Construction Activity/ General Observations*	*Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed*	*Photo#*
10:00 am	Surveyed	potential areas	For new drill sites.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		*Photo #*

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 10/29/04 START/END TIME: 0630 - 1700

WEATHER: Clear, sunny, no wind, 70s

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	Installed around const. site & roads.
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	Wash out in place for concrete trucks.
Material stored within approved locations?	☑ Yes ☐ No	stored @ staging area.
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	clear & grub complete for TP.
Were access roads watered?	☑ Yes ☐ No	Although recent rain, truck watering roads.
Site checked for biota prior to construction?	☑ Yes ☐ No	After safety mtg & throughout day.
Special status species observed onsite? Describe.	☑ Yes ☑ No	
Crew trained on biological minimization measures?	☑ Yes ☐ No	
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	Facility	Safety Mtg.		
0700	HR66	Geo-textile fabric	Laying out fabric & roadbase on HR66	
0845	Facility	Temp. electricity	Electricians installing transformer & line from existing pole to const. trailers.	
1120	Unnamed wash	field survey	Resurveyed wash for access/egress route. Called stevens. to include staked route for	
1130	Facility	Temp electricity	workers to avoid sensitive resources. Electricians completed installation. Departed site.	
1545	"	Concrete Const.	Departed site, secured work area.	
1600	HR66	fabric	Laid out fabric west of East Mesa.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Remaining rolls of road fabric came in yesterday. Laying out fabric today. Road base placed over fabric.	
	Concrete workers putting in footings around facility.	
	Observed common raven, side blotched lizards, Antelope squirrel, & sparrows.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): GV DATE: 10/29/04 START/END TIME: 6:30 am / 4:00 pm

WEATHER: Sunny / few clouds

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

❑ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
7:00 am	Const. site	Historic Rt 66 - Placing fabric on road & road base cover.		

❑ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/1/04 START/END TIME: 0630 - 1700

WEATHER: Clear, very wind (20+ gusts), cool (60s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	Crews are very cooperative.
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around site & along roads
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Pit lined with plastic for concrete washouts tomorrow
Material stored within approved locations?	☑Yes ☐No	stored at staging area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	clear & grub for TP complete
Were access roads watered?	☑Yes ☐No	Windy day. Watering keeping down dust.
Site checked for biota prior to construction?	☑Yes ☐No	checked after safety mtg & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common species only
Crew trained on biological minimization measures?	☑Yes ☐No	Trained new electricians - Robinson electric
Need to contact agencies? Describe.	☐Yes ☑No	Cathy Wolfe onsite @ ~10am.

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	TP	Safety mtg.	Go over safety & nat/cult issues.	
0700	"	Awareness trng	Trained new electricians & laborer.	
0700	HR66	Const.	Laying out fabric & roadbase on HR66.	
0900	HR66	Cultural Res.	Arch taking auger samples along HR66 to get depth(s)	
1400	TP	Concrete Forms	Concrete constructors continue to make forms for concrete pour in the morning.	
1000	TP	BLM Visit	Cathy Wolfe onsite visiting with Phil's.	
1700	HR66	Fabric	Finished for the day.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Concrete Constructors preparing site for first concrete pour tomorrow. Surveyors laying out route for pipeline. Laborers & operators laying out fabric & road base along HR66. Observed flock of 40+ white pelicans this morning. Several ravens have flown thru the site over the day. Drillers will be onsite tomorrow.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): R. Romero DATE: 11/2/04 START/END TIME: 0600 – 1720

WEATHER: clear, slight wind, cool

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around site & along rds.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Spilled outside pit. Crew will clean up.
Material stored within approved locations?	☑Yes ☐No	Materials @ staging area.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	clear & grub complete @ TP
Were access roads watered?	☑Yes ☐No	watered throughout day
Site checked for biota prior to construction?	☑Yes ☐No	After safety mtg & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	observed common ravens
Crew trained on biological minimization measures?	☑Yes ☐No	Trained new concrete workers in morning.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg		
0615	"	Awareness trng	Briefed new concrete workers.	
0630	"	Concrete pour	~18 trucks hauling in concrete.	
0720	HFF66	Protection	Laying out last of geo fabric. Placing road ba	
"	MW41	Drilling	Drillers waiting on drillpipe.	
0900	Staging area	Concrete washout	Briefed drivers to clean out in pit. Area will need to be cleaned up from concrete out	A7
1720	TP	Depart	Work activities complete for the day.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Completed laying out geo-textile fabric to Park Moabi Rd. Road base in place. Need addt'l road base for 5" cover. Compacted & graded road base. Layed concrete for pad & pit. Additional pours needed. Completed tech memo for 7 proposed monitoring wells. Sent draft memo & map to Steves. Steve will get report out to Martin to attach to his work plan. Chris Green onsite. Provided him with info, site familiarization, introduced to workers, essentially trained for bio monitoring.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11-2-09 START/END TIME: 06:00 - 16:30

WEATHER: Clear, some wind, 70-75° F

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☐Yes ☒No	No new construction sites
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	4 new employees
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Big cement pour for treatment plant foundation. 2 trucks not using cement washout. Drivers cleaned up cement + PM notified. All other trucks in compliance.	
	Road construction over Historic Rte 66 continued. Belly dumps, grading + compacting.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoeneke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/3/04 START/END TIME: 0600 - 1730

WEATHER: clear, slight to no wind, cool

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around site & roads.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Cleaned up concrete around pit.
Material stored within approved locations?	☑Yes ☐No	stored at staging area.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	Clear & grub complete around TP.
Were access roads watered?	☑Yes ☐No	watered throughout day. Watering HH66 for compaction
Site checked for biota prior to construction?	☑Yes ☐No	After safety mtg & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens & white pelicans observed in area.
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg.	Dan Heath gave safety brief. He is back on site	
0630	HH66	Protection	continue to spread road base on HH66.	
11	TP	Concrete	Crew removing forms from pour yesterday.	
0800	MW41	Markers	Pipe arrived today. Not drilling due to other complications.	
1730	TP/MW41		Work completed for the day.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Made revisions to Bio report (technical) for the 7 compliance monitoring wells. The report will accompany the work plan. AE is producing the cultural rpt.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): CHRIS GREEN DATE: 11/3/09 START/END TIME: 06:00 - 17:15

WEATHER: Clear, Calm, temp - 70's

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☒Yes ☐No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☐No	
Crew trained on biological minimization measures?	☐Yes ☐No	NO New trainees
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	Historic RT66	Construction of cover rd		
ALL DAY	MW 41 PAD	Drilling	water spill - see notes below	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Drill rig at MW 41 HAD some water spill + escape into wash. Activity halted	
*	containment around rig was improved. More hay bales + plastic laid down	
	to enlarge catch basin. Cause of spill is unique to condition down	
	hole. It is not expected to be a problem consistant with future drills.	
	Photos taken of improved containment + area of spill in Bat Cave Wash.	
	Water sample collected - analysis Hex Chrome & detection levels	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/4/04 START/END TIME: 0600 - 1700

WEATHER: Clear, Mild, cool

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Haybales & wattles around site & along roads.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pit lined with black plastic.
Material stored within approved locations?	☑Yes ☐No	Materials stored at staging area.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	All roads watered. Water supplied to drillers.
Site checked for biota prior to construction?	☑Yes ☐No	After safety mtg & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Briefed new worker @ 0830.
Need to contact agencies? Describe.	☐Yes ☑No	DTSC & PG&E mtg @ 10am

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg	Discuss issues	
0700	MW11	Drilling	Placed additional haybales & plastic for SWPP around it	
"	TP	Const.	Building forms for next concrete pour.	
1000	PG&E station	Mtg.	Attended PG&E status mtg.	
1300	TP	Site visit	DTSC & CH visiting site.	
1700	TP/MW11		depart site.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Graders placing additional road base on HRdb to get at least 5" depth. Work taking place at ~~western~~ western portion of HRdb. Grader & roller working road. Duane, Tay, Bruce & myself looked at potential access route in westerly wash for future compliance wells outside of equal work area.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 10-4-04 START/END TIME: 06.00 - 17:00

WEATHER: Some clouds, 70-80°F

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	No New Crew
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	MW 41	Drilling	No Impacts or Issues	
ALL DAY	Historic AIE 106	Gravel cover of historic Rd	No Impacts or Issues	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/5/14 START/END TIME: 0600 – 1230

WEATHER: Clear, Windy, Cool

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around site & roads
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete washout pit lined w/ plastic @ staging area
Material stored within approved locations?	☑Yes ☐No	stored at staging area.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Compacting HRdo.
Site checked for biota prior to construction?	☑Yes ☐No	After safety mtg & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg.	Discuss safety	
0630	MW-4	Drilling	Plan on completing 5th well today.	
11	HRdo	Roadbase	Adding base & compacting.	
1230			departsite.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Chris will support crew this afternoon & weekend.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11-5-04 START/END TIME: 06:00 - 17:15

WEATHER: Some clouds, rain possible 70's

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	No concrete poured; washout maintained
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	No new crew
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	Historic Leo	protective layer of Gravels poured, graded, compacted		
ALL DAY	MW41D Drilling	MW41D finished & grouted. PVC left on string overnight.		
		Grounds policed in preparation to move rig.		
ALL DAY	Plant site	forms for concrete still being built. Gravel brought in		
	.	and dumped at plant site. Gravel is for sub surface		
		below plant concrete floor.		

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11-6-09 START/END TIME: 06:00 - 17:00

WEATHER: Clear, warm, 80s calm

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	No cement being poured. Washout checked for animals
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	No construction crew on site
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	Antelope GS observed on heavy equipment pad
Crew trained on biological minimization measures?	☐Yes ☒No	No new crew
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	MW41 PAD	Drilling of 41m	water tank on trailor is being refilled	
		from tank by plant. Some water run off on shoulder of		
		pad entrance from residual water in Hose. This mitigated		
		by capping hose	after use.	
		white tailed antelope ground squirrel observed by heavy equip.		
		parked on lower construction pad.		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Citrus Green DATE: 11-9-04 START/END TIME: 06:00 - 15:30

WEATHER: Cloudy, occasional rain in AM, sleet/ice in PM

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	No concrete poured
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	by rain - no construction today
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	No new crew
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	MW41 Site	Drilling monitoring wells	Some drilling washout water, drained into wash. water ~ 10 gallons	
		MW41M finished MW41S started		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Washout water from rig - about 10 gallons - escaped the visquine containment.	
	Containment repaired. Wash water sampled - IM MW41S spill - and	
	taken to lab for Hexchrome analysis	
	All the water in the containment structure was pumped out to	
	collection bin.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 4/8/09 START/END TIME: 0600 - 1700

WEATHER: Cloudy, rain, cool

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around site & rds
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	pit in place for concrete pour
Material stored within approved locations?	☑Yes ☐No	Stored @ staging area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Rain
Site checked for biota prior to construction?	☑Yes ☐No	After safety mtg & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg.		
0620	MWTL	Drilling	Finishing up well installations.	
0700	TP	Concrete	working on forms for concrete	
11	East rd	grading	Earth work along hillside - reducing slope	
1600	MWTL	drillers	MWTL completed, site cleaned up & equip. moved to East Mesa	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Concrete pour scheduled for this Thurs. & Fri.	
	Chad Smith informed me of tortise carcass on mesa	
	between east site & Park Moabi Rd. I will record,	
	photograph, & obtain location (GPS) to produce tech memo	
	for BLM. I will verbally inform Mark Stodwell (BLM)	
	of observation.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): CHRIS GREEN DATE: 11-8-04 START/END TIME: 06:00 - 17:00

WEATHER: Rain showers, Cool

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	RAIN
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	NO NEW CREW
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	MW411 PAD	Drilling FINISHED clean up, demob to MESA (east)	IM MW 415 - spill sample results - 0.004 mg/l	
ALL DAY	Rte 66 mitigation	Road Base deposit grading + compaction		
ALL DAY	Plant	forms constructed		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Ancient turtle shell exposed in blow out on MESA A (?). Area	
	between Park Model + treatment Plant. R. Romero notified +	
	FWD documented.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/9/04 START/END TIME: 0600-1700

WEATHER: Clear, sunny, no wind, warm by afternoon

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☑No	Road work near wash. Culverts installed.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around site & rds
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	In place for pour this week, drill rig decon
Material stored within approved locations?	☑Yes ☐No	At staging area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Relocated beavertail cactus Expanded eastern rd for pipeline.
Were access roads watered?	☑Yes ☐No	Throughout day. Compacting HR 66
Site checked for biota prior to construction?	☑Yes ☐No	After safety mtg & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens & lizards observed.
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☑Yes ☑No	Left vm for Mark Howell (BLM) on DT carcass found by Chad S.

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg	Safety, NR & CR issues.	
0630	"	Concrete crew	Constructing forms, Preparing for pour.	
"	East Mesa	drilling	Drill crew set up @ mesa. Started drilling	
0900	East rd	Earth moving	Reducing grade & expanding road width.	
1700	TP & Mesa	Work completed.		

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Reducing grade on east access road, expanding width of road, installed 4 culverts at wash, raising bottom portion of road to ~6-7 ft, in preparation for trenching of pipeline & conduit. Relocated 2 beavertail cactus from work area.	
	Cathy Wolfe - White w/ BLM onsite today.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11-9-04 START/END TIME: 06:00 - 16:30

WEATHER: Storm clearing, sunny in PM

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☒Yes ☐No	2 Beavertails moved-relocated - on east access mitigation
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	EAST Access mitigation
Special status species observed onsite? Describe.	☒Yes ☐No	Beaver tail cactus - 2 relocated
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	EAST AREA	Drilling observation wells	Sandbags to be staged on site wattles NOT ON SITE YET	
ALL DAY	Plant	cement forms + Rebar work		
PM	EAST ACCESS	Road construction	2 beavertail cactus relocated out of construction site	

☒ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	EAST access Rd - slope of hill being lessened. Neccessitates putting in culverts, cut & fill.	
	area cleared biologically + archeologically prior to start.	
	monitoring intensified.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 11/10/04 START/END TIME: 0600 – 1700
WEATHER: Clear, sunny, warm (80s), slight breeze

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Roadwork @ East access – culverts in place
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around site, roads & drill equip.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	In place for pours this week – Thurs & Fri
Material stored within approved locations?	☑Yes ☐No	Staging area & east mesa
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Site kept clean.
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Little veg. impacted – CBS, beavertail cactus relocated
Were access roads watered?	☑Yes ☐No	Throughout day, compacting road
Site checked for biota prior to construction?	☑Yes ☐No	After safety mtg & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens onsite
Crew trained on biological minimization measures?	☑Yes ☐No	Trained several new workers, see attendance sheet
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety mtg	Safety, NR & CR issues	
0700	TP	Trash bin	Trash bin now onsite @ TP	
0800	East mesa	Drilling	Drillers, roll-off bins brought onsite, water tank will be onsite later today.	
"	East access rd	Earthwork	Continue reducing grade/slope of hill.	
1530	"	Cutting trench	Completed ~450 ft trench today.	
1630	East mesa	Drilling	Drillers continue to work.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Continue earthwork at East access road. Reducing slope & increasing road height in preparation for trenching. Plan on trenching today. Relocated beavertail cactus at East Mesa. Double contained pipe arrived today. Pipes are capped & trench contains ramps for escape of wildlife. Trench barricaded and road (east access) closed to traffic.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11-10-04 START/END TIME: 06:00 - 17:15

WEATHER: Clear, calm, WARM

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☒Yes ☐No	1 Beaver tail cactus relocated on EAST MESA to clear Room for water tank
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☒Yes ☒No	Relocated Beaver tail Cactus
Crew trained on biological minimization measures?	☒Yes ☐No	2 crew trained
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E. MESA	Drilling	1 Beaver tail cactus relocated	
ALL DAY	E. Access Rd	Slope mitigation	work monitored	
ALL DAY	Plant site	construction of forms for concrete power	Area monitored	
10:40-EOD	E. Access Rd	Trenching	WORK monitored. & Palo Verde nearby.	
			trench dug with egress ramps every 150 Ft.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	30 yd garbage bin placed at Plant site Drillers visquene can be dumped	
	[illegible]	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoeneske 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 11/1/13 START/END TIME: 0600 - 1715

WEATHER: Cloudy, chance of rain, cool, windy

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Continued road work @ east access road. Ripped over culverts. Building up road.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Installed & wattles placed at treatment facility & along roads.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pour today. Trucks washing out in pit @ staging area.
Material stored within approved locations?	☑Yes ☐No	Stored at staging area. Pipe (double walled) stored along east access road.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site, Dumpster onsite.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Compacting road. Watering trenching activities along east access road.
Site checked for biota prior to construction?	☑Yes ☐No	Checked facility, staging area, open trench, drill sites, etc., in morning & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens & side-blotched lizards
Crew trained on biological minimization measures?	☑Yes ☐No	Trained new drill crew.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg.	Safety/NR/CR issues.	
0600	"	Concrete	Started pour @ facility	
0630	East access rd.	cutting trench	Trenching for drive & road work along east access road.	
"	East Mesa	Drilling	Continuing drilling @ East Mesa w/Sonic rig.	
0900	East access	Continue trenching	Area barricaded.	
1600	East Mesa	New drillers	Provide awareness training.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	New drill crew arrived this afternoon. Mud rotary rig will drill at East Mesa with sonic rig — WDC is drilling company. Concrete pour completed today. Additional pours in near future. Pipe onsite. Double walled is capped. Having other pipe covered with plastic to prevent wildlife from getting entrapped.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Citrus Green DATE: 11-11-04 START/END TIME: 06:00 - 16:30

WEATHER: WARM, Calm

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	small wash North side of Historic Rte 66 on East access Rd Part of East Access Rd improvement
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	No New plants or Animals
Crew trained on biological minimization measures?	☒Yes ☐No	New drilling crew trained
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	EAST MESA	Sonic Rig Drilling	monitored throughout activity	
ALL DAY	RTE 66 (hist)	Grade improvement		
ALL DAY	EAST Access Rd	Trenching		
13:00 - 14:30	EAST MESA	Staging of Mud rig		
06:00 - 11:00	Plant Site	Cement Pour	6 or 7 trucks + Cement pump used. All washout done in Approved pit	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Pipe for pipeline on site - 2 IN pipe has uncapped ends. Dembeste personel are taping ends closed. This work will continue to finish on 11-12-04.	
	Improvent of Slope + grade of East Access Rd + the necessary filling is continuing. An estimate of the fill deposited in the wash will be made on completion of that work.	

PG&E Topock IM-3 Project

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/12/09 START/END TIME: 0600 – 1710

WEATHER: Partial cloudy, slight wind, cool

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑ Yes ☐ No	Raising road at East access
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	Around site & roads. Drill equip have wattles
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	Pit is in place & being used
Material stored within approved locations?	☑ Yes ☐ No	Staged pipe at parking area & along road.
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	
Were access roads watered?	☑ Yes ☐ No	Throughout day. Truck supporting drillers also.
Site checked for biota prior to construction?	☑ Yes ☐ No	After safety mtg, check trench, equip, sites, etc.
Special status species observed onsite? Describe.	☐ Yes ☑ No	
Crew trained on biological minimization measures?	☑ Yes ☐ No	
Need to contact agencies? Describe.	☐ Yes ☑ No	Cathy w/ BLM onsite @ 0900 - site inspection

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety mtg	Safety, NR & CR issues.	
0600	TP	Concrete workers	Removing forms after pour yesterday	
0630	East access	East work	Continue trenching & raising road.	
0630	East Mesa	Drilling	Drillers (2 rigs) working on East Mesa.	
1500	East Mesa	"	Continuing to drill	
1530	TP	concrete	Continue to remove forms & prep site.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: ___sheet(s) used)

Bio-Measure #		Photo #
	WDC sonic & mud rotary rigs working at East Mesa.	
	New crew was briefed yesterday.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): CHRIS GREEN DATE: 11-12-04 START/END TIME: 06:00 - 16:30

WEATHER: _____

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	Slope improvement EAST ACCESS Rd
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	no concrete poured; clean outs checked for trapped animals
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	New Rig onsite, crew trained
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	EAST MESA	Drilling with Sonic Rig	Visqueen + SWP measures in place	
PM	EAST MESA	Set up of Mud Rotary Drill Rig	Visqueen + SWP measures disussed. Measures implemented	
ALL DAY	EAST Access Rd	Trenching	Activity monitored through out the day. Trench walked Start of DAY, MID MORNING,	
			MID Afternoon and END OF DAY for trapped animals	
ALL DAY	Plant Site	concrete forms being worked on		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11-13-04 START/END TIME: 06:00 - 16:30

WEATHER: Clear in the morning, light rain w/ lightening in the afternoon

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	East Access Rd Slope improvement fill will be estimated when work completed
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	Clean out checked start of day for entrapped animals
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	EAST mesa	Drilling with Sonic Rig		
ALL DAY	EAST MESA	Drilling with mud. Rotary Drill		
ALL DAY	EAST Access Rd	Trenching		
ALL DAY	EAST Access Rd	ROAD improvement		
ALL DAY	Plant Site	forms for concrete constructed		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	All open trenches walked start of day, mid morning, mid afternoon, and end of day to check for entrapped animals. Exit ramps in place every 150' or so.	
	Mud rig had small mud spill in the morning. No mud escaped the immediate work site. Crew stopped work & shoveled mud into appropriate containers on site. Size of spill est. at < 50 gallons; probably 20-30 gallons	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11-14-04 START/END TIME: 06:00 -16:30

WEATHER: Clear morning, Showers & Thunderstorms in afternoon

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	Slope improvement on E. Access Rd. Fill to be estimated no construction work today
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	No construction today
Site checked for biota prior to construction?	☒Yes ☐No	open trench inspected in morning, afternoon & evening
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	EAST MESA	Sonic Drilling mud Rotary Drilling	ALL ACTIVITY CONFINED TO E. MESA	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/15/04 START/END TIME: 0600 – 1705

WEATHER: Clear, sunny, cool, slight wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	road work complete. Trenching within road.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At site, along roads and around drill equip.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Pit located at staging area.
Material stored within approved locations?	☑Yes ☐No	Stored at staging area & along ROW
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Dust kept down, road compacted
Site checked for biota prior to construction?	☑Yes ☐No	Const site, staging area, drill sites & trench checks
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven, western diamondback rattlesnake
Crew trained on biological minimization measures?	☑Yes ☐No	New CH Hydro trained. Trained ARB & ISCO who will be putting in pipe
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg.	Safety, NR & CR topics	
0630	TP	Pipeline	New crews – ARB & ISCO onsite to place pipe	
"	East Mesa	Drillers	Continue drill activities.	
1300	East access	Pipeline	Placing pipeline into trench	
1600	East Mesa	Drilling	Relocated western diamondback	
~~15~~ 1705	"	"	Work completion for day	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Trained new crew members. Drillers may start drilling at night this week. Schedule will be determined. Pipefusing equip set up at top of hill along East access rd. Concrete pour scheduled for Thurs. Relocated juvenile (3 buttons) western diamondback rattlesnake. Moved from East mesa away from drill crews to mesa outside project area to the West.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11-15-04 START/END TIME: 06:00 - 16:50

WEATHER: _____

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	No new fill on roads
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	new hydro + pipe welding crew trained
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E. mesa	Drilling	See below	
ALL DAY	E. Access Rd	trench prepped for pipeline		
ALL DAY	Plant site	Concrete prep		
ALL DAY	E. Access Rd	HDPE pipe welding	Site surveyed (again) prior to work, monitor onsite greater part of the day	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Small juvenile W. Diamond back found by drillers on NW corner of east mesa. The called us, as instructed in training orientation. The snake was captured and relocated to appropriate habitat on mesa furthest west of activity.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 4/16/04 START/END TIME: 0600 - 1715

WEATHER: Clear, sunny, blowing, cool

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around const site, rds, drilling equip.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	In place for concrete pour on Thurs.
Material stored within approved locations?	☑Yes ☐No	Const staging area, Eastmesa-drillers
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	All roads watered to keep down dust
Site checked for biota prior to construction?	☑Yes ☐No	Prior to const/drilling & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven
Crew trained on biological minimization measures?	☑Yes ☐No	1 Hydrogeo & driller trained in morning
Need to contact agencies? Describe.	☐Yes ☑No	Sally M & Cathy W. onsite @ 0900

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg.	Check trench & other const sites for bio	
0620	East Mesa	Training	Trained new workers	
0630	"	Drilling	Two rigs (sonic & mud) continue drilling	
0630	East access	Piping	ARB & ISCO continue fusing & placing pipe.	
0630	TP	Concrete	Concrete crew forming & prepping site for pour on Thurs	
1715	TP	Const.	Depart site.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __ sheet(s) used)

Bio-Measure #		Photo #
	Sally Murray (Arch) & Cathy White (PM) w/ BLM arrived onsite @ ~0900 to perform site inspection. Glen Caruso (PG&E Arch) also onsite, speaking w/ BLM. Submitted tech memo, map & photos to Mark H & Cathy W w/ BLM at close of business. CCed internal CH staff via email.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11-16-04 START/END TIME: 06:00 - 16:45

WEATHER: Clear, calm, warm - 70's

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	Hydro + Drill crew member
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E. MESA	Drilling - Sonic Rig + mud rotary	New exclusion fence put up around more ~~some~~ archeologically sensitive areas.	
			Mud rig down most of the day	
ALL DAY	Plant Site	Concrete prep	work contained within approved area	
ALL DAY	E. Access Rd	HDPE pipe construction	work contained in approved area, site kept clean	
			Large track hoe used hillside to maneuver around other equipment. Tracks in previously	
			disturbed area. Site to be mitigated - tracks smoothed out, et	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Met Glen Caruso, PG&E archeo from Bay Area, on site at HDPE Site 09:10-09:17	
	Cathy Wolfshohl AND Sally Murray on site 09:15	
	Open trench and cement truck washout checked in AM after safety	
	meeting, early afternoon and evening. All worksites walked periodically.	
	In the afternoon + evening particular attention paid for snakes sunning	
	on staged equipment or emerging for afternoon heat	

PG&E TOPOCK [illegible]

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 702-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/7/09 START/END TIME: 0600 - 1800

WEATHER: Clear, sunny, cool, no wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Trench cut- placing piping.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around const sites, roads & drill equip.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Located at staging area.
Material stored within approved locations?	☑Yes ☐No	stored at staging area & along ROW.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site - no trash. Trash bin @ TP.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Water truck onsite.
Site checked for biota prior to construction?	☑Yes ☐No	Check site, drill site, roads & trench.
Special status species observed onsite? Describe.	☐Yes ☑No	common raven, white pelicans & rat tracks, Hydro reported W. diamondback seen in ROW.
Crew trained on biological minimization measures?	☑Yes ☐No	All workers are trained.
Need to contact agencies? Describe.	☐Yes ☑No	0830 Mark Howell onsite.

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg.	Safety, NR & CR topics	
0830	TP	Site Visit	Mark Howell w/BLM looking at site,	
1000	CMWs	Survey	Mark & I looking at CMW sites.	
1100	East Mesa	Drilling	Continue drilling w/ 2 rigs	
1700	"	"	Crew will drill at night, Set up lights,	
			Chris G. will monitor. Schedule to	
			work until ~ 1900.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Tim E. reported 14 pallets of bee boxes located near old foundation from restaurant & gas station off of Park Moabite Rd. Escorted Mark H. around site. Addressed ramps at trench, staging materials & relocating Lycium. We looked over compliance well locations. Mark asked to move (2) to another location away from cryptogrammic soil. Jay & I looked at new locations. Jay will inform Marty B.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11-17-04 START/END TIME: 06:00 - 18:15

WEATHER: _____

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	escape ramps an issue. Old ones being improved and repaired - new ones still need to be installed
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	No cement being poured
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	W. Diamond back observed in Bat Cave Wash by workers at ~~Lochne~~ lunch. This is out of the work area. Potential for snakes to be in the work area emphasized during the next safety meeting.
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E. MESA	Drilling - Smic Rig + Mud Rotary Rig	Small mud spill on Mud Rig, all material stayed in containment & scooped into bins	
ALL DAY	HDPE construction in trench			
ALL DAY	Plant Site	prep of forms for cement work		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Old escape ramps in trench improved. New escape ramps where older ramps too widely spaced or caved in or never installed, delineated with ground paint. Spoke to Frank Jackson who will be digging the ramps. He is to get on it this pm. END of DAY - ramps not in.	
	Mud rig working at night. 2 lighting units used for illumination. Lights point down + masts raised as high as manufacturer recommends. No boats or nighthawks observed during night work. Work stopped at 18:15	

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Daily Construction Monitoring Log

Contacts: Phil Schoeneke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 11/18/04 START/END TIME: 0600 – 1730

WEATHER: Clear, sunny, cool, no wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	Work crew is cooperative
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At const site, pads, drilling rigs
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pour today. Washout lined in staging area.
Material stored within approved locations?	☑Yes ☐No	staging area & along ROW.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site – no litter
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Rds watered & H2O tanks kept full.
Site checked for biota prior to construction?	☑Yes ☐No	Const site, staging area, trenches, drill sites checked.
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens, western patchnose snake.
Crew trained on biological minimization measures?	☑Yes ☐No	Work crews trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg.	Safety, NK & CR topics	
0630	East access	Pipeline	Continue fusing HDPE pipe	
0600	TP	Pour	Concrete pour at treatment plant.	
1300	East mesa	drilling	Soil & mud drilling continue	
1100	East access	pipeline	Relocate snake from trench.	
1730	East mesa	drilling	depart site.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Requested ramps be cleaned along open trench. A few addtl ramps will be placed along trench. Relocated juvenile ~~gopher~~ patch nosed snake from trench. Work crew reported sighting promptly. Relocated off site.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11-18-04 START/END TIME: 06:00 - 17:00

WEATHER: Clear, Calm, warm - 70's

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	none not previously recorded
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	Concrete pour - ± 7 trucks; washouts monitored
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☒Yes ☐No	Small oil spots by concrete washout
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	Western patch-nosed snake relocated from HDPE work area
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E. MESA	Drilling - Sonic & Mud Tubs	Crew Rollout bivvs & 1, 21,000 gal bin located on site, Pump truck taking water out of used bin.	
ALL DAY	E. Access Rd	HDPE Pipe Construction	Crew left site before covering up open pipe ends. Issue brought up at Safety Meeting 11-19-04.	
06:00-11:00	Plant Site	Concrete poured	Small oil patches around WASHout	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Oil spots on ground around cement truck washout. Source likely is cement truck.	
	Total amount on ground: ≤ 1 Pint. DAN Heathe notified. I asked him to	
	have his vehicle operators check all equipment & POV's for leaks. He	
	will have someone collect stained soil into bucket.	
	all cement trucks used the washout.	
	HDPE crew reported a snake on site. R. Romero & I responded. Snake -	
	a juvenile Western Patch-nosed was captured and relocated off site.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-604-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/19/04 START/END TIME: 0600 – 1700

WEATHER: Sunny, clear, cool - warm afternoon, no wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around const site, rods, drilling sites
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	pit in staging area.
Material stored within approved locations?	☑Yes ☐No	staging area & along ROW – pipe temp stored along row.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	beavertail cactus crushed. fenced area off from BAS.
Were access roads watered?	☑Yes ☐No	watered daily & compacted
Site checked for biota prior to construction?	☑Yes ☐No	After safeguards and throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All workers trained. Trained 2 new workers.
Need to contact agencies? Describe.	☐Yes ☑No	~~Trained 2 new workers~~

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	~~Safety Mtg.~~	Discuss safety, NR & CR topics	
0630	East access	ramps	Place ramps for wildlife along a few areas of trench	
11	TP	Concrete	Crew pulling forms from pour # yesterday.	
0600	East Mesa	Drilling	Continue drilling activities.	
1700	TP	Const Drilling	Depart site.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	beavertail cactus crushed at East Mesa. vehicle ran over cactus. Uncertain who ran it over. reminded crew of protection measures. Excluded area with cattle & flagging from feature parking. Diamond back observed by Chris Green in ROW. No work activities in this area.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Crew DATE: 11/20/04 START/END TIME: 06:00 - 17:00

WEATHER: Clear & warm in AM. Cold front moving in in PM, Clouds & cooler

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	No concrete poured
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E. Mesa	Drilling - Sonic Rig & mud rotary Rig	Drilling on E. Mesa is the only construction activity occurring today.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	A small beavertail cactus by next location of Mud Rig relocated out of work area.	
	Visquene/straw wattle/SAND BAG containment constructed in small wash NW side of construction area. This is ADJACENT to next work area for Sonic Rig.	
	Trenches & cement washout inspected in the morning, after lunch and in the afternoon at end of day.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11/21/04 START/END TIME: 06:00 - 14:30

WEATHER: Cold, WINDY, WIND Chill probably in the 20's. Rain or SNOW likely.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	See below
Decontamination and concrete wash-outs in approved areas?	☒Yes ☒No	NO concrete poured
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
06:00 - 14:30	E. MESA	Drilling	Both rigs working	
			Drilling on E. MESA is the only construction activity today	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Washes where stormwater will likely flow of MESA need addressing. Silt fence/straw wattles/ SAND bags used as barriers to slow + filter runoff at these sites. Light rain at 10:45; heavy consistant rain all afternoon. Barriers at run off sites INspected and improved as needed. Work stopped because of heavy rain at 14:30	
	Open tronches + cement washout inspected at 06:30 and 13:00.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-604-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/29/04 START/END TIME: 0600 – 1730

WEATHER: Cloudy am, clearing afternoon, no wind, cool – 50's

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around const site, rds, drilling area @ East Mesa
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	No pour today
Material stored within approved locations?	☑Yes ☐No	staging area & along ROW for conveyance pipeline
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	Still wet from rain
Site checked for biota prior to construction?	☑Yes ☐No	After safety mtg & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens observed.
Crew trained on biological minimization measures?	☑Yes ☐No	2 new crew members trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	East Mesa	Drilling wells	plastic & cuttles in place under drill equip	
All day	~~Concrete~~ Treatment Facility	Concrete workers	Placing forms preparing for pour tomorrow	
All day	pipeline ROW	Install conveyance pipe	workers able to get pipe down to BCW	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Pipeliners placed pipe down to BCW for 1st phase. Will place stations in tomorrow at make tie in at bend-rd crossing. Concrete crew preparing for pour tomorrow. Drillers (Sayre) departed for holiday. Mud drillers will stay onsite and continue drilling until caseds. Frank (operator) & laborer cleaned out trench from recent rain & improved ramps into trench for escape of wildlife.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke, 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916 CDG

OBSERVER(S): Chris Green DATE: 11-22-04 START/END TIME: 06:00 - ~~17~~ 16:30

WEATHER: over cast in AM, Clearing as DAY progresses, Temps high 50's

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	EAST MESA. Silt fences inspected and improved where necessary. More SANDBAGS on order.
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	NO cement poured today
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☐No	No watering observed. Compacting most of day.
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	2 new construction workers
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	~~Path~~ E. MESA	Drilling - Sonic Rid & Mud rotary rig	Containment under vehicles inspected for integrety and overflows. Rigs w. clean.	
ALL DAY	E. Access Rd	HDPE Conveyance pipe construction		
ALL DAY	Plant Site	Foundation work		

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __ sheet(s) used)

Bio-Measure #		Photo #
	EASTMESA: Stormwater runoff fences inspected this morning. I have requested from DAN Heathe that we get more SANDBAGS to make silt fences more secure He has 200 more on order but none here at END of DAY. No rain is forcast for next week. Trenches inspected at 06:30, 12:00 & 16:00. Washout inspected at same times. FRANK Jackson & Ron ? spent part of DAY dressing ramps in the trench.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Reben Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/23/04 START/END TIME: 0600 – 1730

WEATHER: Clear, sunny, no wind, cool temps.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	East site, along rds, and at drill site
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pit (lined) in staging area
Material stored within approved locations?	☑Yes ☐No	staging area & pipeline ROW
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	Still wet from recent rain
Site checked for biota prior to construction?	☑Yes ☐No	before work & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens, 2 roadrunners in ROW
Crew trained on biological minimization measures?	☑Yes ☐No	All crew members trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	~~Stream~~ Treatment Fac.	Safety Mtg.	Discuss safety, NR & CR issues every morning.	
0615	East site	Inspection	Clear sites & inspect trench for coast.	
~~All day~~ 0615	CP	Concrete	Place forms & pour concrete	
All day	Pipeline ROW	Set conveyance pipe	Plan on finishing layout of pipe. Place fittings	
All day	East Mesa	Mud drilling	Continue drilling at East Mesa. Basic crew departed yesterday	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Well drillers finished by afternoon & departed site. Started Geophysics on well. Working late on testing. Trench cut across road for pipeline. Plan to drop pipe into trench tomorrow & backfill across road to reopen to traffic. Fusing equip broke down toward end of day. May need to use other equip onsite.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecker 704-984-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/24/04 START/END TIME: 0600 – 1510

WEATHER: Clear, sunny, nswind, cold in morning

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	No cut/fill work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Const site, roads, drillsite.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	No concrete pour.
Material stored within approved locations?	☑Yes ☐No	Staging area & along ROW
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Ground & Roads still wet from rain.
Site checked for biota prior to construction?	☑Yes ☐No	Before work & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	members all trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg	Safety, NR & CR topics	
allday 0615	"	Concrete	Pulling forms from pour	
Allday	EastAccess	Conveyance pipe	Finish pipe run, backfill at road crossing, place "TS	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Drivers are off today. Travel day on Mon & resume drilling on Tues. Bringing in additional gravel at treatment facility. Backfilled portion of trench along east access road. Backfilled piping that crosses dirt road.	

PG&E Topock [illegible]

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 11/29/11 START/END TIME: 0600 - 1700

WEATHER:

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At const site, along rds, at drill site
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	No concrete pour today
Material stored within approved locations?	☑Yes ☐No	Staging area & along ROW
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site
Vegetation impacts w/in CE or outside?	☑Yes ☐No	A few creosote crushed during dig for valve station
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	Prior to work & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety mtg	Discuss safety, NR & CR topics	
0615	TP	Concrete	Stripping forms, compacting site	
"	Eastaccess	pipeline	Fusing & installing valve stations/ leak detection valves	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Drivers have travel day today. Chris traveling today also. He will be onsite tomorrow. I will be offsite tomorrow for the day.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 11/30/04 START/END TIME: 06:00 -

WEATHER: Cold, clear. Ambient temp low 30's with 10mph winds

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	excavation along trench where flow sensors will go. Spoils on road shoulder near BC wash & opposite side near feeder wash
Were silt fences or other means of sediment control employed near washes?	☐Yes ☒No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☒No	No cement poured today
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	New Hydros - Nathan & Cat Brown new driller - ~~Dave~~ Duane Matthews, John Brunson
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All DAY	E. MESA	Drilling - Sonic Rig + mud Rotary	Mud Rotary Rig Relocated to new hole. All relocation work within approved Work area	
ALL DAY	E. Access Rd	Backfilling pipeline trench w SAND	after backfilling trench depth = 2 ft, Escape Ramps still available	
06:00 - 15:00	E. Access Rd	Welding HDPE fittings on conveyance pipeline	HDPE Crew commended for their clean up. Two welding stations demobed & left nearly spotless.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	clean water line to Sonic Rig seeping. Puddle forming by rig. New hose to arrive tomorrow, 12/1/04.	
	This is the first day back after Thanksgiving break. High winds whipped through the area over the weekend neccessitating some clean up of the site. All containment around the drill rigs and all SW containment inspected and repaired as needed.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): CHRIS GREEN DATE: 12/1/04 START/END TIME: 06:00 - 17:00

WEATHER: Clear, cold, some wind. Temp @ 06:00 low 30's

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☐Yes ☒No	Storage bins for drillers waste water are leaking. See below
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	no new activity
Were silt fences or other means of sediment control employed near washes?	☒Yes ☒No	E. MESA silt fences put in place previous work period inspected Sandbags used to contain waste water leaks
Decontamination and concrete wash-outs in approved areas?	☐Yes ☒No	no concrete poured today
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☒Yes ☐No	Small hydraulic fluid leak from pump removed from Mud Rig. Crew soaked it up with diapers, Drapers + soil cleaned up.
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E. MESA	Drilling - SMIC Rig + Mud Rotary Rig	See below	
ALL DAY	E. Access Rd	filling + shading pipe in trench		
ALL DAY	IM-3 Plant site	Back filling around deep vault, compacting soil		

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

Wastewater bin DB721 leaking from 2 small rusted out pinholes near bottom of tank. Tank is full. Visquene liner inside tank gave way when support hook broke. Leak small but persistant. Water contained on site with SANDBAGS. DAN Heath/Denbeste notified. Crew immediately sent onsite to pump out tank. Water going to tank # DB2002, a new tank. @ 14:30 tank # DB2002 started leaking from seals on hinged door. One leak stopped by tightening closure bolts. Leak on hinged side of door can't be stopped. Containment trench dug around leak + reinforced with SANDbags. →

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 12/1/04 START/END TIME: 06:00-17:00

WEATHER: _____

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☐Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☐No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	
Material stored within approved locations?	☐Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☐No	
Vegetation impacts w/in CE or outside?	☐Yes ☐No	
Were access roads watered?	☐Yes ☐No	
Site checked for biota prior to construction?	☐Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☐No	
Crew trained on biological minimization measures?	☐Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☐No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __ sheet(s) used)

Bio-Measure #		Photo #
	Drillers are also using this tank now for wastewater. At 15:00 drilling stopped. New hoses run to a third tank for drillers wastewater. Dewbeste pump crew moved to pump out tank DB2002. Total amount of water ~ 20gal est. All water contained in immediate area.	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 12/2/14 START/END TIME: 0600 - 1630

WEATHER: clear, sunny, windy, cold

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At const site, along roads, around drill rigs
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	No pour today
Material stored within approved locations?	☑Yes ☐No	staging area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Picked up blowing caution tape
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Crushed/buried creosote at sand pile, Request/report of sand
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Concrete	Building forms for next pour	
Allday	East Mesa	Driving	2 drill rigs (mud & sonic)	
Allday	East Access	pipeline	Placing flanges for hydrostatic test	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 12/2/04 START/END TIME: 06:00 - 16:45

WEATHER: Clear, cool, windy

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☒No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	no concrete poured
Material stored within approved locations?	☐Yes ☒No	see below
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E. MEGA	Drilling - Sonic Rig & mud Rotary Rig	all leaky hoses have been repaired or replaced	
ALL DAY	E. Access Rd	Backfilling trench w/ SAND	Excess materials cleaned up along trench Backfilling nearly complete.	
ALL DAY	Im-3 Plant site	Prep for concrete pour		
ALL DAY	HDPE Pipe-line	Fitting for pressure test installed		

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __ sheet(s) used)

Bio-Measure #		Photo #
	More SAND for trench brought in + Dumped at west corner of E. Access Road. This is not an approved location. Spoke to Denbeste personel to relocate SAND to staging area just east of Bat cave wash. Relocation began this afternoon + will finish tomorrow morning. Heavy equipment parked along E. Access Rd also moved to approved staging areas. Areas of impact from Heavy Equip. to be raked.	
	Excess caution tape + work debris along trench cleaned up.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 2/3/04 START/END TIME: 0600 – 1600

WEATHER: Clear, sunny, windy, cold

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At sites & along roads
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	No concrete pour today. Const forms
Material stored within approved locations?	☑Yes ☐No	Staging area & near MW11
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site, no litter
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Throughout day.
Site checked for biota prior to construction?	☑Yes ☐No	After safety mtg & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg	Discuss safety, NOI & CM topics	
Allday	TP	Concrete	Bldg concrete forms for next pour	
Allday	East access	pipeline	Prepare for hydrostatic test	
Allday	East Mesa	Drilling	Continue drilling (mud & sonic rigs)	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Hydrostatic test of conveyance pipeline today. Sonic rig had to "fish" out casing. Broke off in afternoon. Crews will monitor drillers over the weekend.	

PG&E TOPOCK IMP - PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): CHRIS GREEN DATE: 12/3/09 START/END TIME: 06:00 - 16 45

WEATHER: Clear, Cold, some WIND

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	NO NEW SILT FENCE
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	NO CONCRETE POURED
Material stored within approved locations?	☐Yes ☒No	SAND for trench placed in previously disturbed area but area is unacceptable for any new disturbance. SAND moved to west end of trench
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☑No	NO NEW CREW
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	EAST MESA	Drilling	Containment under Sonic Rig extended & bolstered for draining clean water at END of DAY	
ALL DAY	E. ACCESS Rd.	Prep for pressure test of HDPE LINES. Start of test		
ALL DAY	Plant Site	Prep for next Cement Pour		

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	New Sand for trench cover stored at first corner west of Bat cave Wash on E. Access Rd. This site was previously used by ARB as Pipe welding Station. It was not to be disturbed again. Dewbeste personel removed SAND to previously approved location.	
Sonic	Drill Rig is pumping out clean water lines each evening to prevent freezing over night. Some of this water is spilling off existing containment. New containment built for this water.	
	Pressure test of 4 inch HDPE line halted due to bad weld at ~~west~~ EAST CD6 END. Water from	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 12/3/09 START/END TIME: 06:00 #16:45

WEATHER: _____

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☐Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☐No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	
Material stored within approved locations?	☐Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☐No	
Vegetation impacts w/in CE or outside?	☐Yes ☐No	
Were access roads watered?	☐Yes ☐No	
Site checked for biota prior to construction?	☐Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☐No	
Crew trained on biological minimization measures?	☐Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☐No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: ___ sheet(s) used)

Bio-Measure #		Photo.#
	this line allowed to drain into trench to relieve pressure on faulty weld.	
The	3 inch line was filled but not pressurized. No leaks observed	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 12/4/09 START/END TIME: 06:00 - 16:30

WEATHER: Some clouds, mostly sunny & mild. Some wind in afternoon

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Rain forcast so silt fences on E. MESA checked & improved as necessary
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	Drillers decon pad moved off W. MESA to E. MESA no concrete poured
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	No new crew
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E. MESA	Drilling - Sonic Rig & Mud Rotary Rig		

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Both drill rigs down for the morning. Crews used time to clean up the MESA, pour pads at completed wells & check equipment. Clean water line for Mud Rotary Rig is leaking at 2 locations, Hose is to be repaired before further use.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 12-5-01 START/END TIME: 06:00 - 16:30

WEATHER: Clear, mild, warm

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☒No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☒No	no concrete poured.
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	
Site checked for biota prior to construction?	☐Yes ☒No	no construction or equipment moving at site
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	CBG / ~~new hire~~
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E MESA	Drilling	Sonic Rig moved to new hole 20 feet from previous hole.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	All containment around rigs inspected + improved as necessary.	
	The seal around the conductor pipe beneath Sonic Rig broken.	
	Crew resealed it. If seal doesn't hold this may become a source	
	of wastewater. Containment extended to cover this eventuality.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 12/16/04 START/END TIME: 06:00- 17:00

WEATHER: Clear & warm, little wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	60 yds N Bat Cave Wash, 23 N wash to the west
Were silt fences or other means of sediment control employed near washes?	☐Yes ☒No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☒No	no concrete poured
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☒Yes ☐No	one lycium relocated from trench alignment
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	1 new hydrogeologist
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E. Mesa	Drilling	Seal around conductor pipe holding, OK	
ALL DAY	IM-3 Site	prep for concrete		
1300 - 1630	Bat Cave wash	Trenching	Trench spoils in washes	
ALL DAY	E. Access Rd	Prep of Pipeline for Leak test	3 in line pressurized & tested, 4 in line repaired and filled with water.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Trench spoils in the washes are an issue. Need clarification of their proper location.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): CHRIS GREEN DATE: 12-7-04 START/END TIME: 06:00 -

WEATHER: overcast & WINDY

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☐Yes ☐No	uncertain. Trench spoils remain in the washes
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	estimated yesterday AS 60 yd³ in BatcaveWash, 23 yd³ in wash to the west
Were silt fences or other means of sediment control employed near washes?	☐Yes ☒No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	60 yds³ cement poured this morning. Trucks used washout
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	E. MESA	Drilling - Sonic Rig, mud Rotary Rig		
07:00 - 14:00	Bat Cave wash	HDPE welding	3" & 4" return lines run across BC wash to ~~Ex~~-3 plant mesa. Lines prepped for leak test	
06:00 - 11:00	IM-3 Site	cement pour	60 yd³ - 6-7 trucks	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: ___ sheet(s) used)

Bio-Measure #		Photo #
	RAY Romero, CHRIS GREEN & Robert Hernandez spoke with Phill Schoeneke about trench spoils in washes. Under emergency Notification the spoils may be allowed in washes. RAY Romero is going to review original WORK plan & consult with BLM.	
	3 Diesel Light stands placed in position around Mud Rig on E Mesa at 16:30. Lighting checked to minimize stray light over valley.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 12/8/04 START/END TIME: 06:00 - 19:00

WEATHER: _____

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☐Yes ☒No	Trench spoils still bridging but cave wash + wash west of it
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☒No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
ALL DAY	East Mesa	Drilling Sonic Rig & mud Rotary Rig		
ALL DAY	IM-3 Site	Prep for next concrete pour		
ALL DAY	E. Access Rd	Leak & Pressure test of 3 inch & 4 inch conveyance pipe		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Notified at 1700 that Dewaste must remove trench spoils from washes.	
	Lights set up on E. Mesa for night time drilling. All lights aimed down & to the south. Masts raised to minimum effective height. Drilling with mud rotary rig continued all night.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 12/9/04 START/END TIME: ~~6~~ 6:00 - 16:30

WEATHER: _____

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☐Yes ☒No	Trench spoils in washes
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	Bat cave wash & wash west of it.
Were silt fences or other means of sediment control employed near washes?	☐Yes ☒No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
06:00-14:00	E, MESA	Drilling - Sonic Rig & mud Rotary Rig		
ALL DAY	IM-3 Site	Prep for next concrete pour		
ALL DAY	E, Access Rd	HDPE Pipe test		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: ___ sheet(s) used)

Bio-Measure #	Photo #
After 06:00 Safety Meeting Ray Romero showed Phil Schoenecke / Denbeste the section of the SWPP stating all spoils are to be stockpiled at least 50 feet from the washes. At 10:30, on East Mesa I asked Mr. Schoenecke if there was a time table set for removing the spoils. I also put forward our preferred method for their removal. ~~I~~ Mr. Schoenecke replied that there was no schedule for that task. He stated he has "a call in to Steve and Marilyn and we'll see how it's done." I presume he is refering to Steve Smith and Marilyn Blume. John Geels / CH2M Hill, Denver was present during this conversation. At 13:50 I had met with	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Chris Green DATE: 12/9/04 START/END TIME: _____

WEATHER: _____

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☐Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☐No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	
Material stored within approved locations?	☐Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☐No	
Vegetation impacts w/in CE or outside?	☐Yes ☐No	
Were access roads watered?	☐Yes ☐No	
Site checked for biota prior to construction?	☐Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☐No	
Crew trained on biological minimization measures?	☐Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☐No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Dan Heath, Steve Sorves (?), and Duane Budd, all with Dewberstle, to plan how the spoils were to be moved and where they would be stockpiled. Spoils in Bat Cave wash are south of the trench. The excavator and loader will be moved in from the south to pick up spoils. Soil will be stockpiled at north end of staging area.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 12/9/04 START/END TIME: 0600 - 1630

WEATHER: Clear, sunny, windy, mild temps.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	trench spoil pile being removed from BCW later in day
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	Removal of spoil pile in BCW
Were silt fences or other means of sediment control employed near washes?	☐Yes ☒No	Open trench for pipe. Difficult to employ control meas.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	In approved area. No pour
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	throughout day
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	East Mesa	Drilling	Mud & Sonic rigs last day on 10 day run	
All day	Treatment Facility	Concrete	Bldg concrete forms	
All day	E. Access rd	HDPE pipe test	Hydrostatic test of pipelines	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	At 0800 after safety mtg., I showed Phil S. the section of the SWPPP that addresses issue of stockpiling spoil in wash. It states that stockpiles must be staged a minimum of 50 ft from the wash. Later in the day Chris asked Phil of status of removal. Later in day, Duane called me on what needs to be completed in the wash. I informed him of stipulations & our proposed method of removal. I asked that he get w/ Chris because I was at the office. I was informed that Duane treated Chris in an unprofessional manner by yelling at him in front of our contractors. I was informed of this at the end of the work day by Chris G. & Tom Everett (Arch. [illegible]	

PG&E TOPOCK [illegible]

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 12/10/04 START/END TIME: 0600 - 1630

WEATHER: Clear, sunny, slightly windy, mild temps.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	Remaining spoil being removed from BCW
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	BCW spoil removal
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Treatment facility & along rds.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	Located at staging area.
Material stored within approved locations?	☒Yes ☐No	staging areas & along ROW
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	water truck also being used for hydro test
Site checked for biota prior to construction?	☒Yes ☐No	throughout site & allday.
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	Cathy White onsite @ ~ 0915.

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety mtg / talk w/ Duane	Spoke to Duane about his behavior & treatment toward Chris. We will speak to Phil on Monday	
Allday	East access rd.	Hydro test	Pressure test pipelines. ISCO onsite for pipe fusing	
Allday	TP	Fuse HD PE	Fusing pipe for tie-in.	
Allday	East Mesa	Well development	CH & WDC developing wells.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Mud & sonic drillers are off today & weekend. They will return on Monday. Two man crew will develop wells on east mesa today. Completed tie in of 8" double walled pipe at end of day.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 12/13/04 START/END TIME: 0600 – 1640

WEATHER: Clear, sunny, no wind, cool temp, warmer in afternoon

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☐Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Installing Ts and vault for pipeline near BCW.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Work area, roads, drilling area.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pour today
Material stored within approved locations?	☑Yes ☐No	staging area & along ROW
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Picked up some trash in staging area.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Throughout day. H2O tank for drillers kept full.
Site checked for biota prior to construction?	☑Yes ☐No	Prior to work & throughout day.
Special status species observed onsite? Describe.	☐Yes ☐No	Common ravens, coyotes howling, sparrows, sideblotched lizard
Crew trained on biological minimization measures?	☑Yes ☐No	Crew trained, no new workers
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	BCW	Conveyance pipeline	Install Ts & vault – ISCO & ARB	
0700	TP	Concrete	Pour & finish concrete at facility area	
0700	East Mesa	Drilling	Mud drillers making repairs. Sonic preparing to drill shallow well.	
1640	TP & East Mesa	Const./Drilling	Completed for the day. ISCO finished tie ins & departed. Drillers not working tonite.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Next 2 days shallow well will be drilled by Sonic rig. Once completed, they will depart site. Expected to be back on Jan 4 to start CMWs. Coord w/ Linda Anton. She will be onsite on Weds. to perform Bio monitoring. Crew draining bins from East Mesa – 23 total. Electrical conduit brought in today & staged along ROW. 3 areas – near Park Moabi Rd, East access crest & near BCW. Informed Dan Heath areas were not officially approved for material staging. He informed me needs them at those areas for logistic reasons. I informed him that they may need to be removed per BLM.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 12/14/04 START/END TIME: 0600 - 1730

WEATHER: Clear, sunny, no wind, cool temp, warmby after noon

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑ Yes ☐ No	Placing risers off of "T's" to pipe
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	Const. area, rds, drill site
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	No pour today. Pit getting close to full
Material stored within approved locations?	☑ Yes ☐ No	staging area & along row
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	Clean site
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	No clear/grub.
Were access roads watered?	☑ Yes ☐ No	throughout day
Site checked for biota prior to construction?	☑ Yes ☐ No	After safety mtg & throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	common raven, side-blotched lizard
Crew trained on biological minimization measures?	☑ Yes ☐ No	No new crew members.
Need to contact agencies? Describe.	☐ Yes ☑ No	0815 Cathy White (BLM) onsite. 1415 DTSC onsite.

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	Conveyance pipe	Hydro test	Test pipeline for leaks. Install risers @ "T's"	
All day	TP	Concrete	~~Fen~~ Finish & remove forms	
All day	East Mesa	Drilling	Continue mud & sonic drilling (2 rigs)	
All night	"	"	Mud drill rig working all night.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Requested that crew cap electrical conduit this morning - Done. DTSC and Native Americans onsite at ~~1430~~ 1415. Didn't get out of vehicle, Took pictures and left area. Compacting HR 66 in places. With crew setting up lights - no issues. On call over night if needed.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 12/15/04 START/END TIME: 0600 – 1730

WEATHER: Sunny, clear, no wind, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Installing riser near BCW
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Const area, rds, drill site
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	No pour today.
Material stored within approved locations?	☑Yes ☐No	Verbal approval to use MW41 as staging area, need to delineate.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Daily
Site checked for biota prior to construction?	☑Yes ☐No	throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven
Crew trained on biological minimization measures?	☑Yes ☐No	~~no new crewmembers~~ Linda trained 2 new people.
Need to contact agencies? Describe.	☐Yes ☑No	Conf call @ 0900. See below. First week of weekly calls.

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	East access rd	Hydrotest	Test pipe for leaks and install riser	
Allday	TP	Concrete	Setting forms, spreading gravel.	
Allday	East Mesa	Drilling	Mud rig worked last night & today.	
Night	"	Setting well	~~Drill~~ Drill crew setting well at night.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Sonic rig completed today. Decon on west mesa. They will depart site & return on Jan 4 to drill CMWs. At 0900, participated in conf. call w/ PG&E, DTSC & BLM bio & archs to discuss monitoring, surveys & work activities. 1420 Met w/ BLM (Mark & Sally). They gave verbal approval on altering wash into BCW. No written request needed. Rec'd verbal approval on second staging area. Need written request. Need to cap fittings, close doors to conexboxes & relocate veg near wash. They are concerned w/ night lighting. Martin & Jay to write email explaining activities. Tim & Tony will take pictures	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 12/30/04 START/END TIME: 0600 - 1640

WEATHER: Clear, sunny, cold, no wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	Cooperative work crew.
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Trench already backfilled @ BCW. water flows in washes yesterday.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Repairs made due to recent rain. Road base placed on [illegible] for repairs.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	No concrete pour today. Removing forms from last pour. No drilling this week. Drillers back on Jan.
Material stored within approved locations?	☑Yes ☐No	Equip & materials at staging area. Drill equip @ East wash [illegible] moved to staging area.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Site kept clean. Lg. trash bins w/ locking covers onsite
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No clear & grub. Backfilling trench and around vaults.
Were access roads watered?	☐Yes ☑No	Recent rain saturated area. No need for road watering
Site checked for biota prior to construction?	☑Yes ☐No	Prior to work & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven flying by site.
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	East access	Backfilling trench	Front end loader & dump truck backfilling trench & around vaults.	
"	"	Blowing string/electrical	Electricians prepping conduit for electrical wire. They did not work yesterday due to rain.	
"	Treatment plant	Concrete crew	Removing forms from recent pour. They did not work yesterday due to rain.	
1300	"	Cutting trench	Trenching for pipeline into facility.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Possibility of work tomorrow - Friday, New Years eve. No work scheduled after all for Friday. Excavator being used to cut trench. Spoil placed in dump truck & hauled to staging area. Concrete Constructors cut pavement on HW 66/Park Moabi Rd where trench will be cut for pipeline & conduit from MW20 bench.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 1/3/05 START/END TIME: 0600 – 1630

WEATHER: Cloudy, raining, no wind, cold

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	Cooperative work group.
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Transplanting veg.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	No concrete pour today.
Material stored within approved locations?	☑Yes ☐No	vehicles & materials at staging area.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site
Vegetation impacts w/in CE or outside?	☑Yes ☐No	veg transplanted from BCW
Were access roads watered?	☐Yes ☑No	Rainy day
Site checked for biota prior to construction?	☑Yes ☐No	throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	No wildlife observed on rainy day.
Crew trained on biological minimization measures?	☑Yes ☐No	Rob trained new person.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg.	Trained Rob Gilman w/ GANDA. His first day.	
0700	TP	Pipe fusing	Pipe being fused by ISCO & ARB into TP.	
1300	BCW	Removing veg	Transplanting veg from BCW for wash alteration & culvert.	
1400	TP	Coordination	Coord w/ Jay Piper on drill activities for tomorrow.	
1630	TP	Depart site	Site secured for night.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Rainy day. Not too much activity. Lycium & Palo verde transplanted near MW41. Some maintenance on HR66. Not able to do much fusing of HDPE due to rain. Pipe needs to be dry. Rec'd approval from BLM on veg transplanting. Rob Gilman w/ GANDA is new onsite. I trained him & provided site familiarization. He will monitor for bio concerns and adhere to drillers schedule – 10 days on 4 days off.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Construction crew

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Rob Gilman DATE: 1/3/05 START/END TIME: 0600 - 1630

WEATHER: Rainy, 45°-55° F

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	Crew transplated a palo verde, creosote in a wash adjat to the construction trailers. (MW-41 bench)
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Hay bales & sediment control employed around treatment plant facility and roads.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☒Yes ☐No	Crew transplated palo verde & creosote in a wash adjacent to the construction trailers (MW-41 bench)
Were access roads watered?	☐Yes ☒No	Not necessary due to rain.
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	New worker trained on site.
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600 ~~0600~~-1630	IM3 Plant	Construction of plant.	None.	
1500	MW-41 bench	Transplanting Plants	See vegetation impacts above.	
0700-1130	IM3 Plant	Excavation of utility Trench.	Trench inspected for wildlife at 0700, 1130, & 1630.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-804-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 1/4/05 START/END TIME: 0600 – 1700

WEATHER: Cloudy, raining, NO wind, cold

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Excavator working BCW in prep for culverts
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around site & access road.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pour today.
Material stored within approved locations?	☑Yes ☐No	Stored at staging areas.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Removed creosote for drill equip set up & access to CMWs.
Were access roads watered?	☐Yes ☑No	rainy day
Site checked for biota prior to construction?	☑Yes ☐No	throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Cold & rainy day – no wildlife.
Crew trained on biological minimization measures?	☑Yes ☐No	Rob trained new driller.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety mtg	Discuss JSA, cult, & safety.	
0700	CMW1	Drilling	Set up rig at new drill location.	
0830	CMW2&3	Drilling	Cleared access for future drilling.	
0900	HR66	Road repair	Placing road base at HR66 due to washouts.	
1330	BCW	Prep fo culverts	Excavator working BCW in prep for culverts.	
1700	East Mesa	well development	Report site.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Only one sonic rig working. Mud rig will be taken off site. Sonic will be onsite next week to drill CMW4. Cut bank for access to CMW 2&3. Placed some fill in small drainage to access CMW.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Drill Crew + Construction Crew

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Rob Gilman DATE: 1/4/05 START/END TIME: 0630 - 1700

WEATHER: 90% cloud cover, 40° - ° F, light intermittant rain

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	Grading wash behind IM-3 building. See R. Romero's log for cut/fill estimates.
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Hay bales & sediment control employed around treatment plant & roads. ~~Not Applicable to today's activities.~~
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	Not necessary due to rainy conditions.
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	New worker trained onsite.
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0830	CMW-1	Grading of well site ≈ 30' x 80'	Removal of a few creosote bushes.	
0900	CMW-1	Crew set-up SONIC drill (MAST UP).	None	
0900-1615	CMW-1	Drill	None	
1300-1600	MW-41 bench	Grade Wash	None	
0600-1600	~~Plant~~ IM-3	IM-3 Pave concrete, construction	None; open trench checked @ 0700, 1230, 1530	
0700-1700	E. Mesa	Well development	None	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	~~Ø~~	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 1/5/04 START/END TIME: 0600 - 1700

WEATHER: Clear, cold, no clouds, no wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	Diverted small wash into BCW. Work approved by BLM
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Work on BCW in prep for 6-48' culverts
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & roads
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pour, washouts in pit @ staging area
Material stored within approved locations?	☑Yes ☐No	materials & heavy equip on upper & light vehicles on lower
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Crew picks up after themselves.
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Veg (Lycium) relocated from BCW. Creosote removed.
Were access roads watered?	☑Yes ☐No	Little watering needed due to recent rain.
Site checked for biota prior to construction?	☑Yes ☐No	Throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven flew over on several occasions.
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg	Discuss work plan, safety, NR & CR	
0800	BCW	Excavation	Prepping BCW for culverts. Expanded wash.	
1300	CMW1	Drilling	Check on drillers. Rob monitoring crew.	
1400	Station	Conference call	Discuss bio issues at PG&E Hinkley site.	
~~150~~ 1700	CMW1	Drilling	Check on crew & depart site.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Const. crew widening BCW, removing veg & grading site in preparation for 6-48ft culverts that will be installed next week. Drill crew (WDC) working at CMW1 (second day at site). They will install two wells at CMW1 location, approx 10 day run to complete wells at this location. WDC will install CMWs 2 & 3 after CMW1. CMW4 will be installed by Prosonic next week.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Rob Gilman DATE: 1/5/05 START/END TIME: 0600 - 1715

WEATHER: Clear, 45° - 60° F

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	Drainage @ Bat Cave wash Graded (near MW-41 bench). See Ray Romero log FOR cut/fill estimates.
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	~~Not applicable~~ Hay bales and sediment control employed around treatment plant & roads.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	Not necessary due to rain on previous day (1/4/05).
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0645-1630	Bat Cave Wash near MW-41	Grading wash	None.	
0630-1615	E. Mesa	Well development	None.	
0630-1715	CMW-1	Drilling	None	
0600-1830	IM-3 (CH2q Plant) facility	Construction of facility	~~None~~. Open trenches checked 3X for wildlife.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoeneke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Raymond DATE: 1/6/04 START/END TIME: 0600 – 1650

WEATHER: Clear, cold, no clouds, no wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Prepping BCW for culverts.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & roads
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pour today. Wash out used at staging area.
Material stored within approved locations?	☑Yes ☐No	Stored at staging area. Vehicles parked on lower area.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Picked up a couple of plastic covers.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No veg removal or transplanting from BCW
Were access roads watered?	☑Yes ☐No	Rds still moist from recent rain.
Site checked for biota prior to construction?	☑Yes ☐No	Sites cleared & checked throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Blue gray gnatcatchers heard in area. Only common ravens observed.
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Safety Mtg.	Work plan, safety, NH & CR issues.	
0630	BCW	Prep	Prep work for culverts. level & compaction.	
"	TP	Concrete	Concrete pour today of foundations	
0930	TP	Tanks	Setting 2 7000 lbs tanks at TP.	
1100	CMW1	Drilling	Check on drillers & see how Robis doing w/ drill	
1600	TP & CMW1	Const & Drilling	Check over sites toward end of day.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Widening of BCW complete for culverts. Approx. 120 cubic yds of material were cut & removed from wash. Width of wash was ~ 30ft. After cut, wash is currently ~44ft wide. Length of cut along both banks is currently ~103ft. Provided info to Steves. for emergency notification to CDFG.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Rob Gilman DATE: 1/6/05 START/END TIME: 0600 - 1630

WEATHER: Partly cloudy (Approx. Cloud coverage = 20%), 45°-55°F

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	Drainage at Bat Cave WASH at Route 66 graded. See Ray Romero's log for cut/fill estimates.
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	~~Not Replaced~~ Hay bales & (sediment) erosion control employed around treatment plant & roads.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	Roads wet from recent rainstorms.
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	1 crewmember trained.
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630-1630	CMW-1	Drilling	None.	
0630-1630	E. Mesa	Well development	None.	
0600-1630	IM-3 (H2O PLANT) Facility	Place water TANKS down; Construction of plant.	~~None~~ Open trenches were checked three time for wildlife (0600, 1230, 1600).	
063-1630	Bat Cave WASH at Route 66.	Grading of wash, FOR access road. Work conducted intermittently.	None.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 1/7/05 START/END TIME: 0600 – 1600

WEATHER: Clear/Cloudy, cold, no wind, chance of rain into weekend

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & rds.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Some outside pit was pushed into pit w/backhoe. Concrete trucks washed out in pit yesterday.
Material stored within approved locations?	☑Yes ☐No	material & heavy equip @ upper & vehicles @ lower area.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	picked up a couple of food wrappers in staging area.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Also used for hydrotest of HDPE pipe
Site checked for biota prior to construction?	☑Yes ☐No	Before work & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Crew trained on bio measures
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday 0630	TP	HDPE fusing	Continue to fuse pipe & run test.	
Allday 0630	CMW1	Drilling	Drill crew continuing drilling.	
Allday 0630	TP	Concrete	Continue to set & remove forms from pour.	
Allday	HR66	Compacting road	Operating roller to compact HR66.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Mud rig & support equip being taken offsite. Materials for mud rig also being hauled offsite. Crew continuing to perform well development at East Mesa. Rob will cover well drilling over the weekend @ CMW1.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916
OBSERVER(S): Rob Gilman DATE: 1/7/04 START/END TIME: 0600 - 1710
WEATHER: 36° - 47° F, light intermittent rain, 90% cloud cover

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Hay bales & sediment control employed around treatmt plant facility & roads.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	Not necessary due to rain.
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	1 worker trained
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600-1600	IM-3 H_2O Plant	Work in trenches & construction of treatmt plant.	~~None~~ Open Trenches were inspected 3X for wildlife	
0630-1630	E. Mesa	Well development.	None.	
0630-1710	CMW-1	Drilling	None.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Rob Gilman DATE: 1/8/04 (Saturday) START/END TIME: 0630-1700
WEATHER: Overcast (90% cloud cover), 50° - 57° F, Wind = approx 10-15 mph

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Hay bales & sediment control employed around IM-3 treatment plant & roads.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☒Yes ☐No	No fuel leaks, however decon water spill on W. Mesa (see below)
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	Not necessary due to recent rain.
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	1 worker trained today.
Need to contact agencies? Describe.	☐Yes ☒No	

❑ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630-1700	CMW-1	Drilling		
0630-1700	E. Mesa	Well Development		
0700-1500	IM-3 plant	IM3 H_2O Plant	Trenches checked 3 times for wildlife. (No wildlife observed).	
1400-1640	W. Mesa	Decon of equipt.	See the following section below.	

❑ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Water was observed running off the decon pad on the west mesa	
	where the WDC crew was decontaminating mud rig equipment. Water	9262
	was observed draining downhill along a roadside gully due to the	9263
	decon pad overflowing. Tim McDonald collected a water sample	
	from water in the decon pad. The water that overflowed the pad drained	
	for approximately 150' downhill. Tim McDonald & Rob Gilman left	
	messages with Ray Romero between 1430-1500. Cleanup was conducted	
	by using buckets, a plastic scoop, & shovels to remove as much	

of the water and affected soils as possible and place these materials in a

[illegible]

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

SUNDAY

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Rob Gilman DATE: 1/9/05 START/END TIME: 0630 - 1700

WEATHER: Overcast, 100% cloud cover, 50°-60° F

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Hay bales & sediment control employed around IM-3 water treatment plant and roads.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	Not necessary due to recent rain.
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630-1120	CMW-1	Drilling	None	
0630-1700	E. Mesa	Well Development	None	
——	IM3 Plant	No Construction	Open trenches checked 3 times (Morning, Approx. noon, late afternoon).	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Rob Gilman DATE: 1/10/05 START/END TIME: 0600 - 1700

WEATHER: Mainly overcast, 50°-60° F

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Hay bales & sediment control employed around treatment plant and access roads.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	Not necessary due to recent rain.
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	1 worker trained today.
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600-1630	IM-3 plant	backfilling trenches general construction	Open trenches checked 3 times for wildlife (Morning, noon, Afternoon).	
1300 ~~1630~~-1700	CW-4	Set up drill rig Equipment; Drilling	Sensetive plants flagged & avoided	
0630-1700	CMW-1	Drilling	None.	
0630-1700	E. Mesa	Well development	None.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Rob Gilman DATE: 1/11/05 START/END TIME: 0600 - 1700

WEATHER: Partly cloudy (10-70% cloud cover, 55° - 65° F, Windy Afternoon (25-30 mph).

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Hay bales of sediment control used around IM-3 treatment plant and along access roads.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	~~☐Yes~~ ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600-1630	IM-3 Plant	Trenching, pipe installation, backfill	open trenches checked 3 times for wildlife (Morning, noon, afternoon)	
0630-1700	CW-4	Drilling	None.	
0630-1700	MW-1	Drilling, Install well	None.	
0630-1700	E. Mesa	Well development	None.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Rob Gilman DATE: 1/12/05 START/END TIME: 0600 - 1700

WEATHER: partly overcast morning, clear afternoon, 45°-55° F, wind = 15 mph

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Hay bales and sediment control used around IM-3 treatment plant and along access roads.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	1 worker trained today.
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600-1630	IM-3 plant	Trenching, pouring concrete, rebar tieing	Open trenches checked 3 times (Morning, mid-day, afternoon).	
0630-1700	CW-4	Drilling	None.	
0630-1700	CMW-1	Install well	None.	
0630-1700	E. Mesa	Well development	None.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
5	Two sets of off-road tire marks were observed in the vicinity of MW-14.	9268
	The first is located approx. 50 ft. north of MW-14. The second	9267
	set is located approx 250 ft. east of MW-14. No sensitive vegetation	
	was impacted and it is unknown whether the disturbance was caused by	
	project or non-project personnel.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Rob Gilman DATE: 1/13/05 START/END TIME: 0600 - ~~1700~~ 1630

WEATHER: clear, 32°- 50° F, WIND = 0-5 MPH

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Hay bales and sediment control used around treatment plant and access roads.
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600-1630	IM-3 Plant	Pouring Concrete, Equipment installation for Plant.	Open trenches checked in the morning, mid-day, and in the afternoon.	
0630-~~1630~~	CW-4	Drilling	None	
0630-1330	CMW-1	Install well	None	
0630-~~1700~~ 1630	E. Mesa	Well development	None	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 1/14/05 START/END TIME: 0600 – 1730

WEATHER: Clear, no wind, cold

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Prosonic drilling in wash for CMW4
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Along TP & roads
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pour today, washout being used. Drill rigs have plastic underneath rigs
Material stored within approved locations?	☑Yes ☐No	Stored at staging areas & east/west mas as
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Sensitive veg flagged & avoided in wash. Minor veg. crushed during drilling in wash
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	Also throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven & grackle observed.
Crew trained on biological minimization measures?	☑Yes ☐No	Trained a few new people. See attendance sheet.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday 0600	TP	Concrete Const.	Concrete pour today	
Allday 0630	Wash	Drilling	Prosonic installing CMW4	
1600	TP	Setting trailer	low bed onsite w/ trailer. Setting on pad.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	WRC 4 days off starts today. Prosonic will move to next well @ CMW4 site tomorrow. Crew set trailer on pad & placed electrical control panels in trailer.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Reynolds DATE: 11505 START/END TIME: 0600 – 1710

WEATHER: Clear, cold, sunny, no wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Prosonic drilling in unnamed wash installing CMW4
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Plastic sheeting placed under drill rig & flat bed
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon for drill rig set up at West Mesa.
Material stored within approved locations?	☑Yes ☐No	Drillers materials staged at west mesa
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Trash contained in plastic bags
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Minor veg crushed in wash. Staged & avoided. sensitive veg flagged & avoided.
Were access roads watered?	☐Yes ☑No	Water truck off today. Lt to little traffic on Rd
Site checked for biota prior to construction?	☑Yes ☐No	Before & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven flew by.
Crew trained on biological minimization measures?	☑Yes ☐No	Trained new CH employee today. See attendance sheet.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600 – 1710	Unnamed wash	Drilling	~~Set up & started shallow well. A~~ A cluster of two wells were installed in wash known as CMW4 site. Crew set PVC pipe for deep well & grouted. Break-down in late morning. Crew went to Needles for parts. Resumed work after lunch.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Const. not taking place on weekends. WDC drillers are off for 4 days. Back to work on Tues. Only crew working over this weekend is Prosonic drill crew. Ben & Bob w/CH are onsite hydros for this crew. Prosonic has a crew of 3. Bruce (onsite Arch) does not need to be present over weekends.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 1/6/05 START/END TIME: 0630 – 1300

WEATHER: Clear, sunny, no wind, cold mornings

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Rosonic moved 8ft North in wash to drill shallow well @ CMW4
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Drivers using no water to drill wells. Plastic placed under drill rig & flatbed.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon for drivers located at West Mesa.
Material stored within approved locations?	☑Yes ☐No	Materials staged at West Mesa
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Trash contained in bags
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Minor crushed veg. in wash. Sensitive veg flagged/avoided
Were access roads watered?	☐Yes ☑No	Little traffic on roads.
Site checked for biota prior to construction?	☑Yes ☐No	Prior & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens observed
Crew trained on biological minimization measures?	☑Yes ☐No	Trained new Rosonic crew member. See attendance sheet
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630 – 1300	unnamed wash	Rosonic drilling	Moved to shallow well location. Drilling within ESA	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Rosonic crew worked "1/2 day" today. Rosonic only crew working today. EA/NDA will be back onsite starting Tues.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 1/17/05 START/END TIME: 0600 – 1700

WEATHER: Clear, sunny, no wind, cold mornings

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	Cooperative work crew.
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Prosonic drilling CMW4 shallow well in wash.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Hay bales & straw wattles at const site & along rds. Plastic placed under neath drill equip.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Drivers decon at West mesa on pad. Concrete pour today. Washout located at staging area.
Material stored within approved locations?	☑Yes ☐No	Stored at approved staging areas near const area. Stored at west/east mesas for drivers
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Picked up minor trash at staging area. Sensitive veg flagged & avoided.
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Minor veg disturbance during drilling in wash
Were access roads watered?	☑Yes ☐No	Dust suppression from road & site watering.
Site checked for biota prior to construction?	☑Yes ☐No	Also checked throughout the day.
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens flying throughout day.
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained on bio measures. Trained new operator. See sheet
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	treatment plant	Concrete pour	Pouring concrete at facility today & placing form	
All day	wash	Drilling	Placing 1 shallow well in wash – Prosonic.	
All day	east access road	road grading	grade road & cut drainage along shoulder.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Tim Everett replacing Bruce Gothar as onsite Arch this week. WDC will return to site tomorrow. Prosonic completed second shallow well @ CMW4 site. Cleaned up area & started decon of equip @ West mesa. They will place monuments tomorrow & mobilize to next well site – CMW2. Ganda back onsite tomorrow morning.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Crawford DATE: 1/18/05 START/END TIME: 0600 – 1700

WEATHER: Clear, sunny, slight wind, warm temps.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Prosonic setting monuments & pouring concrete pads
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Plastic placed under drill rigs. Hay bales & wattles around const. site & rds
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete washout at staging area. No pour today. Decon'd drillers at west mesa
Material stored within approved locations?	☑Yes ☐No	stored at staging areas & mesas
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site
Vegetation impacts w/in CE or outside?	☑Yes ☐No	A couple creosote removed to dig pit for bore under HH66.
Were access roads watered?	☑Yes ☐No	water truck watering rds & taking H2O to drillers
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens flying by site.
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained on measures.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	~~Entire~~ TP	Concrete crew	Removing forms from yesterday's pour. Prep for next pour	
0900	TP	Excavation	Digging pit for bore equip under HH66.	
All day	CMW-1	WDC	Finishing well at CMW-1. Decon tomorrow.	
Morning	CMW-4	Prosonic	Setting monuments & pouring concrete @ CMW-4	
Afternoon	CMW-2	Prosonic	Mobilizing to CMW-2 on Mesa 300.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Jackie Fuks (Garda) 1st day onsite. Provided training & Site familiarization. Introduced her to staff.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): JACKIE FINCK DATE: 1/10/05 START/END TIME: 0600 / 1647

WEATHER: 76F, CLEAR, WIND <5

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	CMW4 - PROSONIC PUTS 3 MONUMENTS ON WELLS
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	MINOR TRASH PICK UP
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☒ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
822	CMW 4	MONUMENT INSTALL PROSONIC		
~~822~~	~~CMW4~~			
1000	LOWER STAGE AREA	EXCAVATING TRENCH & SPOIL PILE		
1115	CMW4	CONCRETE POURED		
1515	MW19	CHECK OPEN TRENCH		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916
OBSERVER(S): David Smith DATE: 11/9/05 START/END TIME: 0600 – 1700
WEATHER: Clear, sunny warm, slight wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Drilling completed in wash @ CMW4
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Facility site, roads, drill sites. Plastic under drill rigs
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	WDC decon at West Mesa on pad.
Material stored within approved locations?	☑Yes ☐No	staging areas & mesas
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site.
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Minor veg (creosote) crushed at CMW2 & Baccess
Were access roads watered?	☑Yes ☐No	throughout day, tbd truck supporting drill rigs.
Site checked for biota prior to construction?	☑Yes ☐No	Also throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens observed throughout day
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day 0600	TP	concrete placing trailer	Continue w/ concrete support, setting trailer.	
"	"	Electricians	Running wire	
All day 0630	CMW2	Prosonic	Continue drilling @ CMW2	
All day	CMW3	WDC	Crew decon & set up at CMW3	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Well development taking place at east mesa. Ganda supporting all crews while I assist Robert H. with completion of wetlands delineation & jurisdictional tbDs mapping in the afternoon.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): JACQUELINE FINCK DATE: 1/19/05 START/END TIME: 550 / 1701

WEATHER: 80F, CLEAR, WIND<5

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	WDC DECONS EQUIP.
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☒Yes ☐No	MINOR TRASH PICKUP
Vegetation impacts w/in CE or outside?	☒Yes ☐No	REMOVED A CREOSOTE OFF EAST MESA
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☒ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
820	DECON	WDC DECONS EQUIP.		
925	CMW3	WDC STARTS DRILLING		
1027	TRENCH	CHECKED MW19 & LOWER STAGE AREA		
1058	CONSTRUCT. YARD	POUR CONCRETE, DIG + INSERT CONCRETE	BURROWS	
1400	ACCESS RD	GRADE RD		
1454	TRENCH	CHECK MW19		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 1/20/05 START/END TIME: 0600 - 1700

WEATHER: cloudy, cool, slight wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Made repairs at east mesa Also along rds, drill sites & treatment facility
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Crews, decon & washout in approved locations
Material stored within approved locations?	☑Yes ☐No	East/west mesas for drivers upper & lower areas @ treatment facility
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Minor litter picked up at east mesa
Vegetation impacts w/in CE or outside?	☐Yes ☑No	Impacts to veg (crushing) already documented.
Were access roads watered?	☑Yes ☐No	H2O truck also supporting drillers
Site checked for biota prior to construction?	☑Yes ☐No	Also throughout the day
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens flying by
Crew trained on biological minimization measures?	☑Yes ☐No	Trained new electrician, see attendance sheet.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	treatment plant	Electrical, concrete	Continue placing forms & running wire	
All day	CMW2	Prosonic	Continue drilling	
All day	CMW3	WDC	Continue drilling	
All day	Accessrd	Vaults	Placing vaults for electricians	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Bore pit completed at staging area for horizontal directional bore under HR66 at treatment facility.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): JACQUELINE FINCK DATE: 1/20/05 START/END TIME: 557 / 1706

WEATHER: 75F, MOSTLY CLOUDY, WIND <5

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	MINOR TRASH PICK UP
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	SIT-IN AS RAY ROMERO TRAINS IN 1 PERSON
Need to contact agencies? Describe.	☐Yes ☑No	

OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
700	HISTORIC 66 RD	INSERTING CONCRETE BOXES		
745	MW 19	CHECK TRENCH		
1102	LOWER STAGING AREA	CHECK TRENCH		
1240	MW 19	CHECK TRENCH		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 12/05 START/END TIME: 0600 – 1530

WEATHER: Cloudy, slight wind, cool, chance of rain

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Const silt fences at drill sites
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	No concrete pour today.
Material stored within approved locations?	☑Yes ☐No	Upper & lower staging areas & west/east mesas
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Minor housekeeping. Removing excess rebar offsite
Vegetation impacts w/in CE or outside?	☐Yes ☑No	Drill rigs set up
Were access roads watered?	☑Yes ☐No	H2O trk supporting drillers also.
Site checked for biota prior to construction?	☑Yes ☐No	checked throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven only
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Concrete Const.	Placing forms for next pour	
All day	CM2	Prosonic	Drilling well	
All day	CM3	WDC	Drilling well	
All day	TP	Electrical	Running wire/conduit, etc.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Double wide trailer was been put together, Control panels in trailer. Drill crews staying within staked boundaries. Straw wattles placed around drill rigs on top of plastic to absorb any excess water due to drilling. Continued well development of injection well at east mesa. Rolloff bins being vacuumed & allowed to dry out in preparation for removal off the site.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): JACQUELINE FINUC DATE: 1/21/05 START/END TIME: 555 / 1707

WEATHER: _____

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☑ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
705	MW19	CITEC TRENCH		
1331	MW19	CITEC TRENCH		
1430	EAST MESA	WDC SHUTS DOWN FOR REPAIRS		
			RAVENS (2), BATS	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): JACQUELINE FINCK DATE: 1/22/05 START/END TIME: 630 / 1725

WEATHER: 81°F, CLEAR, WIND=0

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☑ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
945	EAST MESA	PROSONIC SHUTS DOWN FOR REPAIRS		
1055	MW19, LOWER STAGE	CHECK TRENCHES		
1100	EAST MESA	PROSONIC + WOC FIXING EQUIP		
1330	MW19, LOWER MESA	CHECK TRENCHES		
1650	MW19, LOWER MESA	CHECK TRENCHES		
			BATS,	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __ sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): JACQUELINE FINCK DATE: 4/23/05 START/END TIME: 426 / 1550

WEATHER: 75°F, MOSTLY CLEAR, WIND ≤5

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☑Yes ☐No	1 LOGGERHEAD SHRIKE NEAR HISTORIC RD-66
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☑ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
720	MW19, LOWER STAGE	CHECK TRENCHES		
1300	MW19, LOWER STAGE	CHECK TRENCHES		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 1/24/05 START/END TIME: 0600 – 1700

WEATHER: Cloudy, slight breeze, warm later in day

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Along TP site, rds, & drill sites
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pour of ballards around electrical vaults
Material stored within approved locations?	☑Yes ☐No	Staging areas & east/west mesas
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Cleansite. Picked up excess slurry from rd.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	Throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens. Great blue heron observed by Jackie
Crew trained on biological minimization measures?	☑Yes ☐No	Jackie will train 2 new workers tomorrow.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Concrete	Placing forms for next pour	
Allday	east access	Ballards	Install ballards around electrical vaults	
Allday	far east mesa	WDC	Continue drilling @ CMW3	
Allday	"	Prosonic	Completed well (deep), setting monument @ CMW	
Allday	TP	Electrical	Electricians running wire.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Prosonic completed deep well at CMW2. They will decon	
	tomorrow. Electricians continue to run wire into	
	double wide trailer (control room). Received approvals from	
	agencies to mobilize to floodplain. Probably move down on	
	Tues or Weds. Prosonic will do wells in floodplain.	
	I will escort Prosonic & others to well sites.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): JACQUELINE FINCK DATE: 1/24/05 START/END TIME: 557/1645

WEATHER: 75°F, WINDS5, PARTLY CLOUDY

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	PROSONIC MOVES TO DECON AREA
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	CONSTRUCTION CLEANS STRAY CONCRETE ALONG HISTORIC RD-66
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
830	CONSTRUCT. PAD + HISTORIC 66	DIGGING TRENCH ON PAD & DIGGING HOLES		
910	CONSTRUCT PAD		CHECK OUT POSSIBLE SNAKE	
940	MW19	CHECK TRENCH		
1306				
1400				
1420	DECON AREA	PROSONIC MOVES TO DECON		
			2 RAVENS, 1 GREAT EGRET	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 1/25/05 START/END TIME: 0600 – 1700

WEATHER: Scattered clouds, cool, slight breeze

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP pads & drill sites
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete washout at const. staging area. Decon @ west mesa – Prosonic decon'ing today
Material stored within approved locations?	☑Yes ☐No	Upper & lower staging areas for const. East/west mesas for drillers.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Picked up a few pieces of trash at staging area
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Water truck also supporting WDC drilling.
Site checked for biota prior to construction?	☑Yes ☐No	Also, throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common ravens observed
Crew trained on biological minimization measures?	☑Yes ☐No	Jackie trained new workers – see attendance sheet
Need to contact agencies? Describe.	☐Yes ☑No	Cathy Wakefield onsite – spot check.

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	Far east mesa WDC	Drilling deep well	Drilling CMW 3 at mesa – deep well	
All day	Far east mesa Prosonic	Setting well deconing equip	Finished drilling CMW2. Deconing & will move to Topock pad tomorrow	
All day	TP	Concrete	Setting forms for next pour.	
All day	TP	Electrical	Pulling wire & setting electronics – control room	
	~~TP~~	~~Directional drill~~ Horizontal	~~Drilling hole for HDPE pipe going to well field~~	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	WDC & Prosonic finished day ~~shift~~ early. Departed site & prepping for tomorrow.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): JACQUELINE FINCK DATE: 1/25/05 START/END TIME: 555/1636

WEATHER: 78°F, MOSTLY CLEAR, WIND = 0

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	PRESONIC DECON'D
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	TRAINED 2 CONCRETE RPI
Need to contact agencies? Describe.	☐Yes ☑No	

☑ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
650	MW19	CHECK TRENCH		
1023	WEST MESA	CHECK DECON ACTIVITY		
1120	MW19	CHECK TRENCH		
1455	MW19	CHECK TRENCH		
			2 RAVENS	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 1/26/05 START/END TIME: 0600 - 1730

WEATHER: cloudy, raining, no wind, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP, rds, drill sites
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	No decon or concrete pour today. Decon at west mesa, washout at staging area.
Material stored within approved locations?	☑Yes ☐No	staging areas & west/east mesas
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Prep work for HDPE tie in at MW20 bench. minor veg removal & trimming @ MW20 bench.
Were access roads watered?	☐Yes ☑No	Raining
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	MW20 bench	Veg trimming & minor removal.	Prep for HDPE tie in w/ MW20 bench	
Allday	Far east mesa	Drilling	WDC finishing up CMW3.	
Allday	floodplain	Drilling	Prosonic set up at MW34	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Prosonic on stand by today. morning WDC in morning meeting to discuss well logistics. Informed w/ dont have all approvals to access floodplain yet. Prosonic mobilized to MW34 site in afternoon. Set up rig for drilling @ ~120 ft. ARB onsite to prep & fuse HDPE. ISCO onsite tomorrow morning.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): JACQUELINE FINCK DATE: 1/26/05 START/END TIME: 554/1821

WEATHER: RAIN, 69°F, WINDLS

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	CONCRETE WASHED OUT
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	MINOR TRASH
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	IT WAS RAINING ALL DAY
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☑ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
900	CONSTRUCTION PAD	POURING CONCRETE		
1020	CONSTRUCTION STAGING AREA	CONCRETE WASHOUT		
1500	MW19/PARK MOABI RD	EXCAVATING		
1551	MW19	CHECK TRENCH		
			2 RAVENS	

☑ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	NOTICING RAVENS AROUND PICKUP TRUCKS (TRASH INSIDE PICK UP, BUT NOT IN A CLOSED CONTAINER)	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 1/27/05 START/END TIME: 0600 – 1715

WEATHER: Cloudy, recent rain (overnight), cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	Prosonic drilling in Colorado River Floodplain
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	Around TP, rds & drill sites.
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	No decon or washout today.
Material stored within approved locations?	☑ Yes ☐ No	staging areas for const & mesas for drillers.
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	
Vegetation impacts w/in CE or outside?	☑ Yes ☐ No	Crushed creosote during excavation for HDPE.
Were access roads watered?	☐ Yes ☑ No	Rds very wet from recent rain
Site checked for biota prior to construction?	☑ Yes ☐ No	Also throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	Common raven, pigeons, grackles, coots at river.
Crew trained on biological minimization measures?	☑ Yes ☐ No	Jackie trained several new people - see attendance sheet
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	East access	HDPE fusing	ARB & ISCO onsite to tie-in & fuse HDPE. Crossing Park Moabi Rd. tomorrow	
Allday	TP	Concrete	stripping forms from yesterday's pour. Prep for next pour	
Allday	Floodplain	Prosonic drilling	Start drilling @ MW34 near Colorado River	
Yz day	Far east mesa	Drilling - WDC	Complete 1st well at CMW3. Depart site. WDC off for 4 days. Back on Tues.	
Allday	TP	Horizontal drill	Set up & drill under HR66 between TP & staging area	
Allday	east access	Electrical	Electricians setting up conduit	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Jackie trained surveyors (2), ISCO (1), Denbeste (1), & directional drillers.	
	Jackie will work full day today - last day today. Pierre will replace	
	her on Tues. I will cover const & Prosonic myself between Fri - Mon.	
	GANDA back onsite Tues. Coord w/ Mark H. w/ BLM. Provided	
	project update, rpting requirements, coord on misunderstanding	
	regarding CW6 mtg on desert tortoise breeding season.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): JACQUELINE FINCK DATE: 1/27/05 START/END TIME: 557 / 1650

WEATHER: MOSTLY CLOUDY, 77°F, WIND 5

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	1 CREOSOTE RUN OVER (w/ PERMISSION) @ PARK MOABI RD.
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	TRAINED 2 CONSTRUCTION, 3 DRILLERS, 2 SURVEYORS
Need to contact agencies? Describe.	☐Yes ☑No	

☑ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
900	CONSTRUCTION STAGING AREA	LAYING PIPE UNDER RTE 66		
950	MW19	WELDING		
1000	MW19/PARK MOABI RD	EXCAVATING		
1330	CONSTRUCTION STAGING AREA	CHECK ON PIPE LAYING		
1420	MW19/PARK MOABI RD	CONTINUE EXCAVATING		

☑ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	TRASH IN CLOSED CONTAINERS WAS ADDRESSED & CORRECTED	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 1/28/05 START/END TIME: 0800 – 1710

WEATHER: Some scattered clouds, no wind, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Prosonic drilling along Colorado River
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	TP, roads & drill sites
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Temp areas at staging area & west mesa
Material stored within approved locations?	☑Yes ☐No	Upper & lower east areas & west/east mesas for [illegible]
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site.
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Receiving pit for bore – creosote removed.
Were access roads watered?	☑Yes ☐No	Water truck onsite full time for project duration
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Ravens, great egret, coots
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	Pipeline ROW	Excavating	Cutting trench for tie-ins MW20 bench	
All day	TP	Horizontal bore	Bore under HWY 66 between TP & stage area	
All day	Floodplain	Drilling	Prosonic drilling MW34D.	
All day	TP	Concrete	Const forms for next pour	
All day	TP	Electrical	Electricians wiring Control Room	
All day	Pipeline ROW	HDPE fusing	ARB & ISCO onsite fusing pipe	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Prosonic picking up pump this morning. Traffic control at Park Moabi Rd during trench excavation for HDPE pipeline tie-in to MW20. Completed trenching across Park Moabi Rd. HDPE & conduit back filled & steel plated. Pipes are capped.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 12/1/05 START/END TIME: 0600 - 1630

WEATHER: Cloudy, chance of controlled rain (rained heavily last night), slight wind, cool temps.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Drilling in Colorado River Floodplain
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Plastic sheeting placed under drilling
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon at west mesa
Material stored within approved locations?	☑Yes ☐No	west mesa for Prosonic drilling ops
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site, trash taken out daily
Vegetation impacts w/in CE or outside?	☐Yes ☑No	Previously disturbed site - no veg removal
Were access roads watered?	☐Yes ☑No	No need for watering in flood plain - rained last night
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common raven, coots, pigeons, hummingbird
Crew trained on biological minimization measures?	☑Yes ☐No	All members trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	~~CW~~ MW 34D	Drilling	Completed drilling, set casing & thermisters,	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Completed drilling of ~~CW~~ MW 34D, Placed thermisters. Need to grout well tomorrow morning. Plan on mobilizing to SD-1 tomorrow also. WRC & const crews off over the weekend. Monitoring Prosonic at Colorado River Flood plain - CW34D. Need to complete all well installations by March 15, 05 per BLM. No additional veg removal at site. Area previously disturbed from other well installations @ MW34D. Area back bladed with bob cat to smooth out work area & access road.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Raymond DATE: 1/25/05 START/END TIME: 0600 – 1300

WEATHER: Clear, no wind, cool temps, recent rain

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Prosonic drilling in Colorado River Floodplain
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Plastic sheeting placed under drilling
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon site at west mesa.
Material stored within approved locations?	☑Yes ☐No	BLM approved laydown West mesa for Prosonic, bins at CLW35,
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	All trash picked up & disposed of daily.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No veg. removal needed at MW 34D.
Were access roads watered?	☐Yes ☑No	No watering in flood plain – recent rain
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven, pigeons & coots
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	MW34D	Drilling completion	Grout & set well. Moved to SO-1.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Completed MW34D & moved/set up at SO-1. Plan on drilling on Monday. Prosonic only crew working today.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 1/31/05 START/END TIME: 0800 – 1645

WEATHER: Clear, sunny, cool, low winds, recent rain over weekend. Winds strong later in day for most of the day.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Prosonic drilling in CR floodplain – March's decade
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP, along rds & at drillsites
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	Upper & lower const areas & west/east mesas
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Minor veg impact – broken branches when trenching MW20
Were access roads watered?	☑Yes ☐No	Partially – recent rain flooded some areas.
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Trained new ISCO pipeline fusing tech.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Concrete	Repairing for next pour. Placing rails & stairs	
Allday	TP	Electrical	Running wire at control room	
Allday	Park/Madrid East access	HDPE	Running/fusing pipeline toward MW20 beach	
Allday	Floodplain	Prosonic drilling	Crew set up & drilling @ SO-1 (aka MW42	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Garda & WDC travel day. Back onsite tomorrow. Well SO-1 has been newly assigned as MW 42D. Collect soil & H2O samples.	
	Const crew cutting trench from Park Madrid Rd to MW20 beach. AKS & ISCO pre-fabricating the HDPE pipe to drop into the trench.	
	Wildlife: Common raven, grackles, pigeons	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-804-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 2/1/05 START/END TIME: 0548 - 1710

WEATHER: Scattered clouds, cool temps, slight wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Prosonic drilling in Colorado River Floodplain
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP site, along rds, at drillsites.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon. @ west mesa. Wash-out at staging area
Material stored within approved locations?	☑Yes ☐No	staging areas & mesas.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Mnr during Prosonic drilling – Salsola
Were access roads watered?	☑Yes ☐No	water truck also supporting drillers.
Site checked for biota prior to construction?	☑Yes ☐No	Also throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	ravens, pigeons
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	far east mesa	WDC drilling	Moved to 2nd well at CMW3 & started drilli	
Allday	TP	Concrete/electric	Const. concrete forms & running wire	
Allday	MW20 Bench	HDPE/conduit	Running piping & conduit, finished cutting trer	
Allday	CE-floodplain	Prosonic drilling	Finishing #2D. Need for two addtl wells.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Ganda & WDC onsite today for 10day run. Prosonic will take 6 days off starting on Feb 3. Pierre w/ Ganda was trained and provided w/ site familarization by me.	
	wildlife – ravens, pigeons	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 2/2/05 START/END TIME: 0547 – 1710

WEATHER: Clear, sunny, strong wind gusts, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Arsonic working in CR flood plain, last day
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Const site, along rds & drill sites.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon at west mesa. washout at staging area.
Material stored within approved locations?	☑Yes ☐No	upper & lower staging areas & west/east mesas.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	workers keep site clean
Vegetation impacts w/in CE or outside?	☑Yes ☐No	transplanted palo verde tree – see below. Removed veg from MW27
Were access roads watered?	☑Yes ☐No	water truck also supporting drillers.
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven, coots, pigeons, grackles
Crew trained on biological minimization measures?	☑Yes ☐No	All crew have been trained. Ricore trained new WDC driller in afternoon.
Need to contact agencies? Describe.	☑Yes ☑No	Left msg for Mark H. (BLM) to coord on [illegible] concerns.

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	CP	Concrete Const.	Concrete pour today.	
All day	Park Moabi Rd	HDPE	Fab pipe, drop in trench & pad w/sand	
All day	"	electricians	Fab conduit & place in trench	
All day	Far east mesa	WDC drilling	Started shallow well (#2) at CMW3.	
All day	CR floodplain	Arsonic	setting monuments & pouring foundations.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
0700	Denise called Cathy (BLM) on this issue. Relocated transplanted small palo verde from MW20 bench exit	
0700	to eastern edge of MW20 bench. Trucks scrapping on	
	side of tree – cut back / trimmed tree, but trucks	
	scrapping trunk. Used large excavator to relocate tree.	
	Today is Arsonic's 24th day working straight. They will	
	take 6 days off & return to work on Feb 9th.	
0930	Cleared veg w/ front end loader @ MW27. Length = 127 ft. Width = 16 ft	
	Cut new access route to avoid several mesquite trees (~7). 95% arrowweed	
	5% salt cedar trees (~3 trees). Surveyed for nests – none observed. ~40% of arrowweed [illegible] removed from [illegible]. Coord w/ Mark Howell (BLM R.O.) on this action. Agreed w/ decision	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Pierre Fidenci DATE: 02/01/05 START/END TIME: 600 to 16:45

WEATHER: clear wind 10 - 25 mph

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☒No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☒No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☒Yes ☐No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	Wind 10 - 25 mph, sunny but cold not very suitable for most special status species
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☒ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
600-720	meeting safety	none	none	
720. 845	project sites	introduction for project activities	none	
845 945	drilling in mesa	drilling	none	
9:45. 11:45	construction area	filling, removing dirt	none	
11:45. 12:05	drilling in mesa	drilling	none	
12:35 - 16:45	drilling + construction site + mesa	drilling, filling + other	none	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Pierre Fidenci DATE: 02/02/05 START/END TIME: 6:00 16:35

WEATHER: clear wind 5 - 20 mph

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☒No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	William Zamow, WDC
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
6:00-6:15	construction site	meeting	none	
6:15-7:15	drilling mesa	drilling	none	
7:15-10:30	construction site	removing soil, faults construction	none	
10:35-12:05	drilling mesa	drilling	none	
12:30-16:35	construction site mesa	drilling filling constructed facility	none	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 2/3/05 START/END TIME: 0555 - 1700

WEATHER: Clear, sunny, moderate winds, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	Culverts @ BCW will be installed @ future date
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	Around TP, along rds, and drill sites
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	Decon for drillers @ west mesa, washout at staging area
Material stored within approved locations?	☑ Yes ☐ No	upper/lower staging areas, west least mesas
Fuel leaks/stray material/trash w/in the CE?	☑ Yes ☐ No	Minor trash picked up @ site.
Vegetation impacts w/in CE or outside?	☑ Yes ☐ No	minor veg (chaosebush) removed during trenching @ MW2
Were access roads watered?	☑ Yes ☐ No	throughout day, water truck supporting WDC drillers
Site checked for biota prior to construction?	☑ Yes ☐ No	Prior to work & throughout day.
Special status species observed onsite? Describe.	☑ Yes ☐ No	Northern harrier (♀) hunting along floodplain near BCW.
Crew trained on biological minimization measures?	☑ Yes ☐ No	All crew members are trained. Provided short brief for well developers on CMW4.
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP ~~Concrete~~	Concrete Const.	Stripping forms from yesterday's pour	
Allday	Park Moabi	HDPE Pipeline	Continue placing pipe & backfilling	
Allday	Forecast mesa	WDC drilling	Continue working on CMW3.	
Allday	CMW4	Well development	Trained crew of 2 on measures for working @ CMW4. Truck & trailer only in wash.	
Allday	Park Moabi	Electricians	Placing conduit above HDPE pipe & padding w/sand	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Prosonic left drill rig @ MW42. Completed all 3 wells at this location yesterday. No vegetation was removed at this site. Area was previously disturbed. They will move rig to MW 27 when they return on Feb 9. Veg removed @ MW27 yesterday. WDC will finish CMW3 today & mobilize to CMW2 tomorrow. ARB pressure testing double walled pipe w/ H_2O.	
	Wildlife: common raven, coot, pigeons, grackles, northern harrier, brush lizard, hummingbird, great egret	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Pierre Fidenci DATE: 02/03/05 START/END TIME: 600 to [redacted] 16:30

WEATHER: clear - Wind

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☒Yes ☐No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
600-615	construction site	meeting, none	none	
615-630	Construction site	none checking equip.	none	
630-830	Mesa	drilling	none	
830-900	Construction site	construction facilities, d	none	
1000-1100	mesa	drilling	none	
1100 1200	construction site	construction facilities	none	
1230-1630	construction site + mesa	drilling, construction facilities	none	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916
OBSERVER(S): [illegible] DATE: 2/4/05 START/END TIME: 0600 – 1500
WEATHER: Cool, sunny, slight wind, warm temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Also supporting WBC drivers throughout day.
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	Ravens
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	Cathy Wolfe w/ BLM onsite @ 1230

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	far east mesa	WBC drilling	Move from CMW3 to CMW2, start drilling	
Allday	TP	Concrete Electrical	Setting supports, tanks and running wire	
Allday	Bat-Modified HDPE pipeline		finish testing line. Backfilling trench	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Pierre Fidenca DATE: 02/04/05 START/END TIME: 600 - 1635

WEATHER: clear Wind S - 15 mph

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	N/A
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	N/A
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
600-615	construction site	meeting	none	
615-1200	mesa + construction site	drilling, sampling construction of facility	none	
1230-1635	mesa + construction site	drilling, sampling electrical work	none	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Pierre Fidencio DATE: 02/05/05 START/END TIME: ~~0700~~ 0615 - 1700

WEATHER: partly cloudy

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
615-1145	mesa	drilling	none	
12:15-1700	mesa	drilling	none	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831 Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Pierre Fidenci DATE: 02/06/05 START/END TIME: 620 - 1700

WEATHER: clear

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☒Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☐Yes ☑No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
620 - 1200	mesa	drilling	none	
1230 - 1700	mesa	drilling	none	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Pierre Fiderer DATE: 02/07/05 START/END TIME: 600 - [redacted]/1700

WEATHER: clear

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	crew trained in the morning (at 6 20)
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
600 620	Construction site	safety meeting	none	
620 - 1200	mesa + construction site	drilling, cleaning up testing electrical	none	
1230 - 1700	mesa + construction site	cleaning up, testing pumping well, electrical	none	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916
OBSERVER(S): [illegible] DATE: 2/8/05 START/END TIME: 0600 – 1640
WEATHER: Clear, sunny, slight wind, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At grading pts.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon @ west mesa. Wash out at staging area.
Material stored within approved locations?	☑Yes ☐No	Const staging area. Vehicles at lower lot.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Throughout day.
Site checked for biota prior to construction?	☑Yes ☐No	throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Ravens, pigeons
Crew trained on biological minimization measures?	☑Yes ☐No	Pierre trained new electrician
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	far east mesa	well development	Neil developing wells for WDC.	
Allday	Park Moabi	HDD	Tie-in & testing of pipe.	
Allday	TP	Const	Concrete forms & setting materials on pad.	
Allday	TP	Electrical	Pulling wire & working on control center.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	WDC completed wells & demobed site for Las Vegas. Prosonic will be back onsite tomorrow. GANDA will be on same schedule as Prosonic. WDC cleaning up site @ East Mesa. Neil w/ WDC developing last well. Pierre w/ GANDA will be onsite until Thurs. On Fri morning, Graham will fill in. Graham will monitor Prosonic on the floodplain.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Pierre Fidenci DATE: 02/08/05 START/END TIME: 600 - 16.30

WEATHER: clear

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	crew trained in early morning
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
600 - 620	Construction site	safety meeting	none	
620 - 1200	Mesa construction site	cleaning up, pumping, electrical work	none	
1230 - 1630	construction site	trenches, electrical work	none	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E Topock IM-3 Project
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 2/9/05 START/END TIME: 0550 – 1645

WEATHER: Clear, sunny, slight breeze, cool temps.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☒Yes ☐No	Preparing to install 6-48" culverts in BCW.
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	Around ~~TP~~ TP along roads
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	washout in staging area. Decon at W. mesa
Material stored within approved locations?	☒Yes ☐No	upper staging area. Lower for vehicles only.
Fuel leaks/stray material/trash w/in the CE?	☒Yes ☐No	minor trash pick up
Vegetation impacts w/in CE or outside?	☒Yes ☐No	minor veg impact while backfilling bore pits.
Were access roads watered?	☒Yes ☐No	throughout day
Site checked for biota prior to construction?	☒Yes ☐No	throughout day
Special status species observed onsite? Describe.	☐Yes ☒No	Common raven, brush lizard
Crew trained on biological minimization measures?	☒Yes ☐No	Trained new ~~[illegible]~~ operator
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	Staging area	HDPE & electrical	Tie-in lines at bore under HR66	
Morning ~~All day~~	TP	Electrical	City of Needles setting power poles	
All day	TP	Concrete Const.	Setting forms & braces for piping.	
All day	BCW	Culverts	start installing 6-48" culverts in BCW.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Pierre w/Garcia monitoring Prosonic in floodplain. They will mobilize to MW27 & start drilling. Veg removal complete & documented. Pierre will train two new personnel. Backfilled bore and 100 ft trench along HR66 for pipe & conduit running toward injection well field. Placed flares & culverts in BCW today. Today is first day of work installing culverts in BCW. I will provide fill calcs to Steve S. for CDFG 1600 Emergency Notification.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Steve Fidenci DATE: 02/08/05 START/END TIME: 615 - 1635

WEATHER: Clear

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	non native vegetation impacted. ~~[illegible]~~ No native vegetation was impacted
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☑Yes ☐No	
Crew trained on biological minimization measures?	☑Yes ☐No	crew trained in early morning
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
615-1200	~~[illegible]~~ flood plain	drilling	none	
1230-1635	flood plain	drilling	none	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

PG&E Topock [illegible]

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Piens Fidencio DATE: 02/10/05 START/END TIME: 615 - 1530

WEATHER: clear

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☒No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☐Yes ☒No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
615 - 1200	flood plain	drilling	none	
1230 - 1530	flood plain	drilling	none	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 2/10/05 START/END TIME: 0545-1650

WEATHER: Cloudy, slight breeze, cool temps, chance of rain

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Start @ ~200 yds³ of fill @ BCW. Installing 6-48" culverts in BCW. Brought in fill
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP & along rds. Added wattles to rd.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Reconfor drivers at west mesa. Concrete washout at staging area.
Material stored within approved locations?	☑Yes ☐No	Prosonic @ west Mesa. Const at upper staging area.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash pick up at site.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Watered throughout day & supporting ARB w/ pressure test of HDPE
Site checked for biota prior to construction?	☑Yes ☐No	Throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven
Crew trained on biological minimization measures?	☑Yes ☐No	All crew members trained @ const. site.
Need to contact agencies? Describe.	☐Yes ☑No	Cathy W w/ BLM onsite in morning

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Concrete Const.	Concrete forms & setting supports.	
Allday	BCW	Culverts	Installing 6-48" culverts in BCW.	
Allday	TP	HDPE pressure test	ARB testing pipe for leaks.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Pierre w/ Ganda monitoring Prosonic installing wells at MW27 on floodplain. Robert H. onsite to GPS disturbance from well installations & well locations. He will also photo document sites for report that will be submitted to BLM within 30 days of completion. Past few days, roll off tanks from mesas have been removed. Brought in ~200 yds³ of fill material & placed between & on top of culverts for access rd @ BCW. Additional fill needed. Coord. w/ Steves, on CDFG notification for CMW4 & FM-1 wells on floodplain.	

PG&E TOPOCK IM-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 2/11/05 START/END TIME: 0548 – 1600

WEATHER: Cloudy, raining all day, no wind, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Add'l 200 yds3 of fill over culverts @ BCW, placing additional road base on culverts in BCW.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP & along roads, reinforced along rds.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Prone west mesa, washout at const staging area
Material stored within approved locations?	☑Yes ☐No	Const staging area & west mesa for Parsons
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Site kept clean
Vegetation impacts w/in CE or outside?	☐Yes ☑No	Fill material in BCW, no addt'l veg removal/work
Were access roads watered?	☐Yes ☑No	Raining – water not released for day
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Raining all day. No activity observed.
Crew trained on biological minimization measures?	☑Yes ☐No	All const. crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	BCW	Culverts & rd.	Installed culverts & placing fill over culverts. Compacting road base w/ rollers & DS. Stan, King & Mike only ones working at const site today.	
Afternoon	HWY66	Road repairs	Repairs to rd – adding rd base to washed out areas.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Raining all day. Concrete const & Robinson electric not working due to rain. ARS completed work yesterday. Parsons continues drilling in floodplain. Evaluation w/ GSA/NOA monitoring Parsons. Parsons should complete MW27 today & possibly mobilize to CW-2. Awaiting permits from USFWS & Cal Trans for SD-2 well on HWY. Added another ~200 yds3 of fill to cover culverts & create a rd @ BCW.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.11.05 START/END TIME: 700 AM – 1500 (3 pm)

WEATHER: Heavy rain throughout day

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	rain
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☒Yes ☐No	flagged veg from previous surveys
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0900	Pumping Station	✓	2 ravens on flood plain hovering w/ harrier (north) observed over Co. river bank nearest I40	
1010	MW 27	well drilling		
1400	MW 30	mobilized to new site	Brought over equipment to next site. Not did not set up.	
1500	flood plain upriver MW30	✓	Canada geese	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #				Photo #
	great egret	rock doves	double-crested cormorant	
	verdin	loggerhead shrike	kestrel	
	Abert's towhee	Bewick's wren		
	Am. coot	Black-tailed gnatcatcher	coyote tracks	
	phainopepla	snowy egret		
	Amias hummingbird	gt.-tailed grackle		
	Black phoebe	turkey vulture		
	white pelican	greater roadrunner		

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.12.05 START/END TIME: 0630 - 1730

WEATHER: Mostly cloudy morning; partly cloudy afternoon

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	still wet from rain
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	MW30	Setting up new site	Open sandy area	
0900	new rd. to construction site	Checked ditches	Lots of rain has eroded road - straw waddles in bad shape in places. Check const. Site	
1200	"	"		
1330	MW30	Start drilling / core samples		
1430		Checked const. Offices		
1645		Checked ditches		
1715		Checked const. offices		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	western bluebird	
	raven	
	snowy egret	
	coopers hawk	
	American coot	
	wood rat	

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.13.05 START/END TIME: 0630-1695

WEATHER: morning and fog,

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	still wet from rain
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0645	plant rd, under const.	check ditches / office	possible opening in concrete @ pump station- check w/ Ray.	
0735	MW 33D	begin drilling/sampling	valley fog	
1150	Plant Rd.	check ditches / office	mostly sunny, clear	
1300	"	"		
1720			Done for day	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 2/14/05 START/END TIME: 0548 - 1715

WEATHER: Cloudy, recent rain, more rain expected, no wind, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Install extensions & duck bills on culverts in BCW.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	No concrete pour or decon today. Decon @ Westmesa. Washout @ staging area
Material stored within approved locations?	☑Yes ☐No	Westmesa - Prosonic. Staging area - const.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash pickup
Vegetation impacts w/in CE or outside?	☑Yes ☐No	minor veg crushing while setting vault near Park Moabi
Were access roads watered?	☐Yes ☑No	Site muddy due to recent rain.
Site checked for biota prior to construction?	☑Yes ☐No	Throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven, roadrunner
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Const.	Bldg concrete forms, installing supports	
Morning	HR66	Rd repair	Add road base to HR66 due to rains.	
All day	TP	Electrical	Running wire, wiring control room.	
Late Morning Afternoon	BCW	Install culverts	lengthen culverts & install duck bills.	
Afternoon	Park Moabi	Install vault	Installed large concrete vault for HDPE pipe	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Graham monitored Prosonic over the weekend. They will finish up well and depart site tomorrow night. They will be back on Monday. Driller's father is critically ill. Waiting on CalTrans & USFWS permits for SO-2 well. Crew installed large concrete vault near Park Moabi rd. for HDPE pipe. Palo verde in area was avoided.	

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.14.05 START/END TIME: 0630 - 1700

WEATHER: ~~Foggy~~ Cloudy, Cool in A.M.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	Still not enough — no dust
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0700	MW33D	drilling/sampling		
1000	/	/	looked at access routes w/Ray on wildlife refuge.	
1530		finished drill		
1400		done		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Crawford DATE: 2/15/05 START/END TIME: 0545 – 1700

WEATHER: Cloudy, chance of rain tonight, no wind, cool temps.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Recompacting road base around culverts. Extensions & backfills on culverts @ BCW
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & reinforced along HWY 66.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Bean for drillers @ West mesa, Wash out @ stage area
Material stored within approved locations?	☑Yes ☐No	Prosonic @ west mesa, Const across from TP.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Crew pretty good about not littering
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	Area still wet, Expect more rain tonight.
Site checked for biota prior to construction?	☑Yes ☐No	Also throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven
Crew trained on biological minimization measures?	☑Yes ☐No	Crew has been trained.
Need to contact agencies? Describe.	☐Yes ☑No	

❑ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	BCW	Install culverts	Place extensions & bkfills on culverts in BCW.	
Allday	~~Elec~~ TP	Electrical	running wire & control room.	
Allday	TP	Concrete	Placing forms & setting braces – mechanical	
Allday	Floodplain	Prosonic drilling	Completed MW33, Graham monitoring crew.	

❑ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Crew removing soil off of culverts & recompacting. Using tampers between culverts. Provide sieves. with disturbance calcs for floodplain wells. Also, provided calcs for estimated road base fill & riprap @ BCW. Currently 400 yds^3 of fill @ BCW. Estimate up to an additional 300 yds^3 of fill to complete road over culverts. Estimate ± 300 yds^3 of rip rap to armor banks & culverts. Today Prosonic completed MW 33. They took time off to wait on Cal Trans & USFWS permits to drill 50-2 on HWY. Back on Monday. Carla (Graham) als back on Monday.	

PG&E TOPOCK IMP-3 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.15.05 START/END TIME: 0630 ~ 1620

WEATHER: mostly cloudy / slight rain in late afternoon

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	rain
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	MW33D	checked equip.	/	
0715		started pulling in well.	/	
1015	checked wash const.	culverts	staying in disturbed areas only	
1420	"	"	"	
1440	MW33D	done setting well	site demob. & clean-up	
1610		done off site.	measured disturbance w/ Ray	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #

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Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Gail Romero DATE: 2/16/05 START/END TIME: 0550 - 1645

WEATHER: Foggy A.M. morning, clear by late morning, no wind, warm temps (70s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Recompact fill & prep for rip-rap
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP & along HR66
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Soon @ west mesa & wash out @ staging area.
Material stored within approved locations?	☑Yes ☐No	Plastic - west mesa. Const - top staging area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Minor litter pick-up.
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Transplanted smoke tree in BCW. Removed creosote at BCW.
Were access roads watered?	☑Yes ☐No	HR66 watered
Site checked for biota prior to construction?	☑Yes ☐No	Throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	western diamondback, common raven, brush lizard
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Concrete Const.	Placing forms & erecting supports.	
All day	BCW	Culverts	Recompact fill & prep for rip rap.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Plastic & Sands off today. Back on Monday. Could not dig out smoke tree because located above gas line. Placed sling around tree & pulled out w/ excavator. Transplanted north of culverts near 2 other smoke trees in BCW. Covered HDPE pipe that became exposed. Observed western diamondback rattlesnake at den entrance in BCW bank. Excavator, sm excavator, frontend loader & roller being worked in BCW. Sheeps foot & D5 dozer will be removed from jobsite - no further need for this equip.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 2/17/05 START/END TIME: 0550-1640

WEATHER: Cloudy, chance of rain, slight winds, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	Additional 100 yds3 of fill. Brought in 85 tons of rock @ BCW
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Sloping road surface over culverts @ BCW. Placing geo-textile fabric & rocks for riprap @ BC
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along HR 66 road shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon @ west mesa for Prosonic. Washout @ stage area
Material stored within approved locations?	☑Yes ☐No	Staging area, west mesa & some pipe @ MW20 bend
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Picked up H2O bottles - minor
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Beaver tail cactus that was marked was crushed. Little watering due to expected rain near vault 4.
Were access roads watered?	☑Yes ☐No	Little watering due to expected rain
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven
Crew trained on biological minimization measures?	☑Yes ☐No	All crew have been trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Concrete Const	Placing forms & supports	
Allday	TP	Electrical	Running wire into control room.	
Allday	BCW	Culverts	Placing geotextile fabric & rock for riprap	
Allday	Park Moabi	HDPE fusing	Tie-in at Vault 4. Two fuses needed.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	TSCO onsite today to make tie in @ vault 4 near Park Moabi Rd. Once completed, Robinson electric will place conduit in place for electrical. Once everything is in the trench, the trench will be backfilled. Additional materials/equip brought in to be placed @ TP. Completed tie-in of HDPE & conduit into Vault 4. Plan on backfilling tomorrow. Showed Denbeste, Phil & Duane area @ SO-2 that needed to be cleared of veg on HNWR. Possibly clear area next week of veg.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 2/18/05 START/END TIME: 0555 – 1500 rain

WEATHER: Cloudy, chance of rain, rained last night, no wind, cool temps started raining @ ~11am.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	~~85 tons of rock placed @ BCW. 4 truck loads~~ Additional rock to riprap around culverts @ BCW
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP and along HR66.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon @ west mesa. Washout @ staging area.
Material stored within approved locations?	☑Yes ☐No	Approx. 2 bins/day being removed from east mesa Const staging area & west mesa for materials.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Minor trash pickup on site.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	Little water. Anticipate more rain today.
Site checked for biota prior to construction?	☑Yes ☐No	Before and throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	2 Greater roadrunner in BCW. Common rowen
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Halfday rain ~~Allday~~	TP	Concrete Const.	Bldg forms, erecting braces/equip	
Allday	BCW	Culverts	Placed add'l fabric & rock in BCW along culvert	
Allday	Park Moabi Rd	Backfill trench	Complete tie-in @ vault 4 & backfill trench	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Another 85 tons of rock delivered from Blythe. Four ten wheelers each day. Spoke to Phil & Jay again about clearing area for SO-2 on HNWR. Awaiting Cal Trans permit. Started raining 6-4 lunch. Concrete Constructors, Inc. departed site. Water flowing in washes including BCW.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.21.05 START/END TIME: 0845 - 1730

WEATHER: overcast / light rain

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	rain
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0900	MW33D	On-site - working on equipment	trained new personnel. Developing well.	
1030	SO 20	walked new well access w/ Ray	Looked for native plants, outlined route for drill rig ROW. 12' access rd; 40 ft. circ. work area.	
1430	MW33	Developing well / prepping for new well.	Cleaned up grout spilled from cleaning Bobcat tracks, Dumped in bin.	
1540	MW33	Drilling new well	- Fresh water lsand coming up from D configured H2O / added bentonite chips to well.	
1620	"	still trying to stop H2O seepage from D		
1645	"	adding more clips to hold	-- Dog well cut to ~3 ft.	
1650	"	Resume drilling	-Still leaking. Put in pump to waste tank to drain.	
1720	"	Stop @ 97'		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: sheet(s) used)

Bio-Measure #		Photo #
	gave training to 3 new CH2MHill employees. Allen Erickson, Thomas Lee, Joe Sandell	
	Aberts towhee	
	White pelicans	
	common ravens	
	Anna's hummingbird	
	American coot	
	Turkey buzzards vulture	
	Dbl crested cormorants	
	rock dove	
	violet green swallow	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 2/22/05 START/END TIME: 0555 – 1645

WEATHER: Cloudy, chance of rain (rain last night), no wind, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	Drilling in Colorado floodplain.
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	At TP & along HR66.
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	Decon @ west mesa & washout @ staging area.
Material stored within approved locations?	☑ Yes ☐ No	Material @ west mesa (Prosonic), Const staging area
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	Some house keeping performed by crews.
Vegetation impacts w/in CE or outside?	☑ Yes ☐ No	Veg removal @ SO-2 well on floodplain.
Were access roads watered?	☑ Yes ☐ No	Partially, Expect rain.
Site checked for biota prior to construction?	☑ Yes ☐ No	Throughout day.
Special status species observed onsite? Describe.	☐ Yes ☑ No	American coot, Turkey vulture Common raven, grackle, Anna's hummingbird
Crew trained on biological minimization measures?	☑ Yes ☐ No	All crew trained.
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Concrete Const.	Mechanical work, setting equip	
Allday	East access rd.	Grader	Road base & grading on eastern access rd.	
Allday	SO-2	Veg removal	Cleared veg to drill SO-2 under I-40 bridge	
Allday	MW33M	Well installation	Complete well, Plan to mobilize to SO-2 in morning	
1/2 day	Park Mobile Rd	Open trench & concrete	Reopened trench & placed red concrete over conduit	
Allday	East access rd.	Bollards	Set, clean & prep bollards for paint	
Allday	~~[illegible]~~ "	Electrical	Running wire through vaults to control room	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Provided Steve S. final calcs on BCW fill & rock materials. He will incorporate into Emergency Notification package for CDFG. Coord w/ Phil, Jay & others on status of SO-2 veg removal. All veg removed & chipped today. Drill crew will mobilize to SO-2 in morning. Additional roll off bins removed from east mesa. Several loads of road base placed on eastern access road. Old wattles along downslope of eastern access road will be removed & replaced w/ new ones. Four rolloff bins & one frac tank left on East Mesa.	

PG&E Topock IM-3 Project

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.22.05 START/END TIME: 0630 – 1630

WEATHER: overcast / rain

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☒Yes ☐No	Cut new road to SO2 on approved ROW. No wildlife seen.
Were access roads watered?	☐Yes ☒No	rain
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	MW33	safety mtg - set up for day		
0720	SO2	cutting crew arrived - set up to clear access rd.		
0755	SO2	start cutting/chipping - staked ROW to minimize cutting		
1215	SO2	cutting drill pad area. No animals seen in area.		
1400	SO2	Danzel checked out cleared area + okay'd size. crew should finish today w/some branches to chip tomorrow.		
1450	SO2	Done cutting + chipping.		
1530	MW3	Demolition, back-blading. moved to new site @ 1620		
1630		Done for day.		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #			Photo #
	dbl crested cormorants	Veg removed for SO2:	
	gt tailed grackle	95% Salt cedar	
	rock doves	4.5% arrow weed	
	ravens		
	coots	0.5% baccharis	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 2/23/05 START/END TIME: 0550 - 1645

WEATHER: Cloudy, chance of rain (rain last night), no wind, cool temps.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Some additional rock placed in BCW (~20+ tons)
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along HR66.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon @ west mesa. Washout @ staging area.
Material stored within approved locations?	☑Yes ☐No	Prosonic @ west mesa. Const across from TP.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	Heavy rainfall last night. Add roadbase for repairs.
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common rowen
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	BLM onsite today. Discuss colors of TP. Minimize visual effect

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	Access rd	Road base	Laying out roadbase along access road	
Allday	TP	Mechanical	Installing braces & mechanical equip.	
Allday	TP	Electrical	Running wire through vaults & at control room	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Drivers started 1st well @ 50-2. Graham monitoring drivers. Very wet/muddy conditions @ flood plain.	

PG&E TOPOCK IM-01 PROJECT

Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.23.05 START/END TIME: 0640 – 1730

WEATHER: Overcast / rain

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	Rain
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0645	SO-2	Setting up for drilling @ new pad.		
0840	Plant site	checked on road/ plant construction area.	Heavy rain – limited activity Checked decon station.	
0930	SO-2	Road getting very muddy – may need road base applied.	Heavy rain.	
	SO-2 – MW 43			
1100	Plant rd.	Checking access rd. Adding gravel + grading.		
1320 1415	SO-2 / MW43 Plant rd.	still drilling/sampling, working on culverts.		
1540 1720	SO-2 SO-2	Hit bedrock. H2O sampling Done for day.	Did not have key to lock gate; dummy – locked it.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: ___ sheet(s) used)

Bio-Measure #		Photo #
	• cotton tail rabbit • rock doves	
	• ravens	
	• mourning doves	
	• Canada geese	
	• coots	
	• wh. pelicans	
	• turkey vulture	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 2/24/05 START/END TIME: 0553 – 1700
WEATHER: Clear skies (rain last night), no wind, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	No work @ BCW today.
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	At TP & along HR66
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	Decon @ west mesa, washout @ staging area
Material stored within approved locations?	☑ Yes ☐ No	Const. staging area & west mesa for Prosonic
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	Clean site.
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	Graded east access rd. No veg removal.
Were access roads watered?	☐ Yes ☑ No	Rain most of week. No need to H2O roads.
Site checked for biota prior to construction?	☑ Yes ☐ No	Prior to & throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	Relocated [illegible] from stage area to BCW. Mark w/ BLM helped relocate snake. Common raven.
Crew trained on biological minimization measures?	☑ Yes ☐ No	All crew trained.
Need to contact agencies? Describe.	☐ Yes ☑ No	BLM & DTSC onsite today. Looked @ extraction well sites.

❑ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	East access	Rd base & grading	Improving East access rd. Will become primary access	
All day	TP	CCI – Mechanical	Placing equip, braces, etc. @ TP.	
All day	TP	Electrical	Running wire @ Control Room	
All day	SO-2	Well installation	Prosonic installing well @ SO-2 on HNWR	

❑ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Graham monitoring Prosonic drilling wells @ SO-2 located on HNWR. I escorted BLM to proposed extraction well locations on floodplain in the afternoon. Denbeste (?) continuing to remove roll-off bins from east mesa. Removing last remaining bins. Frac tank will be the last to go. Smoothing out ruts caused by bin removal. Also showed BLM SO-2 drill site & drill equip.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.24.05 START/END TIME: 0630 – 1700

WEATHER: clear, 60's

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☒No	~~rain still [illegible]~~ in afternoon
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	SO-2	opened gate @ staging area.	checked equip't @ site. Starting to grout well etc. Crew developing MW 33. this a.m.	
1200	Access rd.	on hill monitoring wiring crews		
1330	Bat Cave Wash culverts	some heavy equip. being moved.		
1410	@SO2	crew snagged well pipe + accidentally pulled it up a bit. Working on re-positioning it.		
1540	Access rd.	checking construction crews.		
1640	SO-2	done w/ drilling 1st well.		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Abert's towhee	
	coyote tracks	
	Am. coots	
	raven	
	rock dones	
	Clark's grebe	
	~~Anna's hummingbird~~	
	gt. tailed grackle	
	blk-tailed gnatcatcher	
	Am. white pelican	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.25.05 START/END TIME: 0630 - 1630

WEATHER: clear

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	some arrow weed crushed @ SO-2.
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	? w. diamond back @ const. staging area.
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	OS-2	setting up for next wells	went over road use / backblading items w/ crew.	
0830	PE-1		looked @ extraction site w/ Ray. Briefed drill crew.	
1200	Access Rd.	checking construction	no activity	
1420		moving drill rig	to decon on W. mesa.	
1520	PE 1, 1A, 1B	Photographing PE 1, 1A, 1B		
1540	staging pad	w. diamond back snake @ staging area. Let it leave on its own. No more work activity over weekend. ~8 rattle buds		
1630	Decon pad	W. mesa. Equip. staging put til morning. Done for day.		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: ___ sheet(s) used)

Bio-Measure #			Photo #
	Abert's towhee		
	coots	kestrel nest on RR bridge b/w 2nd & 3rd trestle	
	rock doves	from west side, south aspect of bridge. Observed 2	
	turkey vultures	adult.	
	raven		
	gt. tailed grackle		
	fox tracks		
	w. diamondback snake		

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): RROMERO DATE: 2/26/05 START/END TIME: 0553 - 1530

WEATHER: Clear, sunny, no wind, warm temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	Need BLM & DTSC approvals for PE 1

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Concrete pour	Four large pads @ TP	
All day	IM3 & IM1	Vac bins	Remove waste H2O from bins	
All day	IM3	Electrical	Run wire @ Park Moabi Rd.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Canada monitoring Prosonic @ SO-2. Completed SO-2. Ran to mobilize & start drilling @ PE 1 this weekend.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.26.05 START/END TIME: 0830 - 1700

WEATHER: Clear

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	(on flood plains)
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	decon pad	waiting for crew.	Noted drill pipe ends not covered.	
0830	MW33	drill crew setting	monuments - waiting to mob. to PE1	
0900		met w/ Jay - have	added core sampling @ PEA + B.	
1030	decon pad	Mobilize to PE1B	covered garbage bin - not tarped.	
1105	@ PE1B	set-up for PE1B - no	well planned.	
1145	PE1	Looked over dump material w/ Bruce	Not culturally significant.	
1330	PE1B	core drilling.		
1500	Const site	check ~~[illegible]~~ treatment plant area.		
1650	PE1B	Done drilling / H_2O sampling for day.		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	~~Abert's to~~ Western banded gecko - decon w. mesa . Gamble's quail @ campground	
	coyote tracks near PE1	
	coot	
	wh. pelicans	
	raven	
	rock doves	
	Abert's towhee	
	Anna's hummingbird	
	Verdin	
	N. rough-winged swallow	
	cottontail rabbit	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.27.05 START/END TIME: 0700-1700

WEATHER: Clear

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	Sand
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0700	PE-1B	prep for day.	Sampling H2O + substrate	
1000	processing plant	none	checked for snakes, general security check. w/ diamondback & straw bales	
1340	PE1B	done w/well	moved rig to PE1B	
1540	PE1A	Moving to PE1A	Decond pipes and moved to new well site	
1630		Begin drilling PE1A / water sampling		
1730	PE1A	done for day		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Wh. Pelican in crow	
	rock doves	
	ravens	
	coots	
	blue-gray gnatcatcher	
	fox tracks	
	coyote tracks	
	blk. tailed gnatcatcher	
	N. rough-winged swallows	
	~~turkey vultures~~	
	W. diamondback rattlesnake	
	N. mockingbird	
	A. kestrel	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Reynolds DATE: 2/28/05 START/END TIME: 0550 - 1640

WEATHER: Clear, sunny, no rain, no wind, warm temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☑Yes ☐No	Placing addt'l rock @ BCW.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP & along HRBB.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Dean @ west mesa & washout @ staging area.
Material stored within approved locations?	☑Yes ☐No	West mesa for Atomic Coast staging area.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean site.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	Compacting road w/ roller.
Were access roads watered?	☑Yes ☐No	Throughout day & rolled.
Site checked for biota prior to construction?	☑Yes ☐No	Throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Two diamondbacks. Relocated 1 from stage area. Common raven, brush lizard, pigeons, Gambels quail
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Concrete Coast, Inc	Stripping forms from pour on Fri, Setting equip.	
All day	East access	"	Dressing area around vaults.	
All day	"	"	Watering & rolling (compacting) rd.	
All day	" & TP	Robinson Electric	Running wire thru vaults & control room.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Atomic completed test bore @ PE 1B. Working on test bore @ PE 1A. Plan to complete today. Mobilize to PE 1 to install extraction well soon. GAMA monitoring drillers relocated a large (3.5' w/ w 14 buttons) western diamondback rattlesnake from hay bales at staging area. Again, informed Denbeste, CH & PG&E personnel that we have created habitat for snakes. Should remove or relocate straw wattles & bales to eliminate this concern. Another rattlesnake observed & monitored at den located in bank @ BCW.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 2.28.05 START/END TIME: 0650 – 1630

WEATHER: Clear

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☐Yes ☒No	Sand
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	PE-1A		Checked equip for wildlife -	
0730			Measured disturbance @ 50-2 w/ Ray	
0900	PE1	Went over location w/ Densal for PE1.		
0930	Staging pad @ treatment plant. Called Ray to	Found w. diamondback @ water again. advise → he's coming	to relocate. Relocated across highway. 1020	
1450	"	checking for snakes - none @ bales		
1520	PE1A	done, breaking down site to mob. to next.		
1540	mob to PE1			
1700	PE1	prepping drill pad.		
1730	"	Done setting up rig.		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Am. kestrel	
	rock doves	
	ravens	
	wh. pelican	
	turkey vulture	
	Gambel's quail	
	Abert's towhee	
	w. diamondback	
	sagebrush lizard	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Jay Romero DATE: 3/1/05 START/END TIME: 0555 – 1740

WEATHER: Clear, sunny, dorain, no wind, warm temps.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	BCW fully armored w/ rock.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & HR66.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	Staging area & west mesa
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash pickup
Vegetation impacts w/in CE or outside?	☐Yes ☑No	None at const site. Some crushed weed debris Graham documenting veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common raven, brush lizard, dead coachwhip on road, cottontail rabbit, Gambels quail
Crew trained on biological minimization measures?	☑Yes ☐No	trained new Robinson Electric employee.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Concrete Const.	Prepping for next pour & setting equip.	
Allday	TP	Robinson Electric	running wire @ control room & vaults.	
Allday	TP	Tanks	Confined space entry – coating inside tanks.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Prosonic completed PE-1, extraction well on floodplain. Drilling completed. They need to set monuments and place concrete foundations. Liberco inspecting wells on floodplain. Sanda (Graham) monitoring activities. Coord w/ Jay & Matt in field on PE-1A & 1B. Also conveyance pipeline from PE-1 to MW20 bench. Prosonic will demob from site at the end of this week.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 3.1.05 START/END TIME: 0630 – [illegible]

WEATHER: Clear, smog

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	PE-1	Prepping to drill	Checked equip for wildlife. Some equip't downtime.	
0900	"	Start drilling		
1100	treatment plant	checked site. No machinery being used. No snakes		
1410	"	"	All activity in staging area.	
1515	PE-1			
1550	"	hit bedrock		
1700	"	done for day. Reached TD		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	rock doves	
	coyote tracks	
	Sagebrush lizard	
	Abert's tomtee	
	coots	
	California whiptail	
	W. rough-winged swallows	
	Anna's hummingbird	
	Raven	
	W. pelicans	
	Coachwhip snake killed on 66 by river	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 3/2/05 START/END TIME: 0550 – 1710

WEATHER: Clear, sunny, no rain, no wind, warm temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Work at BAW complete. Excavator taken offsite.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP & along rds.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon @ west mesa & washout @ stage area
Material stored within approved locations?	☑Yes ☐No	Const. stage area.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Crew keeping site clean.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	Veg impacts w/driving recorded by EA/WA.
Were access roads watered?	☑Yes ☐No	Throughout day to compact road & reduce PM10
Site checked for biota prior to construction?	☑Yes ☐No	Throughout day, keep eye on staging area due to snakes.
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven, brush lizards, cottontail rabbit, pigeons
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	Spoke briefly w/ Mark Hall BLM. Provide status report

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Concrete Const.	Concrete forms & setting mechanical equip.	
All day	TP	Robinson Elect.	Running wire @ control room & vaults.	
All day	TP	Confined space	Working in tanks – coating paddles.	
All day	Eastaccess	Bollards	Setting bollards. Prep for concrete tomorrow	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Process continuous work @ AE1. Broke down @ ~1200. went to Phoenix to get parts. In meantime, developing SD-2 while waiting for parts. Plan to start back up tomorrow morning. EA/WA monitoring activities. Today is Carla's last day. I will cover monitoring of const. & last remaining days of drilling @ AE1. Drillers should be completed by end of this week.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Graham Neale DATE: 3.2.05 START/END TIME: 0630 - 1630

WEATHER: partly cloudy

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☒Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☒No	
Were silt fences or other means of sediment control employed near washes?	☒Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☒Yes ☐No	
Material stored within approved locations?	☒Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☒No	
Vegetation impacts w/in CE or outside?	☐Yes ☒No	
Were access roads watered?	☒Yes ☐No	
Site checked for biota prior to construction?	☒Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☒No	
Crew trained on biological minimization measures?	☒Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☒No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0630	PE-1	Checked equip + site for wildelife.		
1050	treatm't plant	Checked site for machinery work, snakes.	w. diamondback @ den. Distinctive, bright cottontail rabbit w/ ½ stripe	
1220	"	Snake still there.		
1330	PE1	Food left out on table - grackles eating it. Warned crew earlier about keeping food contained		
1420	treat't plant	Duct-taped plastic over pipe ends. W.D. rattler @ still @ den		
1500	MW43	with dewt crew; Found cottontail tail.		
1630		Done for day		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	rock doves	
	raven	
	turkey vulture	
	Anna's hummingbird	
	wh. pelican	
	Abert's towhee	
	Verdin	
	w. diamondback	
	house finch	
	coots	
	kn. kestrel	
	C. grackles	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 3/3/05 START/END TIME 0553-1810

WEATHER: Clear, sunny, no wind, warm temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Prosonic drilling @ PE-1 in floodplain
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pour @ TP & Bollards. Washout @ stage area
Material stored within approved locations?	☑Yes ☐No	Prosonic @ West mesa. Const @ staging area.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Minor trash pickup
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Minor veg impact at drill site PE-1, crushed ox
Were access roads watered?	☑Yes ☐No	Water throughout day. Supporting drill crew
Site checked for biota prior to construction?	☑Yes ☐No	Throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	grackles, common raven, coot, brush lizard, brewers blackbirds, W. diamondback @ RCW
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Concrete Const.	Concrete pour @ TP & bollards	
All day	TP	Tanks.	Coating paddles in tanks. Confined space entry.	
All day	TP	Robinson Electric	Running wire in Control room & Vaults.	
All day	PE 1	Prosonic	Continue setting extraction well @ PE 1 in floodplain	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Prosonic will work this weekend. They have training next week & will return March 14 to demob & clean up. They plan on removing materials & equip from flood plain on Sat before they depart.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Romero DATE: 3/4/05 START/END TIME: 0550 – 1730

WEATHER: Cloudy, chance of rain, no wind, warm temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	Drosic working in floodplain.
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	Plastic under drilling, wattles along TP's rds.
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	Decon west mesa. Washout @ staging area
Material stored within approved locations?	☑ Yes ☐ No	West mesa – Drosic. Const @ staging area.
Fuel leaks/stray material/trash w/in the CE?	☑ Yes ☐ No	Minor trash pickup
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	Veg previously crushed at PE-1. No veg removal @ const site
Were access roads watered?	☑ Yes ☐ No	Throughout day
Site checked for biota prior to construction?	☑ Yes ☐ No	Throughout day.
Special status species observed onsite? Describe.	☐ Yes ☑ No	Common raven, grackles, rock doves, brush lizard
Crew trained on biological minimization measures?	☑ Yes ☐ No	All crew trained
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Concrete Const	Forming forms & setting mechanical equip.	
All day	TP	Tanks	Coating paddles in tanks – confined space.	
All day	PE-1 & 2	Drosic	Developing wells.	
All day	TP	Johnson electric	Running wire @ Control room & vaults	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Drosic will finish work on wells today & tomorrow. Plan to remove rig & materials from floodplain tomorrow. Start cleanup & removal of tracks, back drag bucket & drag chain link to level out area & remove tracks tomorrow.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 3/5/05 START/END TIME: 725 - 1840

WEATHER: Cloudy, chance of rain, no wind, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Prosonic working in Colorado River floodplain
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Plastic under drill rig
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Prosonic decon @ west mesa
Material stored within approved locations?	☑Yes ☐No	west mesa staging area for Prosonic materials,
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	onsite.
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Crushing of arrowweed during drilling ops.
Were access roads watered?	☐Yes ☑No	Its water needed. Sandy dunes, unable to access.
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	Kit foxes, gnatcatchers, coots,
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	RE 1	Extraction well	Complete extraction well, cleanup site, demob equip from floodplain.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Prosonic working on Saturday (today) to complete RE 1, cleanup area & demob from floodplain. They will be offsite next week attending training. They will return after training to complete demob from site & clean up. IM-3 const. does not work on weekends.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916
OBSERVER(S): [illegible] DATE: 3/7/05 START/END TIME: 0547-1700
WEATHER: Clear, sunny, a.m. wind, warm temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	BAU complete, Bronic off this week.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around const site & along dirt road shoulders.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon @ west mesa. Washout is almost full @ stage area
Material stored within approved locations?	☑Yes ☐No	Bronic @ west mesa. Const @ staging area.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Minor trash pickup
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts.
Were access roads watered?	☐Yes ☑No	Informed H2O truck released. No more watering today
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common raven, grackles, rock doves, brush lizard
Crew trained on biological minimization measures?	☑Yes ☐No	New crew - G&W Const. Building erectors briefed
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Robinson Electric	Installing wire, boxes, etc. @ TP	
"	"	Denbeste	Vac off tanks for dried crew	
"	"	Concrete Const Inc.	Install equip - mechanical work	
"	"	G&W Builders	Erecting building walls, etc. Supports erected	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Duane B. gave H&S briefing this morning. Bronic drivers off this week. Removed all equip & materials from floodplain & placed at west mesa with exception of Bobcat. Bronic will be back onsite on 3/14/05 to remove tracks, etc. on floodplain. Denbeste vac off roll off bins @ MW35 & SD-2 on HNWR. Preparing to remove bins. Truck vac off water from frac tank @ East Mesa.	
	common raven, grackles, rock doves, brush lizard,	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 3/8/05 START/END TIME: 0553 – 1730

WEATHER: Clear, sunny, no wind, warm temps (80's in afternoon)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	BCW complete. Floodplain wells complete.
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	Around TP & along rd. shoulders.
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	Decon @ west mesa. Washout @ staging area.
Material stored within approved locations?	☑ Yes ☐ No	Prosonic @ west mesa. Const @ staging area
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	Clean site
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	No new veg. impacts.
Were access roads watered?	☐ Yes ☑ No	Water truck removed from site.
Site checked for biota prior to construction?	☑ Yes ☐ No	Throughout day.
Special status species observed onsite? Describe.	☐ Yes ☑ No	See common species list below.
Crew trained on biological minimization measures?	☑ Yes ☐ No	All crew trained.
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Denbeste	Demob equip to Las Vegas	
"	"	Robinson Electric	Placing trays & running wire	
"	"	G&W	Placing bldg wall supports	
"	"	Concrete Const.	Mechanical / concrete work.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Conf call w/ Terri & Steve to discuss call scheduled	
	tomorrow w/ Yvonne. Observed two western diamondback	
	rattlesnakes copulating @ den located @ BCW. Robert H.	
	& I completed documentation (photos, GPS, etc.) of floodplain	
	wells for the ~~docu~~ disturbance report. GANDA will submit	
	proposal this week for APE surveys. Producing work plan for	
	APE & annual surveys.	
	Common raven, grackles, cottontail rabbits, western diamondback	
	rattlesnakes, rock doves, brush lizards	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 3/9/05 START/END TIME: 0555 - 1710

WEATHER: Clear, sunny, slight wind, warm temps (80s in afternoon)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	BCW & floodplain wells completed.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around const. site & along road shoulders.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon @ west mesa, washout @ const staging area.
Material stored within approved locations?	☑Yes ☐No	Const. staging area.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash pick up
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg. impacts.
Were access roads watered?	☐Yes ☑No	H2O truck removed from site.
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	See common species list below.
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained @ TP. Trained 10 Ctt & Strongarm staff
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Demolition	Removing frac tank from East Mesa	Mechanical work.
Allday	TP	Robinson Electric	Wiring, racks, control room	
Allday	TP	Concrete Const Inc	Mechanical work, Installation @ TP.	
Allday	TP	G&W	Erecting bldg supports.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Conf call w/ Yvonne to discuss status of biology @ site (10-12pm). Rob Knutson (PG&E Biologist) was escorted around project site. Discussed permitting being performed by PG&E, Robis monitoring Mears who is performing pipe patching near Compressor station. Trained 10 Ctt & strongarm staff, 4 new & 6 retrained for annual refresher. See attendance sheet. Training @ ~0800.	
	Common raven, grackles, Brewers blackbird, western diamondback @ BCW dam, Gambel's quail, rock doves, cottontail rabbits, brush lizard	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 3/10/05 START/END TIME: 0555 – 1645

WEATHER: Clear, sunny, no wind, warm temps (upper 80s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Work @ BCW & flood plain complete.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & road shoulders.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon @ west mesa & washout @ const staging area
Material stored within approved locations?	☑Yes ☐No	Phoenix @ west mesa. Const @ staging area.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Minor oil leaks from fork lifts
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg. impacts.
Were access roads watered?	☐Yes ☑No	Water truck released from site.
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	See species list below
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	Completed work plan for AVE survey, submit to agencies

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Concrete Const	Mechanical work. Asphalt patch	
Allday	TP	Robinson Electric	Running wire @ control room.	
Allday	TP	S&W	Installing Bldg supports.	
Allday	TP	Benbaste	Mechanical work.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCT completed asphalt patch at HDPE pipeline & conduit crossing at Park Moabi Rd. Painted bollards yesterday & today around vaults. Roll off bins @ MW35 & SO-2 have been removed. Completed work plan for agencies, sent to internal CH for review. EMP crew cut all well sampling wells.	
	Common raven, grackles, brush lizard, diamondback @ BCW den	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916
OBSERVER(S): [illegible] DATE: 3/11/05 START/END TIME: 0600 – 1615
WEATHER: Clear, sunny, windy, warm temps (70's)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	washes & flood plain work complete
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Along TP & along road shoulders.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Wash out full & needs to be dumped. Done next week & washout at stage area.
Material stored within approved locations?	☑Yes ☐No	Coast stage area & TP.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor oil leaks. minor trash pickup.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts.
Were access roads watered?	☐Yes ☑No	water trk released from project site.
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	1st weekly status report sent out to [illegible] & BLM

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Concrete Coast	Mechanical work.	
All day	TP	Robinson Electric	Installing trays, conduit & wire @ TP.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	removed non-native grasses from straw hay bales around TP. Winds causing dust emissions. Water truck was released from project. Matt's (Kenaske Contractor) last day today. Bruce informed me of a lg adult western diamondback rattlesnake on Park-Moabi Rd. I removed snake from road & buried nearby @ ~10am	
	Common raven, greater roadrunner, rock doves	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 3/4/05 START/END TIME: 0552 - 1710

WEATHER: Cloudy / high winds, mild temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Prosonic removing tracks in ~~[illegible]~~ floodplain
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Hay bales & straw wattles @ TP & along rd shoulder.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete pour today. Washout @ staging area.
Material stored within approved locations?	☑Yes ☐No	Stored @ const area.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts.
Were access roads watered?	☑Yes ☐No	Windy day. Water truck onsite today
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Trained 3 new workers. See attendance sheet.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Concrete Const, Inc.	Mechanical & concrete work	
All day	TP	Robinson electric	Running wire @ control room & TP.	
All day	TP	Donbeste	Dan Heath & [illegible] employees onsite.	
All day	floodplain	Prosonic	Removing tracks from equip drilling wells.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Prosonic using Bobcat to back drag areas with ruts & shoulders. Gater w/ chain link & pallets being used to follow behind & remove tracks. Doing an effective job at smoothing out sandy surface. Escorted Linda A. around jobsite & work areas. She will substitute for me tomorrow. I need to go to another jobsite for one day. Prosonic will start demobilizing from site tomorrow.	
	Common raven, K-rat tail drags, coyote tracks, Brewer's blackbird, [illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 3/16/05 START/END TIME: 0555—1645

WEATHER: Clear, sunny, no wind, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Prosonic completed track removal in floodplain.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along access rd.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon pad will be removed. Drilling complete
Material stored within approved locations?	☑Yes ☐No	Prosonic demobbing from West mesa. Const stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	CCI brought out their water truck.
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All crew has been trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Concrete Const, Inc.	Mechanical work @ TP	
All day	TP	Robinson Electric	Electrical work - about 8 electricians onsite	
All day	TP	Denbeste	Mechanical work	
All day	West mesa	Prosonic	Clean up & demob from site.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Prosonic hauling equip & materials to Phoenix. Plan on being completely offsite by this Friday. Final inspection of floodplain. Good job at removing tracks, shoulders, ruts, etc. by Prosonic.	
	Common raven, grackles, rock dove, rodent tracks	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 3/17/05 START/END TIME: 0550 – 1700

WEATHER: Clear, sunny, no wind cool temps (morning) warming up by afternoon

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	Work in washes & flood plain complete
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	Around TP & along access rds.
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	Wash out full and needs to be cleaned out. Decon pad will be removed. Drilling complete.
Material stored within approved locations?	☑ Yes ☐ No	Reminded workers to keep conex box doors closed. Prosonic will complete demob today from W. Mesa
Fuel leaks/stray material/trash w/in the CE?	☑ Yes ☐ No	Minor litter
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	No new veg impacts.
Were access roads watered?	☑ Yes ☐ No	Occassionally watered by CCI
Site checked for biota prior to construction?	☑ Yes ☐ No	Prior to & throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	
Crew trained on biological minimization measures?	☑ Yes ☐ No	All crew trained.
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	CCI	Mechanical work. Concrete finishing	
All day	TP	Robinson Electric	Electrical/mechanical work	
All day	TP	Denbeste	Mechanical work	
Morning	West mesa	Prosonic – Joel Clayton	Last day – final demob.	
All day	East access	CCI	Started cutting 30' x 1' deep area to place	
			gravel at sm wash crossing at E. access rd	
			that drains into BCW. Rattlesnake observed at this location.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Prosonic plans to complete demob. today. Removed decon. pad	
	from West mesa & stored @ const. stage area. Also removed	
	straw wattles from east mesa & stored @ const. stage area. Both mesa	
	sites clean & free of materials w/exception of Prosonic conex	
	box that will be removed from the site soon. Coord w/ Dan Heath	
	@ 0830 on placement of decon pad @ staging area. Prosonic offsite @	
	~ 0930. Final inspection – good. CCI reported diamondback near work area along East access rd. No need to relocate.	
	Common raven, sparrows, Brewers blackbirds, western diamondback.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916
OBSERVER(S): Ray Romero. DATE: 3/28/05 START/END TIME: 0600 – 1600
WEATHER: Cloudy, slight wind, cool temps, chance of rain over weekend

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP & along rds
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon pad removed & stored at const stage area.
Material stored within approved locations?	☑Yes ☐No	Const stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	CCI watered rds.
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	CCI	Mechanical & Concrete work	
Allday	TP	Robinson Electric	Wire, conduit, rails, etc.	
Allday	TP	Benbest	mechanical work	
Allday	East Access	CCI	Placing gravel & rip rap within rd for sm. drainage into BCW. Prevent rd washout.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Installed culvert extension at small wash in front of facility. Back filled & compacted area. Finished placing gravel across road. Placed road base over section.	
	Common raven, geckos, brush lizard	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 3/24/05 START/END TIME: 0548 – 1645

WEATHER: Clear, Sunny, no wind, mild temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Cut/fill activities complete
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & access rd
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon removed. Drilling complete; Washout @ stage area
Material stored within approved locations?	☑Yes ☐No	Approved stage area & parking area near TP.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts.
Were access roads watered?	☑Yes ☐No	CCI watering rds periodically
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	CCI	Concrete/mechanical work	
Allday	TP	Robinson Electric	Electrical at control room	
Allday	TP	Denbeste	Mechanical work	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	G & W building erectors will be back onsite tomorrow.	
	Apparently City of Needles was onsite over weekend to install	
	negative (grounding) cable along existing pole line from TP	
	to Park Moabi Rd. City of Needles out over weekend to place grounding	
	cable along pole line. Myself & Arch were not informed. Damaged 4 arch sites –	
	no significant impacts. Documented by Bruce. I will survey area tomorrow for	
	damage.	
	Desert iguana, western diamondback, raven,	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 3/22/15 START/END TIME: 0550 – 1700

WEATHER: Clear, Sunny, No wind, Mild to warm temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Work complete
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rds
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon removed. Wash out @ stage area
Material stored within approved locations?	☑Yes ☐No	Const stage area. Parking @ lower level.
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	NO new veg impacts onsite. Offsite veg impacts by City of Needles, See be
Were access roads watered?	☑Yes ☐No	Periodically by CCI
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day.
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	CCI	Concrete/mechanical work	
Allday	TP	Robinson Electric	Electrical at control room. Placing rocks	
Allday	TP	G & W	Erecting building	
Allday	TP	Barbosa	Mechanical	
			On Saturday, City of Needles onsite to	
			install grounding cable between TP & Keyhole Park.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: 2 sheet(s) used)

Bio-Measure #		Photo #
	Damage Assess – Far East Mesa – vehicle looped to edge of Arch staking. No creosote was crushed. East & West Mesas – did not go behind fencing. Stayed in disturbed area	
	Trash dump mesa – single set of tracks to N. end & turnaround. Avoided creosote.	
	Maze mesa – several sets of tracks. Accessed from HR 66. Jumped shoulder & cut out creosote	
	Used old loop access rd to 2 poles. Cut creosote dumped in nearby wash. Cut & crushed creosote = 12	
	Crushed beavertail cactus = 1. Second access route at orange fencing NW of Laguna mud wash.	
	Drove around fencing & crushed saltbush. This is old access road to pole line. Stayed to old	
	road with some deviation at washed out areas. Ruttings & spinning tires. Crushed	
	saltbush = 3, crushed beavertail = 5 Crushed creosote = 5 Able to access 2 poles by this route.	

2 pages
2 of 2

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 3/22/05 START/END TIME: 055 – 1700

WEATHER: Clear, sunny, no wind, mild to warm temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☐Yes ☐No	See 1st page
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☐No	
Were silt fences or other means of sediment control employed near washes?	☐Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	
Material stored within approved locations?	☐Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☐No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	Veg impacts offsite by City of Needles
Were access roads watered?	☐Yes ☐No	
Site checked for biota prior to construction?	☐Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☐No	
Crew trained on biological minimization measures?	☐Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☐No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
		Damage Assessment	Wildlife observed - brush lizard,	
		cont.	western diamondback relocated off Park	
		City of Needles	Moabi Rd., American Kestrel, 15 turkey	
		drives thru 4	vultures kettling, Gambel's quail, mourning	
		Arch sites according	dove	
		to Bruce. He did damage		
		assess on Mon. 3/21		

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: 2 sheet(s) used)

Bio-Measure #		Photo #
	City of Needles not able to access pole between 1st two access rds. Walked into	
	this area to string cable. Pole 4999N SOUN with no vehicle damage. Next access	
	route was old rd off of Park Moabi Rd & west of orange fencing. Crushed	
	saltbush = 18. Last pole before reaching Moabi Regional Park. Accessed using	
	old rd from H2O tanks. Not able to fully access due to cable around Arch	
	site by BLM. No crushed veg & stayed to rd. City of Needles appeared to stay	
	to access rds. Areas have revegetated & shrubs were crushed. No littering observed	
	No direct impacts to wildlife (mortalities, etc) including DT. Indirect impacts	
	include habitat disturbance. Myself & Arch not informed of weekend work.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 3/23/05 START/END TIME: 0515 – 1640

WEATHER: Clear, sunny, no wind, warm temps. Cool last night.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Work complete
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rds
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon removed. Washout full @ stage area.
Material stored within approved locations?	☑Yes ☐No	Const stage area. Parking @ lower level
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	periodically by CCI
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained on measures
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	CCI	Mechanical/concrete finish	
Allday	TP	Robinson Electric	Electrical, control panel, rails, etc.	
"	"	S&W	Erecting bldg, frame w/crane	
"	"	Denbeste	Mechanical	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Walked aboveground pipeline route from TP to injection field. Scoped box placement w/Phil & Bruce at entrance to E. Mesa. Surveyors have staked out vaults on E. Mesa. CCI started excavating vault @ MW20 bench. Area fenced w/orange safety fencing at end of day. Soil will be stock piled at const. stage area.	
	Common raven, brush lizard, Brewer's blackbirds, ~~rock doves~~, pigeons	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Sandoval DATE: 3/24/05 START/END TIME: 0650 – 1640

WEATHER: partial clouds, no wind, mild – warm temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	work complete
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP & along rds
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon pad removed. Wash out no longer needed.
Material stored within approved locations?	☑Yes ☐No	Const. stage area.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor oil leaks @ TP.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	periodically by CCI
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Crew has been trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	CCI	mechanical & concrete finishing	
Allday	TP	Johnson Electric	Electrical @ TP, control room, install rails, et	
All day	TP	G&W	Erecting building walls & roof	
Allday	MW20	CCI	Excavating vault, fenced off area.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Continue work @ MW20 bench vault site. Prepping for future pipeline tie-in at this location. Spoil from vault being dumped at const. staging area. Bobcat has been picked up by US Rentals. Was staged @ MW35. Gator still needs to be picked up from this location. Rented conex box @ west mesa has not been picked up yet. Terri packaging APE lab survey work plan for delivery to agencies.	
	warning doves, raven, brush lizard	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 3/25/05 START/END TIME: 0555 - 1600

WEATHER: Clear, sunny, no wind, warm temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Work complete
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon removed, wash out removed, Work complete
Material stored within approved locations?	☑Yes ☐No	Const stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor oil leaks @ TP
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	periodically by CCI
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	CCI	Concrete seal/finish & mechanical	
Allday	TP	Robinson Electric	Wire, racks, control room, etc.	
Allday	TP	G&W	Erecting bldg walls, roof, etc.	
Allday	MW20	CCI	Excavating vault	
Allday	TP	Donbeste	Mechanical work	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	No weekend work scheduled w/ exception of Jim & Glen at trailer.	
	Common raven, brush lizard, desert iguana, sparrows	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): R. Romero DATE: 3/3/05 START/END TIME: 0545 – 1640

WEATHER: Clear, sunny, windy, cool temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Work completed
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Decon & concrete wash-outs no longer needed
Material stored within approved locations?	☑Yes ☐No	Const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg. impacts
Were access roads watered?	☑Yes ☐No	Periodically watered by CCI
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Crew trained on measures
Need to contact agencies? Describe.	☐Yes ☑No	BLM & DTSC onsite to look over area impacted by City of Needles

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	CCI	Mechanical	
"	East access	CCI	Dressing rd shoulders	
"	MW20	CCI	Forming vault for concrete pour	
"	TP	Fabricon Electric	Running wire @ TP & control room	
"	TP	Donlesk	Dan & Ron performing mechanical work.	
0930–1600	Project site	Impact analysis	Escort BLM & DTSC to sites impacted by City.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Green conex box removed from west mesa earlier this wk. Gator also removed from MW35 site, rental company picked up box & gator. I attended mtg @ SFO this week. Linda A. substituting for me. Relieved her yesterday late afternoon. G&W off rest of week. Foreman had a heart attack. They will return on Monday. Escorted BLM & DTSC to look over areas impacted by City of Needles. Showed Mark H River otter area where river otter was observed. Mark GPS'd [illegible] sites. See notes & not non impact analysis.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 4/1/05 START/END TIME: 0600 – 1600

WEATHER: Clear sunny, mild wind, mild temps.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	work completed
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	wash-outs no longer needed.
Material stored within approved locations?	☑Yes ☐No	Const staging area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	Periodically watered by CCI
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	CCI	mechanical work	
All day	TP	Atkinson Electric	running wire, control room	
All day	TP	Kenboste	mechanical work	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Bruce & I placed orange fencing at access points created by City of Needles. Fencing placed at Hwy 66 & old national trails intersection near TP. Fencing also added along fencing segment off of Park Moabi Rd. Monitored 4ft long diamondback crossing Hwy 66 near West Mesa. Crossed safely heading South.	
	Common raven, rock-dove, brush lizard, diamondback rattlesnake, [illegible] Brewer's blackbird.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/4/05 START/END TIME: 0550 - 1710

WEATHER: Clear, sunny, windy, warm temps (80's)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Placed new straw wattles along E access rd on Fry.
Decontamination and concrete wash-outs in approved areas?	☐Yes ☑No	Washouts no longer needed. Removed from site.
Material stored within approved locations?	☑Yes ☐No	Const. stage area.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash & oil leaks @ TP.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts. Relocated 2 beaver tail fr east mesa for trench
Were access roads watered?	☑Yes ☐No	periodically
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Work crew trained - Trained 4 new crew
Need to contact agencies? Describe.	☐Yes ☑No	Mark H. w/ BLM onsite - river otter sign

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	~~CCI~~ TP	~~TP~~ CCI	mechanical work / pour @ MW20 bench	
All day	TP	Robinson Electric	Electrical at Control room	
All day	TP	Denbeste	mechanical work	
1/2 day	East mesa	CCI	Trenching for HDPE pipe to injection well	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Sand delivered and stock piled at East mesa for injection well piping. Concrete pour at vault located @ MW20 bench. Escorted Mark w/ BLM to second site w/ otter sign in morning. 10am interview w/ Bill (PG&E security rep) to discuss City of Needles incident. In afternoon, CCI started trenching at east mesa for HDPE pipe between TP & injection well field.	
	common raven, solpugid, grackles, mourning dove, rock dove	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/5/05 START/END TIME: 0555 – 1645

WEATHER: Clear, sunny, slight winds, warm temps (80s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	No work @ washes
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along road shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete washout @ stage area from yesterday's pour
Material stored within approved locations?	☑Yes ☐No	Cont stage area. Sand for trench E. mesa.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash and oil leaks at TP.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	Periodically by CCI
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	CCI	mechanical	
Allday	E. mesa	CCI	Digging trench for HDPE pipe & padding	
Allday	TP	Johnson	Electrical @ control room	
Allday	MW20	CCI	Constructing valve vault	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	ARB will be out later this week to install HDPE at E. Mesa. Trench complete & padded w/sand. MW20 vault floor complete, stripped forms & bldg walls (forms) for next pour. Inspected trench, trench secured. Coord w/Robert. on potential lighting issues raised by BLM.	
	turkey vulture, common raven, desert iguana, brush lizard,	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/6/05 START/END TIME: 0550 – 1640

WEATHER: Clear, sunny, no wind, hot temps

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	work complete
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	At TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	washout @ stage area
Material stored within approved locations?	☑ Yes ☐ No	stored @ const stage area.
Fuel leaks/stray material/trash w/in the CE?	☑ Yes ☐ No	minor trash & oil leaks @ TP.
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	No new veg impacts
Were access roads watered?	☑ Yes ☐ No	periodically by CCI
Site checked for biota prior to construction?	☑ Yes ☐ No	Prior to & during day
Special status species observed onsite? Describe.	☐ Yes ☑ No	
Crew trained on biological minimization measures?	☑ Yes ☐ No	Crew trained
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	CCI	mechanical work	
Allday	TP	Robinson Electric	Electrical at TP & control room	
Allday	East Mesa	CCI & ARB	Install HDPE tie into injection wells.	
Allday	MW20	CCI	Prep for concrete pour of vault-walls.	
Allday	~~Denbeste~~ TP	Denbeste	mechanical work.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	ARB onsite to install HDPE single walled pipe underground between HR66 & two injection wells. Trench has been cut & padded for pipe. Fused HDPE. Ready to install in trench.	
	raven, gopher snake, desert iguana, brush lizard, Brewer's blackbird	
	[illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 4/7/05 START/END TIME: 0550 – 1645

WEATHER: Clear skies, sunny, slight wind, warm temps (low 90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Work in washes complete
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete washout @ const staging area
Material stored within approved locations?	☑Yes ☐No	Const. staging area for materials
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash & oil leaks
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	watered by CCI throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	Trained new workers see attendance sheet
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Demolition	Mechanical work	
Allday	TP	CCI	"	
Allday	TP	Robinson	Electrical work	
Allday	East Mesa	CCI / ARB	HDPE pipeline tie into injection wells	
Allday	MW20	CCI	Prep for concrete pour of vault walls	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI placing vaults @ East Mesa. ARB continues fusing HDPE & placing in trench. ARB completed HDPE pipe work & departed site, CCI completed padding HDPE pipe with sand. Trench still open for electrical conduit.	
	Raven, Brewer's blackbirds, rock doves, mourning dove, brush lizard, mountain bluebird, hawk, turkey vulture	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 4/8/05 START/END TIME: 0545 – 1600

WEATHER: Clear, sunny, windy, warm 70s (high 80s, low 90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete washout @ stage area
Material stored within approved locations?	☑Yes ☐No	Const stage area.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	Minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	periodically throughout day
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Demoliste	mechanical	
"	"	CCI	"	
1/2 day	"	G&W	erecting bldg walls	
Allday	"	Robinson	electrical	
Allday	East Mesa	CCI	Placing electrical conduit in trench	
Allday	MW20	CCI	Prepping for concrete pour of vault walls.	
Allday	East mesa	ARB	tie in HDPE to vaults,	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI installing electrical conduit for Robinson. They will also pad over conduit w/sand and set 2 vaults at East Mesa. ARB back onsite to place flanges on HDPE & help tie in HDPE to vaults.	
	common raven, rock doves, mourning doves, brush lizard	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/11/05 START/END TIME: 0547 – 1640

WEATHER: Clear, sunny, no wind, warm 60's (80s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	Work completed
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP and along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	washout in const stage area
Material stored within approved locations?	☑Yes ☐No	const stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	Throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Demob	mechanical	
"	"	CCI	"	
"	TP	Mobilization	electrical	
"	East Mesa	CCI	back filling trench	
"	MW20	CCI	Forming vault	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI started back filling trench at East Mesa. Spill @ MW20 trench (~3000 gals). CCI helping clean up contaminated soil. Soil being tested @ lab. CCI forming walls of vault at MW20 trench. Plan on pouring concrete later this week. Spills from east mesa being dropped at Stage area.	
	common raven, brush lizard, Beaver's blackbirds, rock doves, mourning dove	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/12/05 START/END TIME: 0550 – 1640

WEATHER: Clear, sunny, no wind, warm temps (high 80s, low 90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	washout at const. stage area.
Material stored within approved locations?	☑Yes ☐No	Const stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts.
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	See common species list below.
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	CCI	mechanical	
"	"	Denbeste	"	
"	"	Robinson	electrical/control room	
"	E. Mesa	CCI	Back fill trench	
"	MW20	"	forming vault for pour	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI completed backfilling trench @ East mesa. Keeping area watered down to reduce PM10. Coord w/ Bob on CDFG request to survey for ~~add~~ addtl species within APE. Lg tank delivered for treatment facility. Bldg roof panels in place.	
	Common raven, brushlizard, rock doves, mourning dove, Gambel's quail, swallows, sparrows, grackles	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-902-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Drew Romero DATE: 4/13/05 START/END TIME: 0550 - 1630

WEATHER: sunny, clear, no wind, warm temps (low 90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around tp & rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Concrete cleaned up, no washout
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Demolish	Mechanical	
Allday	"	CCI	"	
"	"	Robinson	electrical	
"	East Mesa	CCI	Back filling & removing excess spoil	
"	MW20	"	Forming Vault walls	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Attended 0900 const mtg @ IM3 facility, moving spoil pile from trench at East Mesa to staging area. Completed transfer to stage area.	
	common raven, brush lizard, rock dove, mourning dove, turkey vulture	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/14/05 START/END TIME: 0553 – 1635

WEATHER: Clear, sunny, slight winds, upper temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	No wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	At TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☐Yes ☑No	No need for washouts. Concrete washout cleaned
Material stored within approved locations?	☑Yes ☐No	Const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	See below for common species
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	Denbaste	mechanical work	
"	"	CCI	" "	
"	"	Robinson	electrical work	
"	East Mesa	CCI	soil compaction at vaults	
"	MW20	"	Prep for concrete pour of vault	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	~ 2ft long adult patch nose snake run over by a vehicle	
	~ 80yds West of treatment facility on HR66. I buried the	
	snake ~~near~~ nearby. CCI completed back filling & compacting	
	around vaults @ East Mesa.	
	common raven, turkey vulture, brush lizard, patch nose snake,	

Gambel's quail, mourning dove, rock dove, grackles, road runner

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/15/05 START/END TIME: 0555 – 1630

WEATHER: Clear, sunny, slight wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	wash work complete
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☐Yes ☑No	washouts not needed.
Material stored within approved locations?	☑Yes ☐No	Stored at const. stage area. Parking in approved area.
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash at site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common species list below.
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Denbeste	mechanical work	
"	"	CCI	"	
"	"	Robinson	electrical work	
"	MW20	~~MW20~~ CCI	Prep for concrete pour of vault.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Spoke to Phil S. in morning about weekend work. Tom & Ron will be doing mechanical work, Electricians will also be working over weekend. Working on Saturday only at TP footprint. Also spoke to Phil S. about potential work next weekend. He informed me that WDC is scheduled to only work on Thurs. & Fri. No Sat work is scheduled for WDC @ East Mesa to tie in injection wells.	
	common raven, swallows, mourning dove, brush lizard, desert iguana,	

~~[illegible]~~ dove

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Romero DATE: 4/18/06 START/END TIME: 0550 – 1650

WEATHER: Clear, sunny, no wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	wash work complete
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TPs & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☐Yes ☑No	No washouts needed
Material stored within approved locations?	☑Yes ☐No	Const stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	Clean up on last Fri.
Vegetation impacts w/in CE or outside?	☐Yes ☑No	No new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	see common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	Trained new CH employee – Bobby
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Dewaste	mechanical work	
"	"	CCI	" "	
"	"	Robinson	electrical work	
"	MW20	CCI	concrete forms, Prepare for pour tomorrow	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Work continues to be concentrated at treatment facility. WDC will be onsite Thurs, Fri, & Sat to tie-in HDPE pipe to injection wells on East Mesa. Bruce & I plan on being onsite on Sat. also.	
	Migrating tree swallows feeding on insects along bridge, creosote bushes & 100's of tree swallows at entrance to PG&E on electrical wires & above Common raven, brush lizard, mourning dove, rock dove, & rabbits	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/19/05 START/END TIME: 0555 - 1645

WEATHER: Clear, sunny, no wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	work complete
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout at stage area. Pour @ MW20 to
Material stored within approved locations?	☑Yes ☐No	const stage area storage
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site, recent house keeping
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	watered throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Donboste	mechanical work	
"	"	CCI	" "	
"	"	Robinson	electrical work	
"	MW20	CCI	concrete pour of vault	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	BLM (Mark Howell) onsite, Escorted Paul P. w/ Univ. of New Mexico around site looking for river otter sign, he will be onsite tomorrow also. Need to provide bio. update @ CWG mtg on Thurs.	
	common raven brush lizards, mourning dove, rock doves, beaver sign, Godwit American Coot, desert iguana, turkey vulture	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/20/05 START/END TIME: 0650 – 1635

WEATHER: Clear, sunny, slight wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP and alongside shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout from pour yesterday
Material stored within approved locations?	☑Yes ☐No	const. staging area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	trained new addition employee
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Backfill	mechanical work	
"	"	CCI	" "	
"	"	addition	electrical work	
"	MW20	CCI	stripping concrete forms	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Moved frac tank at TP foot print offsite. Will be replaced by permanent water tank already onsite. Stripped concrete forms at MW20 vault. Mark H. & Paul P. w/ Univ. New Mexico onsite to look for river otter design, both onsite yesterday also. Paul will produce rpt & submit to Mark & I. Mark H. will not be able to attend CW6 mtg tomorrow. Informed internal group. raccoon tracks, American coot, dog tracks, cottontail rabbit, common raven, 11 turkey vultures on floodplain, desert iguana, roadrunner tracks, mourning dove, American kestrel, side-blotched lizard	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

1915

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/21/05 START/END TIME: 0555 – ~~1810~~

WEATHER: Clear, sunny, slight wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	wash work completed
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	site cleaned up yesterday
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	Prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Don Beste	mechanical work	
"	"	CCI	" "	
"	"	Barbara Benson	electrical work	
"	MW20	CCI	Prepping for next pour	
0930	E. Mesa	WRC	Injection wells tie-in.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Replaced trash bin with empty one. Crane onsite to set conex box – move from staging area to TP footprint.	
	Evan & Neal arrived onsite @ ~0930 to tie in HDPE pipe	
	to Injection Wells on East Mesa. WRC working late – until	
	7pm on E. Mesa. PVC pipe arrived onsite @ ~1700. Off loaded at	
	staging area. Bob Doss, Bob Lucas & Barbara Benson onsite	
	@ East Mesa ~ 1845. Departed w/ WRC ~ 1915.	
	common raven, brush lizard, turkey vulture, grackles, mourning doves,	
	nighthawks @ dusk, northern harrier, desert iguana	

PG&E Topock IM-3 Project
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/22/05 START/END TIME: 0550 - 1805

WEATHER: Clear, sunny, no wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	No wash activity
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete wash out @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **Observations** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Midday	TP	Trenching	mechanical work	
"	"	CCI	" "	
"	"	Robinson	electrical work	
"	E. Mesa	WDC	IW tie-in	

☐ **Non-Compliance Issues/Corrective Actions/Notes** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	WDC plans on being onsite Thurs, Fri, & Sat performing IW tie-in @ East Mesa. WDC & couple of electricians working on Sat. Bruce & I will be onsite Sat. for oversight. WDC pulled offsite @ ~ 1800.	
	Common raven, brush lizard, night hawk, grackles	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 4/23/05 START/END TIME: 0600 – ~~1400~~ ~~1200~~ 1400

WEATHER: Clear, sunny, no wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	straw wattles around TP & along rd. shoulder
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	concrete washout @ stage area
Material stored within approved locations?	☑ Yes ☐ No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	clean site
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	no new veg impacts
Were access roads watered?	☐ Yes ☑ No	weekend – H2O truck doesn't work over weekend
Site checked for biota prior to construction?	☑ Yes ☐ No	prior to & throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	
Crew trained on biological minimization measures?	☑ Yes ☐ No	All crew trained.
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
0600	TP	Denbeste/CH2M	Mechanical work	
0700	E. Mesa	WDC	IW pipe tie-in	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Bruce & I onsite to provide oversight, especially for work @ E. Mesa. Bruce pointed out dead rattlesnake on western portion of dirt access road. Snake had been dead for several days. Animal was totally flattened by vehicular traffic. Evan & WDC departed site @ ~ 1200.	
	common raven, grackles, brush lizard; western diamondback rattlesnake (dead) greater roadrunner (2).	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/25/05 START/END TIME: 0530 – 1645

WEATHER: Clear, sunny, no wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ stage area
Material stored within approved locations?	☑Yes ☐No	stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Denbeste	mechanical work	
"	"	CH2M	" "	
"	"	Robinson	electrical work	
1/2 day	E. Mesa	CCI	setting vault lids	
All day	TP	CCI	mechanical work	
All day	MW20	"	concrete work	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI strapping HDPE for transport to PG&E compressor station. Gravel stockpiled at stage area to place around TP. Concrete vault lids placed at East Mesa. CCI making sand bags for pipe. Piping between TP & IW field should start this week.	
	common raven, brush lizard, grackles, mourning dove, rock doves, finches, violet green swallows, desert iguana	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecker 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Drummond DATE: 4/20/05 START/END TIME: 0550 - 1635

WEATHER: Clear, sunny, no wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete wash out @ const stage area
Material stored within approved locations?	☑Yes ☐No	const stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Denbeste	mechanical work	
"	"	CCI	" "	
"	"	Pearson	electrical work	
"	MW20	CCI	concrete work	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	common raven, brush lizard, grackles, mourning dove, turkey vulture	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 4/27/05 START/END TIME: 0553 – 1640

WEATHER: Clear Sunday, moderate wind, high temps (low 90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no work in wash
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const stage area
Material stored within approved locations?	☑Yes ☐No	stored @ const stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☑Yes ☐No	~~Transplanted 2 beavertail & 1 Cholla from pipeline~~ between TP & IW Field.
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	Common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Bechtel	mechanical work	
"	"	CH2M	" "	
"	"	CCI	" "	
"	"	Robinson	electrical work	
"	HH60	CCI	installing steel pipe between TP & IWs.	
"	MW20	CCI	Valve Vault	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Transplanted cacti from pipeline ROW to IW field. Thoroughly watered with H2O truck & 5 gal. bucket. Attended Safety Meeting @ 0900. Rescheduled PE-1 pipeline site walk for 5 May 05. All interested parties were informed. Cut safety inspection today.	
	Common raven, Turkey Vulture, brush lizard, grackles, Bower's black birds, [illegible] Gambel's quail.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): R Hernandez DATE: 4/28/05 START/END TIME: 0555 – 1640

WEATHER: Cloudy, chance of rain, moderate to strong winds, temp @ 70s

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete wash out @ stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor leaks at TP
Vegetation impacts w/in CE or outside?	☑Yes ☐No	minor crushing impacts to veg. during pipeline instal
Were access roads watered?	☑Yes ☐No	periodically throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	CH2M	mechanical work	
"	"	Benbow	" "	
"	"	CCI	" "	
"	"	Robinson	electrical work	
"	HR66	CCI	pipeline installation between TP & IWS	
"	MW20	CCI	soil sampling due to recent spill.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI continuing to install pipeline from TP to IW field.	
	Soil sampling at MW20 bench to test for chrom 6 spilled	
	at site, DTSC requiring addt'l testing of soil. Approx 3,000 gals	
	spilled at site last week.	
	common raven, grackles, mourning dove	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 4/29/05 START/END TIME: 0555T 1615

WEATHER: clear, sunny, no winds, high temps (high 80s, low 90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete wash out @ stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor oil leaks @ TP
Vegetation impacts w/in CE or outside?	☑Yes ☐No	minor veg crushing due to pipeline installation
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH2M	Mechanical work	
"	"	Perkaste	" "	
"	"	CCI	" "	
"	"	Robinson	electrical work	
"	HR66	CCI	pipeline installation	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Pipe strung out to E. Mesa. Pipes tapped ends. Minor digging @ MW20 inside fence. No bio concerns. Tom Everett will follow for Bruce on Sat.	
	Common raven, turkey vulture, desert iguana, brush lizard, sparrows,	

mourning dove.

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 5/2/05 START/END TIME: [illegible] - ~~1640~~ 1700

WEATHER: clear, sunny, no wind, high temps (high 90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	washout @ stage area
Material stored within approved locations?	☑Yes ☐No	@ const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	none
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	~~prior &~~ throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	trained new CCI employee
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	CH2M	mechanical work	
"	"	Dondeste	" "	
"	"	CCI	" " & road base around TP	
"	"	Robinson	electrical work	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Raising grade at TP around concrete pad. CCI also transporting spare HDPE pipe to EMP conex box area near PG&E gate. I was offsite in morning at another jobsite. Returned by early afternoon. Phil, Dan & Bruce were informed of my morning absence last week.	
	common raven, Gambel's quail, brush lizard, desert iguana, turkey vulture, jackrabbits, mourning dove	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 5/3/05 START/END TIME: 0550 – 1640

WEATHER: clear, sunny, no wind, high temps (mid 90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	CH2M	Mechanical work	
"	"	Denbeste	" "	
"	"	CCI	" "	
"	"	Robinson	Electrical work	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI continues to clean up staging area. Moving spare materials to area near SMP conex box by the PG&E gate. CCI also continues to add road base to the facility site to bring up the grade.	
	Common raven, turkey vulture, grackles, brush lizard, desert [illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 5/4/05 START/END TIME: 0553-1640

WEATHER: Clear, sunny, no wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulder
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	site cleanup, especially staging area
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day @ TP & HR66
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	trained new crew - see attendance sheet
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	CH2M	Mechanical work	
"	"	Denbeste	" "	
"	"	CCI	" "	
"	"	Robinson	electrical work	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI continuing to place rd. base at TP to raise grade, clean up of staging area, mechanical work @ TP. Trained new CH operations staff. Prepared for PE-1 site walk. PG&E surveyors onsite to stake out PE-1 pipeline route to MW-20 bench.	
	Common raven, grackles, turkey vulture, desert iguana, brush lizard, [illegible] dove	

PG&E Topock IM-3 Project
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 5/5/05 START/END TIME: 0550 – 1650

WEATHER: Clear, sunny, no wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	Around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	wash out @ stage area
Material stored within approved locations?	☑Yes ☐No	cont. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean up continuing @ stage area
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	trained new crew members – see attached sh
Need to contact agencies? Describe:	☐Yes ☑No	BLM onsite for PE-1 pipeline route site walk

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	CH2M	mechanical work	
"	"	Jenkins	" "	
"	"	CCI	" "	
"	"	Johnson	electrical work	
"	East Mesa	WRC	IW tie-in	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI continuing to place road base/gravel around TP & cleaning up staging area. PE-1 pipeline route site walk w/BLM @ 10 am. Also looked at pipeline between TP & IW field - proposed burial of pipe. Sent external to group informing them of outcome of site walk. WRC onsite today to complete IW tie in today & tomorrow. Not scheduled to work over weekend.	
	grackles, common raven, brush lizard, swallows, mourning dove	

PG&E Topock IM-3 Project
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 5/6/05 START/END TIME: 0553 - 1715

WEATHER: Cloudy (Scattered), no wind, warm temps (80s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	around TP & along rdshoulders
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	concrete washout @ staging area
Material stored within approved locations?	☑ Yes ☐ No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑ Yes ☐ No	minor trash - cigarette butts
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	no new veg impacts
Were access roads watered?	☑ Yes ☐ No	throughout day
Site checked for biota prior to construction?	☑ Yes ☐ No	prior to & throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	common species list below
Crew trained on biological minimization measures?	☑ Yes ☐ No	all crew trained
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ **Observations** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	Ctrm	Mechanical work	
"	"	Demob	" "	
"	"	CCI	" "	
"	"	Division	electrical work	
"	E. Mesa	WDC	IW tie-in	

☐ **Non-Compliance Issues/Corrective Actions/Notes** (use 2nd sheet if needed, not other side: ___ sheet(s) used)

Bio-Measure #		Photo #
	WDC plans to complete work @ E. Mesa today. Weekend work limited to a couple of personal working within TP. Duane B. called City of Needles to verify that they weren't coming out until next week to remove pole & transformer from treatment plant area. They verified they will be out on Mon or Tues.	
	roadrunner, common raven, brush lizard.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 5/11/05 START/END TIME: 0550 – 1640

WEATHER: Clear, sunny, no wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	No wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete wash out @ stage area.
Material stored within approved locations?	☑Yes ☐No	const stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	cleanup & final touchs continue
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below.
Crew trained on biological minimization measures?	☑Yes ☐No	All crew trained.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	CH2M	Mechanical	
"	"	Benteste	"	
"	"	CCI	"	
"	"	Robinson	electrical	
"	MW20	CCI	backfilling around vault	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Escorted Steve Hoyer (CH Engineer) to PE-1 pipeline route (proposed & BLM preferred). He will produce CAMs for BLM's analysis. Linda Aston filled in for me on Monday & Tuesday.	
	Common raven, quail, side blotched lizard, mourning dove, Gambel's quail.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 5/12/05 START/END TIME: 0553-1640

WEATHER: Clear, sunny, no wind, high temps (low 90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & along rd shoulder
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ stage area
Material stored within approved locations?	☑Yes ☐No	const stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	CH2M	Mechanical	
"	"	Denbeste	"	
"	"	CCI	"	
"	"	Robinson	electrical	
"	MW20	CCI	back filling vault	
"	East Mesa	"	trying to set vault lids	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Conf. call to discuss restoration plan to const. stage area. Rob & I will produce a plan for DTSC/BLM review. CCI placing gravel around TP & leveling out area. CCI tried to set vault lids at E. Mesa. Need special hooks. Will try again tomorrow.	
	Common raven, grackles, brush lizard, Gambel's quail, rock doves, road runner, mourning dove, desert iguana	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Duane Budd DATE: 5/13/05 START/END TIME: 0555 – 1625

WEATHER: clear & sunny, no wind, high temps (90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	washout @ stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean up today – Friday
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Alday	TP	CCTV'ing	mechanical	
"	"	Demolish	"	
"	"	CCI	"	
"	"	Fabrication	electrical	
"	MW20	CCI	backfilling vault	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI continuing to backfill around vault @ MW20 bench.	
	common raven, grackles, brush lizard, desert iguana, mourning dove	

mk

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 5/16/05 START/END TIME: 0551-1640

WEATHER: Clear, sunny, no wind, hot temps (low 100's). Wind in afternoon.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete wash out @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☑No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	periodically
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day. Relocated scorpion from inside treatment facility.
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH2M	mechanical work	
"	"	Denbeste	" "	
"	"	CCI	" "	
"	"	Robinson	electrical work	
"	MW20	CCI	Dig & place vaults	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI setting vault lids at E. Mesa. Robinson working on solar panel conduit @ E. Mesa. Setting vault lids w/ front end loader & fork lift. 0900 CCI completed setting vault lids @ E. Mesa. Noticed creosote & spineflower re-establishing within disturbed area of E. Mesa. CCI started work (vault) @ TW2 @ MW20 bench today.	
	common raven, grackles, mourning dove, brush lizard, desert iguana, [illegible] scorpion (desert hairy)	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 5/17/05 START/END TIME: 0555 – 1635

WEATHER: Clear, sunny, no wind, hot temps (low 100s) upper 90s

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	wash out in stge area
Material stored within approved locations?	☑Yes ☐No	const stge area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor stray trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	periodically & throughout day
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH2M	mechanical	
"	"	Kenbaste	"	
"	"	CCI	"	
"	TP & E. Mesa	Robinson	electrical	
"	MW20	CCI	TW2 vault installation	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __ sheet(s) used)

Bio-Measure #		Photo #
	Robinson performing electrical work within vaults @ E. Mesa. CCI placing bollards @ E. mesa around vaults. CCI digging holes to place vault around TW2 & 3. Coord w/ GANDA. They will be onsite tomorrow to perform DT & SUE for expanded APE.	
	common raven, grackles, turkey vulture, mourning doves, roadrunner,	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 5/18/05 START/END TIME: 0553 – 1635

WEATHER: clear, sunny, winds in afternoon, highlights (upper 90s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	const stage area, no concrete pour
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	periodically
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH2M	mechanical	
"	"	Debeste	"	
"	"	CCI	"	
"	"	Robinson	electrical	
"	MW20	CCI	set vault @ TW2 on MW20 bench.	
"	E.Mesa	CCI	Placing bollards around vaults.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	~~Vault set with crane.~~ CCI set vaults @ MW20 over TW3 TW2. Backfilled vaults w/	
	backhoe. GANDA onsite today to perform DT & SWFL surveys	
	for APE. Provided orientation/site familiarization. Started DT	
	survey today. SWFL survey will start tomorrow morning @ 0532	
	CCI continued to work on placing bollards around vaults @ E.Mesa.	
	Phil S (CH) observed raccoon @ BCW. Bobby Horan (CH) observed Beaver @ hut	
	in BCW. Grackles, common raven, swallows (rough winged), mourning doves,	
	[illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 5/19/05 START/END TIME: 0550 – 1655

WEATHER: Clear, sunny, no wind, high temps (low 100s) High of ~109°F

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & along rd. shoulder
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	periodically
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	~~[illegible]~~ TP	CH2M	mechanical	
"	"	Denbeste	"	
"	"	CCI	"	
"	"	Robinson	electrical	
"	MW20	CCI	TW2 vaults backfill	
1/2 day	HR 66	Robinson	galvanized conduit along HDPE.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Jeff S. w/ GANDA starting SWTL survey of CA side today. Robinson put in electrical box @ start point of above ground pipe. Also placed conduit adjacent to steel pipe above ground to E. Mesa. End was duct taped. They will continue tomorrow.	
	Noted someone (unknown) drove around barricades at Park Moabi. Crushed 3 creosotes, common raven, grackle, Gambel's quail, cottontail rabbit, roadrunner, [illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 5/20/05 START/END TIME: 0555-1530

WEATHER: Clear, sunny, no wind, hot temps (100s)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	wash out @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	beer cans (5) found onsite. See below
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☐Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH2M	mechanical	
"	"	Denbeste	"	
"	"	CCI	"	
"	"	Robinson	electrical	
"	HR66	"	laying galvanized conduit	
"	MW20	CCI	Trenching for HDPE pipe.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	City of Needles is not scheduled to perform pole removal onsite this weekend according to Phil S. Found five Budweiser beer cans at treatment facility. Informed Phil S. & Dan H. Bollards in place with concrete & getting painted today. CCI, Denbeste & Robinson will not be working this weekend. Possibly a couple CH personnel will work within plant over weekend.	
	mourning dove, common raven grackles, woodrat (relocated from site), [illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 5/23/05 START/END TIME: 0550 – 1645

WEATHER: Clear, sunny, no wind, hot temps (~112°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	concrete washout @ const. stage area
Material stored within approved locations?	☑ Yes ☐ No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	clean site
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	no new veg. impacts
Were access roads watered?	☑ Yes ☐ No	periodically
Site checked for biota prior to construction?	☑ Yes ☐ No	& throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	common species list below
Crew trained on biological minimization measures?	☑ Yes ☐ No	all crew trained
Need to contact agencies? Describe.	☐ Yes ☑ No	BLM/SHPO/AZ State Arch/NAs near site for site walk.

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH2M	mechanical / OPS personnel onsite today	
"	"	Denbeste	mechanical	
"	" & MW20	CCI	" & vault work @ bench	
"	" & vaults	Robinson	electrical	
"	"	F.I.C.	insulating pipes	
"	E. Mesa	WDC	mechanical - piping	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Dennis Fink & his OPS personnel are onsite today @ IM3.	
	BLM, SHPO, AZ Arch, NA & lawyer looking @ Needles incident	
	today. Bruce & I on standby to answer any questions for BLM.	
	CCI digging trench to tie in above ground w/ below ground	
	piping @ East Mesa. ARB will be onsite this week to tie-in pipe.	
	WDC onsite for 2 days to work @ E. Mesa doing mechanical work in vaults.	
	CCI performing vault work (backfill) @ MW20 bench.	
	Common, raven, grackles, Gambel's quail, desert iguana, cottontail	
	[illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 5/24/05 START/END TIME: 0551 – 1635

WEATHER: Clear, sunny, no wind, hot temps (110+ °F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	periodically
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained, trained new ARB worker
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH2M	mechanical	
"	"	Denbeste	"	
"	" / E Mesa & MW20	CCI	"	
"	"	Robinson	electrical	
"	E. Mesa	WDC	vaults for injection wells	
"	"	ARB	pipe tie-in (HDPE fusing)	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure		Photo #
	ARB onsite to tie-in above ground & below ground pipeline to injection well field on E. Mesa. WDC back onsite to work on injection well vaults. Relocated patch nose snake from drainage at TP (fell through grating). CCI sand blasting TW2 wells to later apply epoxy on inside of vaults. ARB completed tie-in @ E. Mesa & started on tie-in @ MW20 Bench.	
	common raven, grackles, desert iguana, patch nose snake, Gambel's quail, [illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 5/25/05 START/END TIME: 0553-1635

WEATHER: Clear, sunny, no wind, hot temps (110+ °F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	washout @ const. stage area
Material stored within approved locations?	☑ Yes ☐ No	const stage area
Fuel leaks/stray material/trash w/in the CE?	☑ Yes ☐ No	minor trash
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	no new veg. impacts
Were access roads watered?	☑ Yes ☐ No	periodically
Site checked for biota prior to construction?	☑ Yes ☐ No	& throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	see common species list below
Crew trained on biological minimization measures?	☑ Yes ☐ No	crew trained
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CTKM	mechanical	
"	"	Danbeste	"	
"	" MWZO E.Mesa	CCI	" Vault work	
"	"	Robinson	electrical	
"	MWZO	ISCO/ARB	HDPE pipe fusing	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure		Photo #
	WDC completed work @ E. Mesa yesterday. Back onsite to perform work @ MWZO bench approx. mid-June. ISCO & ARB performing HDPE fusing @ MWZO bench. Robinson performing conduit tie-in @ E.Mesa. Fiber optic comm. cable will be placed in galvanized conduit aboveground. trench @ E. Mesa was backfilled.	
	common raven, grackles, cottontail rabbit, brush lizard, mourning dove, [illegible]	

PG&E Topock IM-3 Project
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 702-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 5/26/05 START/END TIME: 0450 - 1645

WEATHER: Clear, sunny, no wind, hot temps (110+ of)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	wash out @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	periodically throughout the day & throughout day
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CTEM	mechanical	
"	"	Demolish	"	
"	"	CCT	"	
"	"	Johnson	electrical	
"	MW20	ARB/ISCO	HDPE pipe fusing	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: ___ sheet(s) used)

Bio-Measure #		Photo #
	Crew worked last night painting epoxy within vaults at MW20 bench. First thing in the morning, I set up Gate V. to perform SWPPP survey on AZ side within HNWR. ARB & ISCO continue HDPE fusing at MW20 bench, plan on flashing tie-in tomorrow. Johnson performing electrical work in vaults on E. Mesa.	
	Road runner, Gambel's quail, cotton tail rabbit, mourning dove, coyotes, [illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-8916

OBSERVER(S): Ray Romero DATE: 5/27/05 START/END TIME: 0550 – 1400

WEATHER: Clear, sunny, no wind, hot temps (110+ of)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	wash out @ stage area
Material stored within approved locations?	☑Yes ☐No	const stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean up of site 6-4 weekend
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	periodically
Site checked for biota prior to construction?	☑Yes ☐No	prior to & throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH2M	mechanical	
"	"	Denbeste	"	
"	"	CCI	"	
"	"	Robinson	electrical	
"	MW20	ISCO & ARB	HDPE fusing	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Most crews departed by ~ noon. ARB & ISCO working full day to complete HDPE pipe tie-ins @ MW20 bench. Today is Duane Budd's last day. Bruce & I remain onsite to monitor ARB & ISCO.	
	mourning dove, common raven, grackles, brushlizard, rock dove, [illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 5/31/05 START/END TIME: 0552 – 1645

WEATHER: Clear, sunny, no wind, hot temps (103°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	wash out @ const stage area
Material stored within approved locations?	☑Yes ☐No	const stage area & MW20 bench
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day, day w/CCI back operating H2O tr
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH2M	mechanical	
"	"	Denbeste	"	
"	"	CCI	"	
"	"	Robinson	electrical	
"	MW20	ISCO/ARB	pipe fusion	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure		Photo #
"	ISCO ~~should~~ completed HDPE pipe fusing today. ARB will pressure test lines this week. CCI working on vaults @ MW20.	
	common raven, grackles, cottontail rabbit, mourning dove, rock dove,	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/1/05 START/END TIME: 0551 - 1635

WEATHER: clear/sunny, no wind, hot temps (~106°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const. stage area
Material stored within approved locations?	☑Yes ☐No	stored @ const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH2M	mechanical	
"	"	Denbeste	"	
"	"	CCI	"	
"	"	Robinson	electrical	
"	MW20	ARB	HDPE pipe fusing/testing	
"	MW20	Robinson	electrical	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: ___ sheet(s) used)

Bio-Measure #		Photo #
	ARB will perform pressure testing of HDPE pipe ~~test~~ this week.	
	Robinson working on electrical in vaults @ MW20 bench.	
	common raven, grackles, turkey vulture, mourning dove, rock dove, [illegible] lizard [illegible] - hinged swallow	

PG&E Topock IM-3 Project
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/2/05 START/END TIME: 0553-1635

WEATHER: Clear, sunny, windy, hot temps (~106°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const stage area & MW20 bench
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CHKM	mechanical	
"	"	Denbeste/CCI	"	
"	"	Robinson	electrical	
"	MW20	"	electrical	
"	"	ARB & CCI	mechanical, ARB pressure testing	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure		Photo #
	ARB testing HDPE pipe @ MW20 bench. Robinson placing conduit & stringing wire @ MW20 bench. CCI backfilling & compacting trench @ MW20 bench. Fort Mohave Tribe on BLM land looking at Maze. Parked @ old restaurant site. Bruce knew of their presence. We did not approach. They did not come onto IM3 site.	
	turkey vulture, common raven, grackles, rough-winged swallows, brush [illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke, 704-661-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9816

OBSERVER(S): [illegible] DATE: 6/30/10 START/END TIME: 0553 - 1630

WEATHER: clear, sunny, no wind, hot temps (101°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & abngd shoulder
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impact
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH2M	mechanical	
"	"	Denbeste	"	
"	"	CCI	"	
"	MW20	Atkinson	electrical in valve vaults	
"	MW20	ARB	pressure testing HDPE pipe	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __ sheet(s) used)

Bio-Measure #		Photo #
	CH2M & ARB pressure testing double-walled HDPE pipe between TP & MW20 bench. CCI making repairs to above ground pipe between TP & injection well field. Gaskets were pinched or not aligned properly, causing leaks.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/6/05 START/END TIME: 0550-1640

WEATHER: clear, sunny, no wind, hot temps (102°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	periodically throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	see common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	~~CH2M~~ TP	CH2M	mechanical	
"	"	Denbste	"	
"	"	Robinson	electrical	
"	MW20	CCI	mechanical / trenching	
"	MW20	ARB	pressure testing HDPE pipe	

Wildlife: grackles, raven, roughwinged swallows, desert iguana, Gambels quail

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: ___ sheet(s) used)

Bio-Measure		Photo #
	CCI using backhoe to cut trench into MW20 plant for double walled HDPE pipe. ISCO will be out on Weds to fuse HDPE pipe & place in trench @ MW20 bench. AvaR & I EPSed & staked proposed & alternate PE-1 pipeline routes for 2nd site walk by BLM. We also collected coords for 10 soil sampling locations @ MW20 bench for Matt J. Collected coords on veg that was transplanted for IM3. Ava will send Matt sampling locations & send me veg locations. Except [illegible] crews will work 4-10s, Robinson may work 7-12s.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/7/05 START/END TIME: 0551 - 1650

WEATHER: Clear, sunny, no wind, hot temps (103°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CTRM/Denbeste	mechanical	
"	"	Robinson	electrical	
"	MW20	"	"	
"	"	ARB	pressure testing pipe	
"	"	CCI	mechanical	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Picked up misc trash & removed flagging from sensitive veg. GANDA onsite starting today to perform 2nd phase of SWFL survey. Phil informed me that electricians & painters will be working this weekend. URS onsite performing SWFL surveys for MWD. They were not informed that MWD sold parcel to PG&E. Informed agencies of SWFL sighting by URS & GANDA. Provided support for site security mtg & tour.	
	greeble, Gambel's quail, desert iguana, common raven, Turkey Vulture, rough winged swallows, potential rabbit mourning dove.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecker 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/2/05 START/END TIME: 0552-1630

WEATHER: clear, sunny, no wind hot temps (102°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	cleanup for tomorrow's site tour
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	~~CH2M/Denbeste~~ TP	CH2M/Denbeste	mechanical	
"	TP/MW20	Robinson	electrical	
"	TP/MW20	CCI	mechanical & earthwork	
1/2 day	MW20	ISCO	Double walled HDPE pipe testing	
all day	TP/MW20	ARB	pressure testing pipes	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __ sheet(s) used)

Bio-Measure #		Photo #
	ISCO completed HDPE pipe tie-in @ bench. ARB continues pressure testing pipe. ARB will depart today & return on Monday to finish testing. Robinson performing some electrical work within vault at E. Mesa. Drove FCR truck to Curt R., Rich M., & Chris S. w/ PG&E. GANDA continues SWFL survey of APE. No confirmed SWFL ("fitz-bew") so far during survey.	
	Common raven, gambel's, desert iguana, rock dove, mourning dove, [illegible] turkey vulture	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-901-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9816

OBSERVER(S): Dan Canada DATE: 6/9/05 START/END TIME: 0549 – 1650

WEATHER: clear, sunny, no wind, hot temps (103°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	p/u misc trash around site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	DTSC & BLM onsite today

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH2M/Denbeste	mechanical	
allday	TP/MW20/	Parsons	electrical	
allday	TP/MW20	CCI	mechanical/cleanup	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	DTSC & SB County inspecting IM3 TP. DTSC & BLM will walk PE1 routes after IM3 inspection. CCI backfilling trench from HDPE pipe installed yesterday @ MW20 bench. ARB offsite & will return on Monday. DTSC & BLM will be onsite on Monday to discuss PE1. Mark reviewing well routes. Sally ok w/ well routes from work plan presented by Jay.	
	common raven, turkey vulture, grackles, Gambels quail, roadrunner	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-3831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/10/05 START/END TIME: 0550 - 1710

WEATHER: Clear sunny, no wind, hot temps (102F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work.
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around site
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	@ const staging area
Material stored within approved locations?	☑Yes ☐No	const staging area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	Robinson stayed within ROW
Were access roads watered?	☐Yes ☑No	no need to water rds.
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	see common species below
Crew trained on biological minimization measures?	☑Yes ☐No	Robinson trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH2M-Jones & MBC	mechanical	
allday	valve vaults	Robinson	pulling cable through vaults	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Robinson Electric pulling cable through existing vaults. Painters will be onsite Sat & Sun to paint control bldg & conex boxes. No need to monitor weekend work. Approx. 22 photos taken of site & compressor station. Forwarded to SFO. Chris Smith (FCR) providing oversight of painters.	
	quail (6), common raven, desert iguana, rough winged swallows,	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/3/05 START/END TIME: 0551 – 1640

WEATHER: Clear, sunny, no wind, hot temps (111°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rds – straw wattles
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	wash out @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH2M/Denbeste	mechanical	
"	" / ROW/MUZO	Robinson	stringing wire thru vaults	
"	TP/E. Mesa	ARB	pressure testing pipe	
"	TP	CCI	misc mechanical / clean up	

Gambel's quail, cotton tail rabbit, mourning doves, brush lizard, common raven, turkey vulture, grackles, rough winged swallows,

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	ARB continuing to pressure test pipe. Attended conf. calls discussing PE1 pipe routes & well access routes w/ DTSC & BLM Linda A. will be onsite tomorrow to support well sampling crews (3 crews). They started today on wells located within heavily disturbed areas off of HR66. Coord w/ Jay & Matt & produced work schedule. Bio & cult will look @ every well & document sensitive resources & protection measures for each well. Conduct pre & post-survey & some monitoring.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 6/14/05 START/END TIME: 0552 - 1645

WEATHER: Clear, sunny, no wind, hot temps (110°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	around TP & along rds
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	stage area
Material stored within approved locations?	☑ Yes ☐ No	stage area
Fuel leaks/stray material/trash w/in the CE?	☑ Yes ☐ No	minor trash
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	no new veg. impacts
Were access roads watered?	☑ Yes ☐ No	throughout day
Site checked for biota prior to construction?	☑ Yes ☐ No	& throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	common species list below
Crew trained on biological minimization measures?	☑ Yes ☐ No	all crew trained
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH2M / Denbeste	mechanical	
"	"	CCI	mechanical / cleanup	
"	ROW	Robinson	electrical - stringing line	
"	MW20	ARB	pressure testing pipe	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Linda A. onsite to support water sampling crews. Conducted pre- & post-surveys & monitoring. ARB will complete pressure testing tomorrow.	
	common raven, turkey vulture, Gambel's quail, rough winged swallows, [illegible] brush [illegible] mourning dove	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecker 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/15/05 START/END TIME: 0555-1650

WEATHER: Clear, sunny, no wind, hot temps (111°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & along rds
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	wash out @ const stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	DTSC & BLM onsite for stage area restoration

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH2M/Denbeste	mechanical	
"	W/MW20	Robinson	electrical	
"	MW20	ARB	pressure testing pipe	
"	TP/MW20	CCI	mechanical	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure # | Photo #

Bollards installed around TP by CCI. BLM, Native Amer. & DTSC onsite to discuss const. stage area restoration. Mark, Rob K, & I discussed well sampling access & methodology w/ Matt R. & Jay P. Mark H. plans to consult w/ USFWS regarding flycatcher for PE-1 & water sampling on floodplain. ARB continues to pressure test pipe @ MW20 bench. Pipe valve failed, need to retest. raven, grackles, turkey vulture, Gambel's quail, cottontail rabbit, mourning dove, rough winged swallows.

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/16/05 START/END TIME: 0550 — 1645

WEATHER: Clear, sunny, no wind, hot temps (100F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	around TP & along rds.
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	stage area
Material stored within approved locations?	☑ Yes ☐ No	stage area
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	clean
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	no new veg. impacts
Were access roads watered?	☑ Yes ☐ No	throughout day
Site checked for biota prior to construction?	☑ Yes ☐ No	& throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	common species list below
Crew trained on biological minimization measures?	☑ Yes ☐ No	all crew trained - trained site security
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH2M/Denbeste	mechanical	
"	"/MW20	CCI	misc. mechanical/cleanup/painting	
"	TP/E. Mesa	Robinson	electrical	
	MW20	ARB	pressure testing @ MW20	
all day	floodplain/upland	CH2M/Strongarm	well sampling continuing from Mon.	
~~ES~~ All day	Project wide	OSS security	Provided trng. They will start site security today	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Robinson installing circuit box at E. Mesa for well field.	
	ARB continued pressure testing at MW20 bench. Provided	
	training & site familiarization for PG&E site security	
	personnel. Robert H. continuing to perform bio surveys of	
	MWs. Should complete today. Robert & Linda will fax	
	info to Jay Piper for tech memo that will be submitted	
	to Mark H. to initiate informal consultation w/USFWS.	
	grackles, turkey vulture, brush lizard, common raven, mourning dove	
	rough winged swallows.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 6/20/05 START/END TIME: 0550 – 1610

WEATHER: clear, partially cloudy, sunny, no wind, hot temps (117°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TPt along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained - new WDC briefed
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	Citizen/Newkirk	mechanical	
"	"	Atkinson	electrical	
"	"/MW20	CCI	mechanical/install bldg @ MW20	
"	IW field	WDC	work @ vaults.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI will erect valve vault bldg @ MW20 Bench soon. WDC is scheduled to be onsite to tie in HDPE pipe into vaults @ MW20 bench & work @ IW field. Cont call w/ Mark Wilson to discuss well sampling & biosupport. Agrees our plan in theory. We plan on meeting tomorrow to discuss plan in field.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 6/21/05 START/END TIME: 0555 – 1825

WEATHER: partially cloudy, sunny, no wind, hot temps (~~[illegible]~~ 121°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & along rd. shoulder
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	crew trained - briefed solar panel crew
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH2M/Denbeste	mechanical	
"	" / MW20	CCI	" / clean up / touch up	
"	" / E. Mesa	Robinson	electrical	
1/2 day	E. Mesa	Solar	Installing solar panels/control panel	
all day	MW20	WDC	tie in HDPE pipe into extraction wells.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Met w/ Mark w/ BLM to go over well sampling plan in the field. Designated work areas. Jay will summarize mtg. outcome & email to appropriate parties. Robinson & solar personnel working @ E. Mesa. Trained new solar personnel. CCI started erecting bldg @ MW20. WDC tie in pipe @ bench. Tie in will continue tomorrow. Jay & I prepared email summarizing BLM mtg in field today. greater roadrunner, common raven, grackles, turkey vulture, rough winged swallows	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 6/22/05 START/END TIME: 0553 – 1740

WEATHER: partially cloudy, sunny, no wind, hot temps (117°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	const. stage area
Material stored within approved locations?	☑ Yes ☐ No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	no new veg. impacts
Were access roads watered?	☑ Yes ☐ No	throughout day
Site checked for biota prior to construction?	☑ Yes ☐ No	& throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	common species list below
Crew trained on biological minimization measures?	☑ Yes ☐ No	all crew trained – Briefed City Needles Power
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP, MW20	CCI	mechanical / erecting bldg @ MW20 bench	
"	TP	CH2M / Denbeste	mechanical	
"	TP/MW20	Robinson	electrical	
"	MW20	WDC	pipe tie in @ bench. Completed & tested – successful	
"	E. Mesa	Solar	installing solar panel & box – completed	
9-10	TP	Needles Power	remove transformer & wire	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Const mtg @ 0800. Fencing crew working to install chain link around TP on Sat & Sun. Painters scheduled for next wk. Well down for tie in at MW20 bench. 0900–1000 – Briefed Needles Power on NR/CR. Escorted onto site & monitored work activities. Removed transformer & wire. GANDA onsite today to start 1st series of July surveys for SWFL. Start on CA side first. Well sampling must be approved by BLM & scheduled around SWFL survey. Tie in completed & tested – successful. Tes grackles, Gambel's quail, rock dove, brush lizard, turkey vulture, common raven, desert iguana	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/23/05 START/END TIME: 0548-1710

WEATHER: Clear, sunny, no wind, hot temps (115°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & along rd should
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	concrete washout @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☑Yes ☐No	Agencies informed pump is down by Matt Johns

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP/Bench CTEM/Denbeste →		mechanical	
"	TP/MW20	CCI	" , bldg installation @ bench	
"	MW20	WDC	troubleshooting pump	
"	TP/MW20	Robinson	electrical, troubleshooting pump	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: ___ sheet(s) used)

Bio-Measure #		Photo #
	Pipe tied into TW-2 @ Bench. Test was successful, last night. Early this morning the pump failed, troubleshooting problem this morning. Pump motor needs to be replaced. ~~No H2O is being trucked.~~ CCI continues erecting structure over valve vault @ MW20 bench. Conf. call w/ BLM & DTSC to discuss well sampling strategy.	
	common raven, grackles, rock doves, turkey vultures, greater roadrunner, desert iguana, cottontail rabbit	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/24/05 START/END TIME: 0549 – 1645

WEATHER: Clear, sunny, no wind, hot temps (114°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	const. stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area – fencing materials in
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site – minor oil leaks (drips)
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☐Yes ☑No	CCI off today, no need for H2O
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	~~trained fencing crew~~ Did not show, Out on Sat
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH/Denbeste/PG&E	mechanical – Steve H. & Chris S.	
allday	E. Mesa/MW20	WDC	well work, Pump should be in for bench	
~~allday~~	~~TP~~		~~fencing around TP~~	
allday	MW20	Robinson	electrical support for pump motor replacement.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Fencing contractor ~~started~~ scheduled to plaque chain link around TP today. Materials delivered before 7am, fencing contractor did not show, Rescheduled for Sat & Sun. Bruce & I will support fencing around TP on Sat & Sun. Pump ~~was~~ motor was successfully replaced @ MW20 bench. Currently running with no problems. Jay overseeing WDC (Neil & Carlos), Roger w/ Robinson providing electrical support	
	grackles, common raven, turkey vulture, cottontail rabbit, short iguana roadrunner	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 6/25/05 START/END TIME: 0449-1450

WEATHER: partially cloudy, sunny, no wind, hot temps (109°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles & bales around TP & along rd.
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	wash out @ const. stage area
Material stored within approved locations?	☑Yes ☐No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☐Yes ☑No	CCI off - no need to H_2O roads
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	trained fencing crew
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP/E Mesa	Ellis fencing	Chain link fencing installation	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Installing chain link fence around treatment plant today & tomorrow. Trained work crew. Bruce, Steve H., & I onsite to provide oversight. Chris S. onsite in the morning. Fencing crew will also install fencing around solar panel site on E. Mesa.	
	grackles, common raven, turkey vultures, brush lizard, mourning dove, Gambel's quail	

PG&E Topock IM-3 Project
Daily Construction Monitoring Log

Contacts: Phil Schoenecke, 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-4[illegible]

OBSERVER(S): [illegible] DATE: 6/26/05 START/END TIME: 0847 - 1005

WEATHER: Clear, sunny, no wind, hot temps (97°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☐Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
1/2 day ~~today~~	TP	Ellis fencing	Chainlink fence installation	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Continue installing fence. Augered holes for posts yesterday, placing posts in holes today. Plan on pouring concrete around posts on Monday. Crew worked 5HRS - early day.	
	grackles, common raven	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-804-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/2/05 START/END TIME: 0545 - 1640

WEATHER: Clear, sunny, no wind, hot temps (109°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	rock for wall @ HR66 brought in & staged near BC
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor oil drips, minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day.
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below. Anna's hummingbird found dead in TP.
Crew trained on biological minimization measures?	☑Yes ☐No	trained scaffold & insulators.
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP/MW20	CH/Denbeste	mechanical	
"	"	CCI	"	
"	"	Robinson	electrical	
"	TP	Ellis fence	install chainlink fencing	
"	"	Brand Scaffold	install scaffolding	
"	"	~~FIR~~ Farwest	insulating crew	
"	"	Elrod	painting roof of TP	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI placed vaults at air stations along aboveground pipe, CCI continuing to erect metal bldg over valve vault @ MW20 bench. Painters onsite to paint roof of treatment plant. Ellis fence continues installation of chainlink around TP. Brand Scaffold erecting scaffolding for Farwest bldg. insulators, Farwest onsite to install wall insulation. Rock delivered for rock wall at edge of HR66. Myself & Dan Hofer (GIS) used a Geo XT to GPS IM3 landuse to update tech memo for Native Americans.	

Anna's hummingbird common raven grackles rock dove mourning dove. Turkey vultures, Gambel's quail,

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-8916

OBSERVER(S): [illegible] DATE: 6/28/05 START/END TIME: 0445 - 1635
WEATHER: clear, sunny, no wind, hot temps (112°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	const. stage area
Material stored within approved locations?	☑Yes ☐No	const stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor oil leaks & trash. Cleanup at end of day
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	see list below
Crew trained on biological minimization measures?	☑Yes ☐No	trained new Brand employees
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	Cal Northwest	mechanical	
"	" / MW-20	CCI	" / erect valve vault bldg. @ bench	
"	"	Robinson	electrical	
"	TP	Ellis Fence	install chain link	
"	"	Elrod	paint roof of TP	
"	"	Brand	Erect scaffolding	
"	"	Farwest	Install insulation around equip.	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Painters/Fencers started early today (0500). Painters/Fencers may work on Fri. If they work they will be confined to TP area. Chris called Rich & decided no need for Arch or Bio monitor if they work on Fri. All other crews will be off on Fri - Mon, returning on Tues. Jeff S. w/ GANDA back onsite to perform SWFL surveys - #4. One on Fri. He will be back on July 11 to finish SWFL surveys - total of 5. grackles, rock doves, turkey vultures, common raven, desert iguana	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoeneck 704-704-1831, Duane Budd 425-922-2078, Rey Romero 661-809-7257, Robert Hernandez 323-446-9816

OBSERVER(S): Rey Romero DATE: 6/29/05 START/END TIME: 0542 – 1650

WEATHER: Clear, Sunny, no wind, hot temps (@109F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	stage area
Material stored within approved locations?	☑Yes ☐No	east stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	periodically
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained – new Brand employee
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	Cut/Demolish	mechanical	
"	"/MW20	CCI	", finished erecting bldg @ MW20	
"	TP	Johnson	electrical	
"	"	~~Farwest~~ Brand	erecting scaffolding for insulators	
"	"	Farwest	insulating tanks, etc.	
"	"	Ellis	fencing around TP	
"	"	Elrod	painting roof of TP	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo#
	CAMA finished CA side of SUFL survey. None detected. Informed agencies & team. Complete A2 side by Fri. Rock wall @ MW20 approved. Plan to construct tomorrow. Plan on working w/ well samplers tomorrow. SOP was approved & practice run w/ BLM tomorrow morning. Ellis will complete fencing by tomorrow. Additional excavation work planned @ MW20 bench soon. Gnatcatchers, rock glares, common raven, turkey vulture,	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 6/30/05 START/END TIME: 0542-1650

WEATHER: Clear, sunny, no wind, hot temps (110°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☑Yes ☐No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH/Denbeste	mechanical	
"	" HR66	CCI	" , install rock wall @ HR66	
"	TP	Robinson	electrical	
"	"	Elrod	painting TP	
"	"	Farwest	install insulation around tanks	
"	"	Brand	install scaffolding	
"	" / EMesa	Ellis	finish fence installation	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Supporting well samplers on floodplain. Mark H. & I evaluating sampling procedures from MW39 to MW34. Spent all day with samplers. Completed sampling of one well. Burned up pump probably due to length of travel for H2O. Strong arm came down with heat stress. Ryan M. providing CH hydro. oversight. I provided sensitivity training, pre surveys, & bio oversight. grackles, common rewen, rock dove, mourning dove, [illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-804-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-0016

OBSERVER(S): Ray Romero DATE: 7/5/05 START/END TIME: 0548-1640

WEATHER: Clear, sunny, no wind, hot temps (116°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	@ const. stage area
Material stored within approved locations?	☑Yes ☐No	@ const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑Yes ☐No	minor trash
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	trained new CCI employee
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP/MW20	GH/Denheste	mechanical	
"	"	CCI	mechanical	
"	HR66	CCI	constructing rock wall	
"	TP	Farwest	insulating tanks	
"	TP	Robinson	electrical	
"	"	Elrod	painting	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI started excavation of contaminated soil at MW20 bench. Erica collecting samples for the lab. Need to await lab analysis before backfilling the trench/pit. Excavation is sloped to allow escape of any entapped wildlife. Equip (excavator & loader) staged at bench.	
	graddles, ravens, mourning doves, rock doves, cottontail rabbit, brush lizard	

PG&E Topock IM-3 Project
Daily Construction Monitoring Log

Contacts: Phil Schoenecker 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 7/6/05 START/END TIME: 0553 – 1640

WEATHER: Clear/sunny, no wind, hot temps (113 °F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑ Yes ☐ No	const. stage area
Material stored within approved locations?	☑ Yes ☐ No	const. stage area
Fuel leaks/stray material/trash w/in the CE?	☑ Yes ☐ No	minor trash
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	no new veg. impacts
Were access roads watered?	☑ Yes ☐ No	throughout day
Site checked for biota prior to construction?	☑ Yes ☐ No	& throughout day
Special status species observed onsite? Describe.	☐ Yes ☑ No	common species list below
Crew trained on biological minimization measures?	☑ Yes ☐ No	all crew trained
Need to contact agencies? Describe.	☐ Yes ☑ No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP/MW20	CCI	mechanical / bldg. erection @ bench	
"	TP	CH	" / mgt	
"	~~Elrod~~ TP	Elrod	painting	
"	TP	Far west	insulation of tanks	
"	"	Robinson	electrical	
"	HR66	CCI	Rock wall	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI continuing to construct rock wall @ HR66.	
	John finishing up metal bldg @ bench. Water truck	
	filling up tanks @ facility to run purge thru lines.	
	GMP sampling event tomorrow between MW 39 & MW34-100.	
	BLM requires Bio with sampling crew between MW39 & RR	
	tracks during breeding season (May – Sept). John Geels	
	onsite today.	
	antelope ground squirrel, mourning dove, brush lizard,	
	common raven, grackles, turkey vulture, Gambels quail, rock dove,	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9816

OBSERVER(S): Ray Romero DATE: 7/7/05 START/END TIME: 0548-1635

WEATHER: Clear/sunny, no wind, hot temps (114°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	Pit @ bench to remain open. Pit has ramp, steve having crew check pit every 4 hrs. for wildl
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	const stage area
Material stored within approved locations?	☑Yes ☐No	" " "
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean up activities today
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& " "
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	new personnel trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH	mgt/mechanical	
"	"	Robinson	electrical	
"	TP/MW20	CCI	mechanical/Bldg/excavation & cleanup	
"	HR66	"	rock wall	
"	TP	Elrod	painting	
"	TP	Farwest	insulation	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCI ~~contains~~ continues steel bldg work @ bench & rock wall const @ HR66. Painters & a couple electricians will work within fenced TP - no need to monitor. Well sampling crew onsite today. Monitoring sampling @ MW 34-100. Must follow work plan & BLM conditions. Denbeste awaiting lab results before they backfill pit @ MW20 bench. Well sampling completed by 1300. Additional digging @ bench. Shawn out tomorrow to survey mourning dove, American Kestrel, Gambel's quail, common raven, [illegible] rabbit, greek les, antelope ground squirrel,	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-604-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9948

OBSERVER(S): Ray Romero DATE: 7/11/05 START/END TIME: 0543-1625

WEATHER: Clear, sunny, no wind, hot temps (1130F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles along TP & rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	@ const stage area
Material stored within approved locations?	☑Yes ☐No	" " " "
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean up today
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	& " "
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH	mechanical / oversight	
"	"	CCI	" / clean up	
"	" / MW20	Robinson	electrical	
"	"	Elrod	painting tanks	
"	"	Farwest	insulating tanks	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Painting contractor should be finished by tomorrow.	
	GANDA SWFL survey today - thurs. This is the fifth (last)	
	SWFL survey. Awaiting lab results before back filling pit	
	@ MW20 bench. Soil removed due to spill @ bench a few	
	months ago. CCI preparing to erect shades around TP.	
	CCI cleaning up TP area. CCI will place bollards (2)	
	at solar panel tomorrow.	
	common raven, grackles, turkey vulture, cottontail rabbit, scaled	
	quail, rock dove, mourning dove, antelope ground squirrel	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 7/12/05 START/END TIME: 0544 - 1635

WEATHER: clear/sunny, no wind, hot temps (1230F), record temps. this wk.

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	const stage area
Material stored within approved locations?	☑Yes ☐No	" " "
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site - clean up
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	" "
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	trained new staff
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH/OMI	mechanical lover sight/startup prep.	
"	"	CCI	"	
"	"	Robinson	electrical	
"	"	Farwest	insulation around tanks	
"	"	Elrod	painting	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Provided SWFL & DT training to several personnel.	
	CCI leveling area @ MW20 to set tanks. Awaiting	
	lab results before back filling pit. CCI placing 2 bollards	
	in front of solar panel on E. Mesa. OMI staff onsite.	
	DTSC & BLM performing site inspection (Norman, Susan,	
	Nu Wing, Sally). GMP staff trained. Start rwer	
	& MW sampling tomorrow.	
	common raven, grackles, turkey vultures, mourning dove,	
	rock dove, [illegible] ground squirrel	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Raytomero DATE: 7/13/05 START/END TIME: 0542-1625

WEATHER: Clear, sunny, no wind, hot temps (126°F) record temp again

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	const. stage area
Material stored within approved locations?	☑Yes ☐No	" " "
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	CCI performing clean up
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	" "
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained - OMP & safety personnel too
Need to contact agencies? Describe.	☐Yes ☑No	Mark Howell onsite for sampling event.

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	~~mechanical~~ OMI/CH	mechanical/prep for startup	
"	" / MW20	CCI	" / cleanup / excavation	
"	"	Farwest	insulation	
"	" / vaults	Robinson	electrical	
"	Floodplain	CH / Strongarm	MW sampling N. of MW39. No need for bio oversight.	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	River & MW sampling today. I am supporting MW sampling. Painters finished yesterday. Additional digging needed at bench (4x4x2' deep pit). Concrete truck onsite to pour bollards @ E. Mesa. Rick Cavil & Frank (DTSC IH) onsite to monitor Health & Safety of sampling crew. Crew done by ~ noon because of high temps. Mark H. onsite today & plans to be onsite tomorrow for sampling. Dead racoon moved to shoulder of Park Moab Rd. approx 1/4 mile E. of Regional Park. Informed Mark Howell for possible taxidermy.	

roadrunner & rackles common raven, turkey vulture, mourning dove

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9816

OBSERVER(S): Ray Romero DATE: 9/14/05 START/END TIME: ~~0544~~ 0530-1710

WEATHER: Clear, Sunny, no wind, hot temps (116°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & rds
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	const stage area
Material stored within approved locations?	☑Yes ☐No	" " "
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	cleanup site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	" "
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	Mark Howell ~~onsite for sampling~~ not able to make it for sampling - sick

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
All day	TP	CH/OMI	mechanical/prep for startup	
"	"	Robinson	electrical (only Roger & Andy)	
"	" / MW20	CCI	mechanical/cleanup/setup for tanks @ [illegible]	
"	TP	Farwest	insulation of tanks	
"	floodplain	CH/ ~~SEF~~ SEFS	well sampling MW34 from MW39	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Provide bio. oversight of GMP team. Sampling MW34 from MW39 as required by BLM. Started at ~0730 on flood plain sampling. Off floodplain by ~1200. Courier to pick up samples @ 1200. Plan on completing 3rd well @ MW34 & starting MW27 tomorrow. Jay Piper onsite working on injection wells @ E. Mesa. CCI working on leveling & placing containment pads @ bench. Robinson misc electrical @ bench & treatment facility. common raven, grackles, bats, cottontail rabbit,	

PG&E Topock IM-3 Project
Daily Construction Monitoring Log

Contacts: Phil Schoenherr 704-604-1831, Duane Budd 425-922-2078, Rey Romero 661-809-7267, Robert Hernandez 323-440-6916

OBSERVER(S): [illegible] DATE: 7/15/05 START/END TIME: 0530 - 1200

WEATHER: Clear, sunny, no wind, hot temps (112 +)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	
Material stored within approved locations?	☑Yes ☐No	
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	
Vegetation impacts w/in CE or outside?	☐Yes ☑No	
Were access roads watered?	☐Yes ☑No	
Site checked for biota prior to construction?	☑Yes ☐No	
Special status species observed onsite? Describe.	☐Yes ☑No	
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
AMday	TP	CH/DMT	Prep for startup tomorrow	
"	MW20	Robinson	electrical for tanks - floats	
"	Floodplain	CH/SETS	well sampling	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Focused support provided for sampling team. Staged @ MW39 & sampled 3rd well @ MW34. Met crew @ trailer @ 0530, Started sampling on floodplain @ 0700. Completed work & departed floodplain @ 1030. No incidents. Crew followed SOP. & Monitored heart rates & temperatures. Additional sampling next week.	
	grackles, common raven, turkey vulture, cottontail rabbit.	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Raymond D DATE: 7/18/05 START/END TIME: 0547-1625

WEATHER: Clear, sunny, no wind, hot temps (126°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	const. stage area
Material stored within approved locations?	☑Yes ☐No	" " "
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site. Designated smoking area @ TP
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	periodically
Site checked for biota prior to construction?	☑Yes ☐No	Relocated rattlesnake after safety mtg.
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	trained new personnel on SWFL.
Need to contact agencies? Describe.	☐Yes ☑No	Called Mark on MW27 sampling

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH/OMI	Operations	
"	" / MW20	CCI	Misc. mechanical / backfilling pit @ MW	
"	"	Robinson	Misc. electrical	
"	Floodplain	CH/SEFS	Sampling MW27 (2 wells)	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure	Photo #
	Relocated western diamondback from TP footprint near trailer. Supporting well samplers - sampling MW27 from MW39. Mark not able to participate. Facility is now operational as of Sun. Background study & transducer downloads today also. Briefed new personnel (sensitivity trng). Samples provided to Lab courier @ ~1200 noon. Informed Mark H (email) that last well @ MW27 will be sampled tomorrow. Sent out weekly western diamondback rattlesnake, common raven, grackles, rock doves, cottontail rabbit.

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 7/19/05 START/END TIME: 0543-1625

WEATHER: Clear, sunny, no wind, hot temps (125°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	at TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	const. stage area
Material stored within approved locations?	☑Yes ☐No	" " "
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☐Yes ☐No	& " "
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH/OMI	operations/mechanical	
"	TP/MW20	CCI	misc. mechanical/clean up	
"	" "	Robinson	misc. electrical	
"	TP	Far west	insulating tanks	
"	floodplain	CH/SEFS	well sampling @ MW27 & MW39	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Continue supporting well sampling activities within BLM sensitive bio area between MW39 & RR tracks. Informed Mark H. that sampling will continue today @ MW27. Complete MW27. ~~& MW39~~ Did one well at MW36 & one well at MW39. Off floodplain before 12 noon to get samples to lab courier. CCI used remaining rock at rock wall, dressed MW20 bench, completed backfilling, etc @ MW20. Mark was onsite w/ me & samplers. Common raven, turkey vulture, rock dove, grackles, cottontail	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-446-9916

OBSERVER(S): Ray Romero DATE: 7/20/05 START/END TIME: 0550 – 1635

WEATHER: Partially cloudy, humid, no wind, hot temps (118°F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☑Yes ☐No	Removed concrete washout – concrete removed
Material stored within approved locations?	☑Yes ☐No	cleaned up staging area
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	cleanedup site
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	periodically
Site checked for biota prior to construction?	☑Yes ☐No	& through out day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
allday	TP	CH-OMI	startup/maintenance	
"	" / MW20	Robinson	misc. electrical	
"	" "	CCT	cleanup, misc. mechanical	
"	TP	Far west	tank insulation	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	CCT completed dressing up @ MW20 bench. Loaded excavator to be hauled back to Barstow. CCT cleaned up staging area – removed extra straw wattles & removed concrete, etc from washout on staging area. CH/OMI continue operations of TP, checked on GMP sampling. Sampling outside sensitive area. Plan to sample on HNWR tomorrow.	
	common raven, gvackles, rock dove, Gambel's quail, mourning dove [illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 7/21/05 START/END TIME: 0505 - 1625

WEATHER: overcast (monsoon), chance of rain, no wind, hot temps (12PF)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑ Yes ☐ No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐ Yes ☑ No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑ Yes ☐ No	around TP & rds
Decontamination and concrete wash-outs in approved areas?	☐ Yes ☑ No	removed, clean up
Material stored within approved locations?	☑ Yes ☐ No	stage area being cleaned up
Fuel leaks/stray material/trash w/in the CE?	☐ Yes ☑ No	clean up of site
Vegetation impacts w/in CE or outside?	☐ Yes ☑ No	no new veg impacts
Were access roads watered?	☑ Yes ☐ No	periodically
Site checked for biota prior to construction?	☑ Yes ☐ No	common species list below
Special status species observed onsite? Describe.	☐ Yes ☑ No	
Crew trained on biological minimization measures?	☑ Yes ☐ No	trained new SEFS tech
Need to contact agencies? Describe.	☐ Yes ☐ No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
Allday	TP	CH/OMI	Ops	
"	TP/MW20	Robinson	misc electrical	
"	" "	CCI	clean up / mechanical	
morning	TP	Farwest	completed insulation of tanks	
Allday	TP	Brand	removing scaffolding	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure #		Photo #
	Farwest completed insulation of tanks. Departed site. Brand removing scaffolding this morning. GMP samplers off today & tomorrow. Background study this week & next. GMP back next wk.	
	Antelope ground squirrel, road runner, grackles, desert iguana, raven, [illegible]	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke, 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-809-7257, Robert Hernandez 323-440-9816

OBSERVER(S): [illegible] DATE: 7/21/05 START/END TIME: 0541 – 1650

WEATHER: partially cloudy / hot / humid / slight breeze / temp @ ~114°F

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	straw wattles around TP & along rd shoulders
Decontamination and concrete wash-outs in approved areas?	☐Yes ☑No	no decon or wash outs needed – end of const.
Material stored within approved locations?	☑Yes ☐No	const. stage area & TP
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	site cleaned up – stage area
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	throughout day
Site checked for biota prior to construction?	☑Yes ☐No	" "
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	trained new GMP crew
Need to contact agencies? Describe.	☐Yes ☑No	

☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH / OMI	oversight / ops	
"	"	CCI	cleanup, misc. mechanical	
"	" (MW20)	Robinson	misc. electrical	
"	floodplain	CH / SEFS	GMP sampling	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __ sheet(s) used)

Bio-Measure #		Photo #
	GMP crew provided sensitivity training. Cleared wells to be sampled. Provided oversight & trained Robert H. to take over bio oversight of GMP sampling for remainder of SWFL breeding/nesting season (end of Sept). CCI performing clean up of staging area. Working equip oversight. Ops started 72 hr test of treatment facility.	
	grackles, raven, turkey vulture, Gambel's quail, cottontail rabbit, desert iguana, brush lizard	

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenebke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): [illegible] DATE: 7/26/05 START/END TIME: 0547 – 1657

WEATHER: Clear, sunny, no wind, hot temps (160F), humid
Afternoon – cloudy, chance of rain (monsoon), windy/dusty, rain in afternoon

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☐Yes ☑No	no decon or wash-outs needed – end of const.
Material stored within approved locations?	☑Yes ☐No	const stage areas & conex boxes
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	CCI cleanup of area
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg. impacts
Were access roads watered?	☑Yes ☐No	periodically
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	all crew trained
Need to contact agencies? Describe.	☐Yes ☑No	

☐ **OBSERVATIONS** (environmentally relevant construction activities, biological observations, general site issues)

Time	*Location*	*Construction Activity/ General Observations*	*Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed*	*Photo#*
all day	TP	CH [illegible]	OB of facility	
"	"	CCI	cleanup of site & stage area	
"	" / MW20	Robinson	misc. electrical	
"	floodplain	EMP	well sampling @ MW43	

☐ **NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES** (use 2nd sheet if needed, not other side: __ sheet(s) used)

Bio-Measure		Photo #
	Robert H. providing bio oversight of EMP water sampling @ MW43. I provided sensitivity training & trained Robert H. yesterday. EMP completed MW43 on HNWR. Set up @ MW 39 to sample MW34-100 in morning tomorrow. I will support EMP tomorrow morning during sampling of MW34. Robert departed site today. CCI packing equip & materials to be hauled back to Barstow. They are also cleaning up the site including staging area.	

grackles, Loggerhead shrike, common raven, rock doves, turkey vulture

PG&E TOPOCK IM-3 PROJECT
Daily Construction Monitoring Log

Contacts: Phil Schoenecke 704-904-1831, Duane Budd 425-922-2078, Ray Romero 661-609-7257, Robert Hernandez 323-440-9916

OBSERVER(S): Ray Romero DATE: 7/27/05 START/END TIME: 0546 – 1530

WEATHER: clear, sunny, humid, no wind, hot temps (121 °F)

Condition	Y/N	Comments
Project in compliance? If not, describe below.	☑Yes ☐No	
Evidence of construction activity inside or near a wash? Estimate of cut / fill.	☐Yes ☑No	no wash work
Were silt fences or other means of sediment control employed near washes?	☑Yes ☐No	around TP & along rd. shoulders
Decontamination and concrete wash-outs in approved areas?	☐Yes ☑No	no wash-outs needed – end of const.
Material stored within approved locations?	☑Yes ☐No	stage area & TP
Fuel leaks/stray material/trash w/in the CE?	☐Yes ☑No	clean up of site by CCI
Vegetation impacts w/in CE or outside?	☐Yes ☑No	no new veg impacts
Were access roads watered?	☑Yes ☐No	periodically
Site checked for biota prior to construction?	☑Yes ☐No	& throughout day
Special status species observed onsite? Describe.	☐Yes ☑No	common species list below
Crew trained on biological minimization measures?	☑Yes ☐No	trained new OSS staff member
Need to contact agencies? Describe.	☐Yes ☑No	

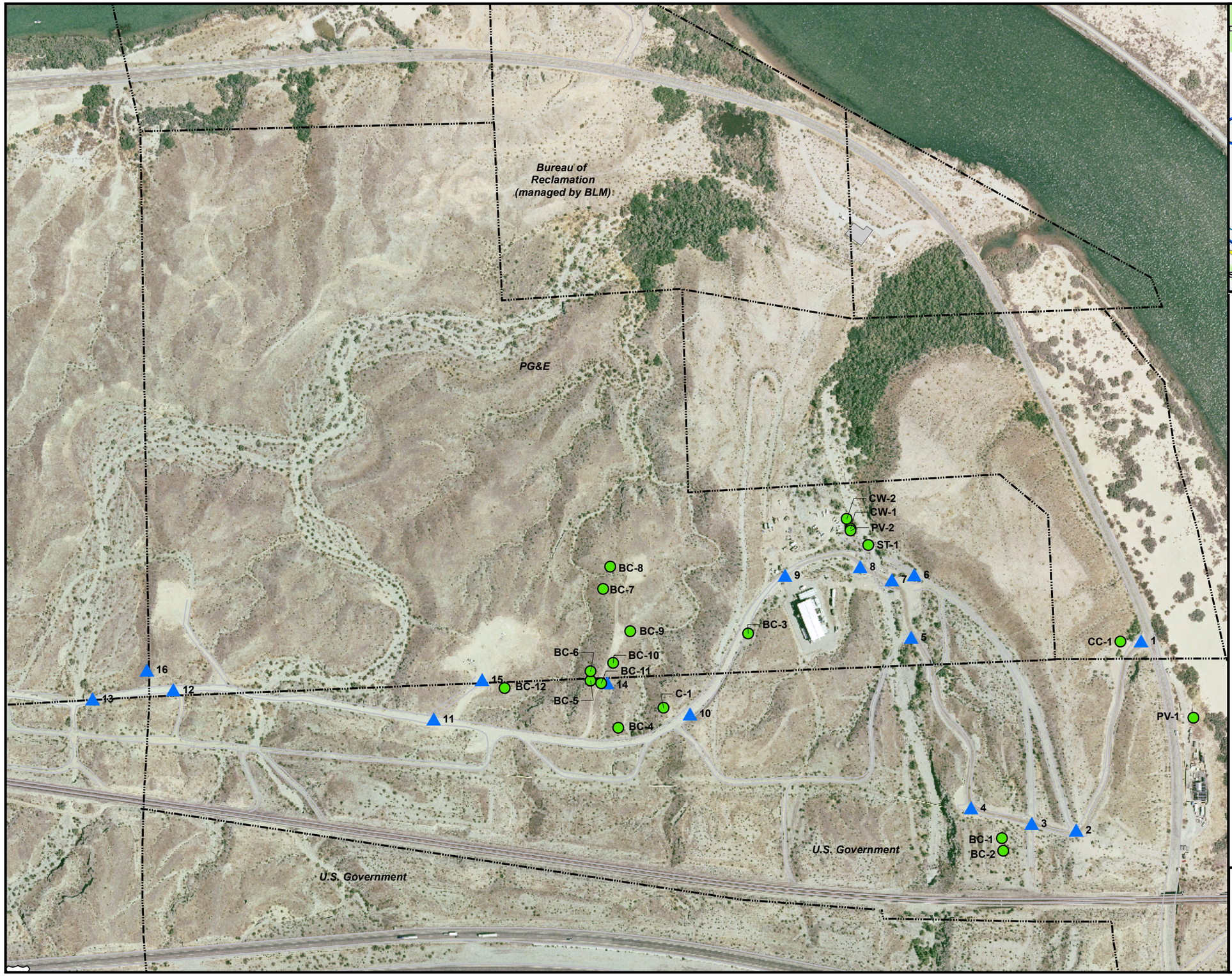
☐ OBSERVATIONS (environmentally relevant construction activities, biological observations, general site issues)

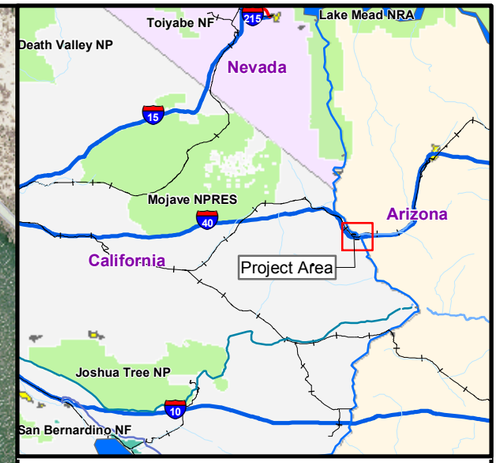
Time	Location	Construction Activity/ General Observations	Biological or General Notes/Observable Impacts/ Non-compliance issues/Wildlife Observed	Photo#
all day	TP	CH/OMI	Ops @ TP	
"	" / MW20	Robinson	misc. electrical	
"	TP	CCI	clean up & demobilization	
"	floodplain / upland	CH/SEFS	well sampling	

☐ NON-COMPLIANCE ISSUES/CORRECTIVE ACTIONS/NOTES (use 2nd sheet if needed, not other side: __sheet(s) used)

Bio-Measure		Photo #
	OMP team completed MW34-100 well sampling in morning. I provided bio oversight. No incidents. They will sample upland wells ~~to~~ today also – observation wells on E. Mesa. Tied up loose ends & coordw/ ~~Steve~~ Chris S. Today is last day for Bruce & I. Rob K. will send out email to agencies announcing Curt, Rich & Chris as FCRs.	
	rock dove, common raven, grackles, turkey vulture, antelope ground squirrel,	

Appendix E
Photodocumentation





LEGEND

- Transplanted Vegetation
- Photographic Point
- Property Boundaries

N

0 175 350 700 Feet

1 inch equals 350 feet

PHOTOGRAPHIC POINT AND TRANSPLANTED VEGETATION LOCATION MAP

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2005\MAY04_MWD_PHOTO_LOCATIONS.MXD MAY04_MWD_PHOTO_AND VEG_LOCATIONS.PDF 9/22/2005 19:15:01

Photo Point 1 Pre-Construction: Viewing southeast from photo point location.

Photo Point 1 Post-Construction: Viewing southeast from photo point location

Photo Point 2 Pre-Construction: Viewing northeast from photo point location.

Photo Point 2 Post-Construction: Viewing northeast from photo point location.

Photo Point 2 Pre-Construction: Viewing northwest along Historic Route 66 from photo point location.

Photo Point 2 Post-Construction: Viewing northwest along Historic Route 66 from photo point location.

Photo Point 2 Pre-Construction: Viewing west from photo point location.

Photo Point 2 Post-Construction: Viewing west from photo point location.

Photo Point 3 Pre-Construction: Viewing north from photo point location.

Photo Point 3 Post-Construction: Viewing north from photo point location.

Photo Point 4 Pre-Construction: Viewing north from photo point location.

Photo Point 4 Post-Construction: Viewing north from photo point location.

Photo Point 5 Pre-Construction: Viewing northwest from photo point location.

Photo Point 5 Post-Construction: Viewing northwest from photo point location.

Photo Point 6 Pre-Construction: Viewing southeast from photo point location.

Photo Point 6 Post-Construction: Viewing southeast from photo point location.

Photo Point 7 Pre-Construction: Viewing northwest from photo point location.

Photo Point 7 Post-Construction: Viewing northwest from photo point location.

Photo Point 8 Pre-Construction: Viewing southeast from photo point location.

Photo Point 8 Post-Construction: Viewing southeast from photo point location.

Photo Point 9 Pre-Construction: Viewing northwest from photo point location.

Photo Point 9 Post-Construction: Viewing northwest from photo point location.

Photo Point 9 Pre-Construction: Viewing northeast from photo point location.

Photo Point 9 Post-Construction: Viewing northeast from photo point location.

Photo Point 9 Pre-Construction: Viewing southeast from photo point location.

Photo Point 9 Post-Construction: Viewing southeast from photo point location.

Photo Point 9 Pre-Construction: Viewing south from photo point location.

Photo Point 9 Post-Construction: Viewing south from photo point location.

Photo Point 9 Pre-Construction: Viewing northwest from photo point location along Historic Route 66.

Photo Point 9 Post-Construction: Viewing northwest from photo point location along Historic Route 66.

Photo Point 10 Pre-Construction: Viewing northeast from photo point location along Historic Route 66.

Photo Point 10 Post-Construction: Viewing northeast from photo point location along Historic Route 66.

Photo Point 10 Pre-Construction: Viewing southwest from photo point location along Historic Route 66.

Photo Point 10 Post-Construction: Viewing southwest from photo point location along Historic Route 66.

Photo Point 11 Pre-Construction: Viewing east from photo point location along Historic Route 66.

Photo Point 11 Post-Construction: Viewing east from photo point location along Historic Route 66.

Photo Point 11 Pre-Construction: Viewing west from photo point location along Historic Route 66.

Photo Point 11 Post-Construction: Viewing west from photo point location along Historic Route 66.

Photo Point 12 Pre-Construction: Viewing east from photo point location along Historic Route 66.

Photo Point 12 Post-Construction: Viewing east from photo point location along Historic Route 66.

Photo Point 12 Pre-Construction: Viewing west from photo point location along Historic Route 66.

Photo Point 12 Post-Construction: Viewing west from photo point location along Historic Route 66.

Photo Point 13 Pre-Construction: Viewing east from photo point location along Historic Route 66.

Photo Point 13 Post-Construction: Viewing east from photo point location along Historic Route 66.

Photo Point 13 Pre-Construction: Viewing west from photo point location along Historic Route 66.

Photo Point 13 Post-Construction: Viewing west from photo point location along Historic Route 66.

Photo Point 14 Pre-Construction: Viewing north at well site location prior to construction.

Photo Point 14 Post-Construction: Viewing north at well site location after construction.

Photo Point 14 Pre-Construction: Viewing south at well site location prior to construction.

Photo Point 14 Post-Construction: Viewing south at well site location after construction.

Photo Point 15 Pre-Construction: Viewing west from photo point location.

Photo Point 15 Post-Construction: Viewing west from photo point location.

Photo Point 15 Pre-Construction: Viewing northwest from photo point location.

Photo Point 15 Post-Construction: Viewing northwest from photo point location.

Photo Point 15 Pre-Construction: Viewing north from photo point location.

Photo Point 15 Post-Construction: Viewing north from photo point location.

Photo Point 15 Pre-Construction: Viewing northeast from photo point location.

Photo Point 15 Post-Construction: Viewing northeast from photo point location.

Photo Point 16 Pre-Construction: Viewing northwest from photo point location.

Photo Point 16 Post-Construction: Viewing northwest from photo point location.

Photo Point 16 Pre-Construction: Viewing north from photo point location.

Photo Point 16 Post-Construction: Viewing north from photo point location.

Photo Point 16 Pre-Construction: Viewing northeast from photo point location.

Photo Point 16 Post-Construction: Viewing northeast from photo point location.

Appendix C8:
PE-1 Final Design Plan

Pacific Gas and Electric Company

Yvonne J. Meeks
Site Remediation – Portfolio Manager
Environmental Affairs

6588 Ontario Road
San Luis Obispo, CA 93405

Mailing Address
4325 South Higuera Street
San Luis Obispo, CA 93401

805.546.5243
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Fax: 805.546.5232
Email: YJM1@pge.com

July 29, 2005

Mr. Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

Subject: Final Design Plan – Conveyance Piping and Power Supply for Extraction Well PE-1, Topock Compressor Station, Needles, California.

Dear Mr. Shopay:

This letter transmits the final design plan for the conveyance piping and power supply for extraction well PE-1 at the Pacific Gas and Electric Company (PG&E) Topock site. The final design plan reflects the suggestions from the United States Bureau of Land Management (BLM) and California Department of Toxic Substances Control (DTSC) for the pipeline route proposed in the draft design plan submitted to DTSC and BLM in March 2005.

If you have any questions, please do not hesitate to contact me. I can be reached at (805) 546-5243.

Sincerely,

for Yvonne Meeks

Final

Design Plan
Conveyance Piping and Power Supply for Extraction Well PE-1

Topock Compressor Station
Needles, California

Prepared for

California Department of Toxic Substances Control

On behalf of

Pacific Gas and Electric Company

July 2005

CH2MHILL

Final

Design Plan
Conveyance Piping and Power Supply for Extraction Well PE-1

Topock Compressor Station
Needles, California

July 2005

Prepared for

California Department of Toxic Substances Control

On behalf of

Pacific Gas and Electric Company

Prepared by

CH2M HILL

This document was prepared by CH2M HILL under the supervision of:

Douglas W. Landfear, P.E.
Project Engineer

CH2M HILL
155 Grand Avenue, Suite 1000
Oakland, California 94612

July 2005

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Tables

1 Referenced Drawings for PE-1
2 Permits, Approvals, and Certifications for Extraction Wells

Appendix

A Drawings for PE-1

Acronyms and Abbreviations

BLM	United States Bureau of Land Management
Cr(VI)	hexavalent chromium
DTSC	California Department of Toxic Substances Control
gpm	gallons per minute
IM	Interim Measures
µg/L	micrograms per liter
PE-1	potential extraction well no. 1
PG&E	Pacific Gas and Electric Company

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station in Needles, California, under the oversight of the California Department of Toxic Substances Control (DTSC). In a letter dated February 16, 2005, DTSC directed PG&E to install a new groundwater extraction well in the Colorado River floodplain at the site (DTSC 2005a). The directive was issued as a result of the detection of hexavalent chromium [Cr(VI)] in a sample collected from monitoring well MW-34-100 at a concentration of 357 micrograms per liter (µg/L) in February 2005. Well MW-34-100 is located on the Colorado River floodplain, approximately 600 feet east of the location of the existing groundwater extraction well TW-2D and the treatment facilities operated as part of Interim Measures (IM) No. 2. Well MW-34-100 monitors the deep portion of the Alluvial Aquifer.

On February 23, 2005, PG&E submitted a work plan to the DTSC and United States Bureau of Land Management (BLM) to site, install, and test a new extraction well, referred to as potential extraction (PE) well PE-1, in the Colorado River floodplain (CH2M HILL 2005a). The DTSC and BLM conditionally approved the extraction well work plan on February 25, 2005 (DTSC 2005b; BLM 2005). Exploratory borings and drilling activities began on February 26, 2005, and the PE-1 was installed on March 5, 2005. The BLM directed PG&E to complete the new extraction well by March 15, 2005 to avoid potential impacts to wildlife and any local or transient threatened or endangered species (e.g., Willow Flycatcher) that could occur within this project area.

On March 4, 2005, PG&E submitted a request for DTSC and BLM approval to design and install piping, well vaults, and power supply for the new extraction well. A draft design plan was submitted to DTSC on March 21, 2005 that provided the details for the new extraction well and facilities. Two site walks were held with BLM and DTSC representatives on May 5 and June 9, 2005 to review the pipeline alignment. In July 2005, DTSC requested that PG&E submit this final design package for the PE-1 pipeline.

1.1 Authorizations

The extraction well, conveyance piping, and power supply will be installed on BLM-managed property. BLM has authorized this activity under an Action Memorandum, dated March 3, 2004 (BLM 2004). Section V of this Action Memorandum requires BLM review and approval of such work before implementation so that appropriate mitigation measures can be identified, and any concerns for biological or cultural resources can be addressed for the proposed work area. Cultural resource survey(s) conducted in 2004 did not identify any cultural resources in the Colorado River floodplain (CH2M HILL 2004a). All activities associated with piping and power installation will be coordinated with BLM to protect resources.

2.0 Design Plan

Two potential extraction wells, including a floodplain extraction well, PE-1, were included in the IM No. 3 *Thirty Percent Design Submittal, Interim Measures No. 3, PG&E, Topock Compressor Station, Needles, California* (CH2M HILL 2004b) that was conditionally approved for construction in a DTSC letter dated September 21, 2004 (DTSC 2004).

This design plan describes the updated design criteria for extraction well PE-1 and describes the facilities that will be constructed in the Colorado River floodplain to convey extracted groundwater to the IM No. 3 treatment plant (or IM No. 2 batch plant).

2.1 Referenced Drawings

Appendix A contains drawings showing details of the conveyance piping, instrumentation and controls, and power supply for extraction well PE-1. The attached drawings are part of a comprehensive drawing package for the IM No. 3 treatment plant that currently consists of over 130 individual drawings. As such, drawing numbers, revision dates (due to ongoing construction changes), and supplemental information not specific to extraction well PE-1 may be included on the drawings provided in this design plan. As part of the design-build approach for the IM No. 3 project, certain details and field modifications will be developed as construction progresses and will be documented as design modifications and in the as-built drawings for the IM No. 3 project.

Table 1 lists the drawings included as part of this submittal that are specifically related to PE-1.

TABLE 1
Referenced Drawings for PE-1
PG&E Topock Compressor Station, Needles, California

Drawing No.	Title	Description
SK-TP-PE1-1	Plan View – Proposed PE-1 Pipeline Route	Sketch of pipeline alignment over aerial photography collected in 2004. Show the alignment in relation to site vegetation. Not a construction drawing.
TP-PC-10-01-07	Piping Plan and Profile	Shows the proposed piping alignment from extraction well PE-1 to Valve Vault #1 at the MW-20 bench.
TP-PC-10-10-08	Detail Sheet 1	Shows a typical trench detail for a single double-contained pipe. Also includes a typical detail for a leak detection sensor station.
TP-EE-20-01-24	PE-1 Electrical Conduit Route	Shows the route of the electrical conduit in the same trench as the piping.

TABLE 1
Referenced Drawings for PE-1
PG&E Topock Compressor Station, Needles, California

Drawing No.	Title	Description
TP-SE-20-00-15	PE-1 Well Vault #3 Sections and Details – Sheet 1	Shows the well vault for extraction well PE-1 (referred to as well vault #3).
TP-PI-20-02-02	Underground Piping - Extraction Wells TW-2D and TW-2S Well Vaults, Bench Site 20 Valve Vault	Shows the piping running from PE-1 into Valve Vault #1 at the MW-20 bench.
TP-PI-20-02-06	Extraction Wells – PE-1 Well Vault	Shows the piping in the PE-1 well vault.
TP-PR-10-10-03	Process and Instrumentation Diagram - Extraction Wells PE-1, PE-1, TW-2D, and TW-2S	Process and Instrumentation Diagram for extraction well PE-1.

2.2 Groundwater Extraction System for Extraction Well PE-1

The groundwater extraction system for PE-1 consists of an extraction well, well pump, conveyance piping, power supply, and instrumentation and controls. The following sections describe the facilities to be installed to convey water from PE-1 to Valve Vault #1 on the MW-20 bench. Valve Vault #1 is designed to combine flows from each extraction well (TW-2D, TW-2S, and PE-1) to the IM No. 3 treatment plant. This vault is also designed to accommodate flows from future extraction wells if necessary.

2.2.1 Extraction Well Design Pump Rate

Extraction Well PE-1 is located in the Colorado River floodplain approximately 75 feet east of the MW-36 cluster. The extraction well was installed in early March 2005 after DTSC and BLM approved of the extraction well work plan. The extraction well was constructed with 6-inch schedule 40 polyvinyl chloride well casing that extends to the ground surface. Based on concurrence from DTSC, the extraction well was screened over a 10-foot interval from approximately 79 feet to 89 feet below ground surface. The well screen was a 6-inch-diameter type 304 stainless-steel screen with 0.060-inch slot size. Initial testing of PE-1 was completed during well development on March 5, 2005. The extraction well pumping capacity was tested for short durations (up to 30 minutes) at flow rates from 10 to 40 gallons per minute (gpm). The specific capacity at these flow rates ranged from 0.75 to 1 gpm per foot of drawdown in the well. The well installation and initial testing of PE-1 was documented in a field summary report submitted to the DTSC April 2005 (CH2M HILL 2005b).

Based on the results of initial testing, a design maximum pumping rate of 40 gpm is proposed for PE-1.

2.2.2 Well Pump

Extraction well PE-1 will be equipped with a Grundfos Model 40S50-12 submersible pump with a rated capacity of 40 gpm capable of conveying extracted groundwater to the IM No. 3 treatment plant. The well pump will be installed at the mid-point of the well screen, approximately 84 feet below ground surface.

2.2.3 Well Vault

The extraction well will be completed within a subsurface pre-cast concrete well vault (Well Vault #3). This vault is similar to that to be installed at TW-2D and TW-2S. The well vault is approximately 7 feet wide, 10 feet long, and 7 feet deep to accommodate the underground double-wall conveyance piping and associated valves and fittings. Drawing TP-SE-20-00-15 depicts the well vault dimensions.

2.2.4 Conveyance and Conduit Systems

Underground piping and electrical and control conduits will be connected to the well head to (1) convey extracted water from PE-1 to Valve Vault #1 on the MW-20 bench and (2) provide power and control for the pump and instrumentation. The alignment and profile for the piping and conduits that will be installed between the Well Vault #3 and Valve Vault #1 on the MW-20 bench is shown on Drawing TP-PC-10-01-07. The length of the alignment is approximately 500 feet. The alignment includes suggestions by BLM during site walks to avoid native vegetation (e.g., mesquite trees) and reduce the removal of non-native salt cedar that serves as potential nesting habit for the southwestern willow flycatcher.

Extracted groundwater will be conveyed in double-contained high-density polyethylene pipeline (3-inch-diameter pipe contained within a 6-inch-diameter pipe, minimum). The piping and appurtenances are sized to accommodate the 40 gpm design flow rate from PE-1. PG&E will also consider the use of extra piping at the site (e.g., 3-inch by 6-inch or 4-inch by 8-inch) to use existing materials that are onsite. The pipeline will be equipped with a leak detection sensor station at a low point (or 400-foot interval) in the line to detect any leaks in the inner conveyance pipe. The location of this sensor station can be adjusted in the field to avoid disturbing vegetation.

Piping inside the Well Vault #3 will be Schedule 80 chlorinated polyvinyl chloride. The design includes one 2.5-inch conduit for 460V/3-phase power supply and one 2-inch conduit for instrumentation. A third, spare 2-inch conduit may be installed between Well Vault #3 and Valve Vault #1 to accommodate future performance monitoring requirements, such as automating water level data collection from monitoring wells.

Drawing TP-PC-10-10-08 includes a typical trench detail for a single pipeline (see profile No. 6 on drawing) and a typical leak detection sensor station for the double-contained high-density polyethylene pipeline. The containment influent pipe, conduits for power and instrumentation, and leak detection sensor(s) will be constructed within a common trench across the floodplain. The nominal bottom width of the trench will be 24 inches wide and approximately 5 feet deep (on average) to accommodate the installations and maintain a minimum of 3 feet of cover. The sidewalls of the trench will be sloped per OSHA guidelines to allow workers to enter the trench.

It is important to note that future tie-ins to the double-contained piping between PE-1 to Valve Vault #1 are not recommended, primarily due to the logistics of draining and/or controlling leakage of the contents and uncertainties in future flow rates. Such tie-ins would also require the construction of additional valve vaults in the Colorado River floodplain. Given the uncertainty of additional extraction wells and conveyance piping in the Colorado River floodplain, it would be difficult to site additional valve vault(s) along the PE-1 alignment. The current IM No. 3 design plan includes provisions for an additional extraction well PE-2 located to the south of the MW-20 bench, if needed in the future. Valve Vault #1 is also designed to accommodate up to five extraction wells. Drawing TP-PI-20-02-02 depicts the current plan to tie-in PE-1 and future extraction wells into Valve Vault #1 on the MW-20 bench. Valve Vault #4 located near monitoring well MW-19 can accommodate pipelines from future extraction wells.

2.2.5 Instrumentation and Controls

Drawing TP-PR-10-10-03 includes a process and instrumentation diagram for extraction well PE-1. As shown in the drawing, extraction well PE-1 will be outfitted with the following instrumentation and controls:

- Water level indicator to monitor low water levels in the well to protect the pump.
- Pressure relief valve and pressure indicator inside the well vault to protect the pipe and allow operators to monitor pump performance.
- Pressure indicator, flow meter, and flow control valves inside Valve Vault #1 at the MW-20 bench.

A sample port for extraction well PE-1 will be available inside Valve Vault #1 for water quality sampling.

2.3 Construction Access and Work Limits

The staging area being considered for these activities is the north end of the MW-20 bench and would be approved by the agencies prior to its use. Construction materials will be stockpiled at the IM No. 3 treatment plant and/or the MW-20 bench and moved to the staging area as needed. Access to the floodplain would be from Park Moabi Road at the MW-35 cluster, similar to prior drilling and groundwater monitoring program access to the floodplain. The access route is noted on Drawing SK-TP-PE1-1.

Due to the nature of the fine sandy soils in the floodplain, it is anticipated that a 50-foot-wide minimum right-of-way will be required to accommodate the trench, temporary soil stockpile, and access for materials and equipment. Existing vegetation that is within the trench excavation area will be removed. It is assumed that the trench excavation may be up to 20 feet wide, assuming one-half to 1 or shallower trench side slopes. Excavated soil will be stockpiled to avoid disturbing vegetation to the extent possible to complete the work. Drawing SK-TP-PE1-1 shows the alignment in relation to site vegetation. A biological monitor will be onsite to monitor the construction activities in the floodplain.

The sequence of construction activities would be to grub the route and install and backfill the well vault. Trenching would be done in approximately 250-foot increments (between

vaults), with the piping and conduits being joined together in the trench. Installing components in the vault could be completed concurrently with pipeline installation.

Required equipment will include a track hoe for grubbing, excavation, and transport of construction materials, a front-end loader, a track-mounted fusion bonding machine, a water buffalo (trailer with water tank and pump for compaction of trench backfill), and four-wheel-drive Gators. Small gas-driven generators will be needed to install the vault components. Construction will be overseen by a construction superintendent. Construction staff will include equipment operators, pipe installers, electricians, and general laborers (10 to 15 workers).

3.0 Mitigation Measures

PG&E anticipates that the following mitigation measures will apply during construction of the conveying piping and power supply in the Colorado River floodplain from extraction well PE-1 to Valve Vault #1 on the MW-20 bench.

- An onsite biologist and cultural resources monitor will be present as appropriate during trenching activities.
- Minor vegetation removal will be required along the pipeline alignment. A biologist knowledgeable with southwestern flora and fauna will conduct a pre-construction survey and will be present during vegetation removal to identify native tree species. In the event native tree species cannot be avoided, those trees will be transplanted to a nearby location approved by the onsite biologist.
- All applicable measures described in the September 17, 2004 Action Memo authorizing IM No. 3 activities will be implemented.

4.0 Construction Schedule

The main elements of the construction schedule for conveyance piping and power supply in the Colorado River floodplain are as follows:

- DTSC and BLM approval of the design plan for the conveyance facilities from the new extraction well.
- Materials required to construct the pipeline will be be ordered after DTSC and BLM approve the design plan. It is assumed that it may take up to 4 weeks to have all of the materials for the pipeline manufactured and delivered to the site. PG&E will also use any extra piping and materials still onsite from IM No. 3 construction to build the PE-1 pipeline.
- The BLM has indicated that drilling and construction activities in the Colorado River floodplain may be constrained by biological resource considerations (e.g., potential habitat for the Willow Flycatcher may occur within this project area). The breeding season for the Willow Flycatcher extends from the spring through the summer and early fall. Approval to begin construction is subject to consideration by federal representatives, specifically biological resource experts.

It is expected that the conveyance piping and power supply can be constructed, tested, and brought into service over a 4- to 5-week period once materials are delivered to the site and BLM approves construction in the Colorado River floodplain. Mobilization time may vary depending on whether the PE-1 construction is completed in conjunction with current IM No. 3 plant construction or is completed later.

5.0 Required Permits and Approvals

Table 2 provides a listing of permits and approvals that have been identified as applicable to the installation of the extraction well facilities on the BLM-managed land adjacent to the Colorado River, near the PG&E Topock Compressor Station. All applicable and necessary permits and approvals will be documented prior to moving construction equipment to the site.

TABLE 2
Permits, Approvals, and Certifications for Extraction Wells
PG&E Topock Compressor Station, Needles, California

Agency	Permits, Approvals, Certifications, etc.
BLM	BLM issued Action Memorandum authorizing IM activities on BLM land. BLM field office review and approval pending.
DTSC	DTSC is evaluating DTSC's responsibilities under California Environmental Quality Act as they relate to this project.
State Water Resources Control Board/ Colorado River Basin Regional Water Quality Control Board	Notice of Intent and Storm Water Pollution Prevention Plan for construction activities; coverage under statewide general permit.
United States Fish and Wildlife Service (USFWS)	Informal Consultation by BLM with USFWS. Project activities shall avoid potential impacts to sensitive species.
California Department of Fish and Game (CDFG)	CDFG 1600 (emergency exemption)
State Historic Preservation Office	Section 106 Consultation
San Bernardino County	San Bernardino County issued well permit. No other permits pending. Site inspections will proceed consistent with current IM No. 3 construction.

6.0 References

CH2M HILL. 2004a. *Cultural Resources Investigations for Interim Measures No. 3: Topock Compressor Station, Expanded Groundwater Extraction and Treatment System.* August.

_____. 2004b. *Thirty Percent Design Submittal, Interim Measures No. 3, PG&E, Topock Compressor Station, Needles, California*. September 16.

_____. 2005a. *Extraction Well Work Plan, PG&E Topock Compressor Station, Needles, California*. February 23.

_____. 2005b. *Groundwater Extraction Well, PE-1 Installation Report, PG&E Topock Compressor Station, Needles, California.* April 29.

Department of Toxic Substances Control (DTSC). 2004. Letter to Yvonne Meeks/PG&E from Norman Shopay/DTSC. September 21.

_____. 2005a. Letter to Yvonne Meeks/PG&E, from Norman Shopay/DTSC. February 16.

_____. 2005b. Letter to Yvonne Meeks/PG&E, from Norman Shopay/DTSC. February 25.

United States Bureau of Land Management (BLM). 2004. *Time Critical Removal Action, Pacific Gas and Electric Topock Compressor Facility*. March 3.

_____. 2005. Letter to Yvonne Meeks/PG&E, from Robert Henderson/BLM. February 25.

Appendix A
Drawings for PE-1

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B	07/26/05	REVISED ROUTE PER COMMENTS	EFC	SDH
A	05/17/05	Conceptual layout for review and comment	JBW	SDH

RESPONSIBLE ENGINEER

PE #

REVISION APPROVAL		REV B	DATE 07/26/05	PRINT DISTRIBUTION	
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED	DATE	
CIVIL		ELECTRICAL		STATUS	
STRUCTURAL		INST & CONTROL		REV.	
MECHANICAL		ARCHITECTURAL		CLIENT	
PROCESS		ENVIRONMENTAL		FIELD	
PIPING		GEN. ARRANG.		INTRA CO.	

STATUS				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY		/ /		
FOR REVIEW AND APPROVAL	B	07/26/05		
APPROVED FOR CONSTRUCTION		/ /		
REVISED & APPROVED FOR CONSTRUCTION		/ /		

SCALE 1"=30'

PACIFIC GAS & ELECTRIC
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER
EXTRACTION AND TREATMENT
SYSTEM

PROJECT NO. 327061

CH2MHILL

PIPING

PLAN VIEW PROPOSED PE-1 PIPELINE ROUTE

DWG. NO. SK-TP-PE1-1

REV. B

BAR IS ONE INCH ON ORIGINAL DRAWING.
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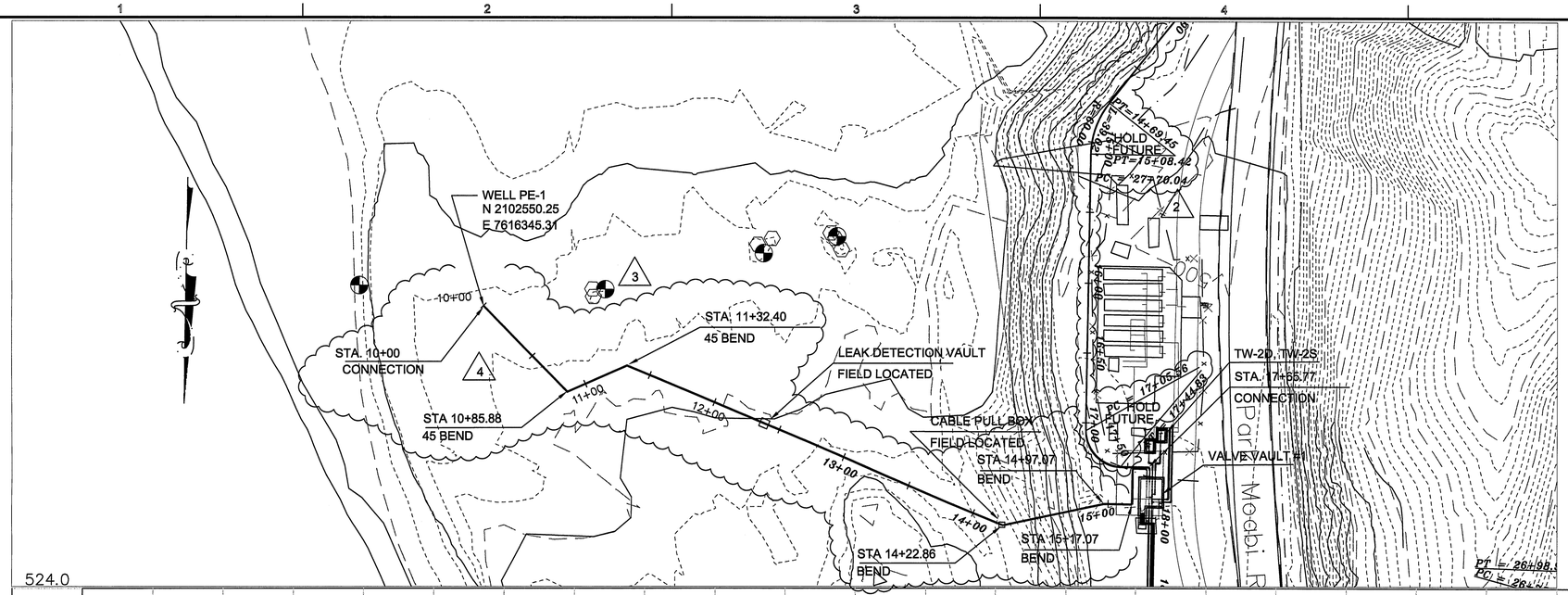

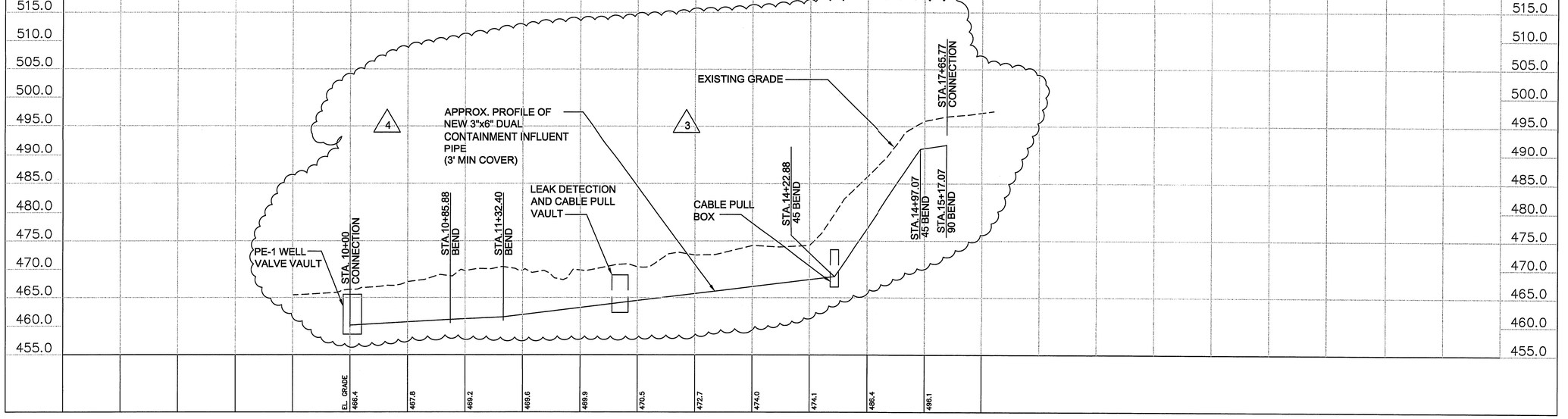

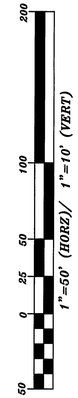

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REGISTERED PROFESSIONAL ENGINEER
DOUGLAS W. LANDFEAR
No. C-66545
Exp. 06-30-06
CIVIL
STATE OF CALIFORNIA

RESPONSIBLE ENGINEER:
DOUGLAS W. LANDFEAR
PE# CEC-66545

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0	8/04	APPROVED FOR CONSTRUCTION	ABH	DWL
1	9/04	REVISED AS NOTED	ABH	DWL
2	11/04	REVISED AS NOTED	ABH	DWL
3	03/05	REVISED ALIGNMENT	WHD	DWL
4	07/05	REVISED ALIGNMENT	EFC	

REVISION APPROVAL		REV 4	DATE 07/26/05
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PIPING		GEN. ARRANG.	

PRINT DISTRIBUTION	
DATE	
STATUS	
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FIELD	
INTRA CO.	

STATUS	REV	DATE	SDE	PEM
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FOR REVIEW AND APPROVAL	A	7/28/04	DWL	
APPROVED FOR CONSTRUCTION	0	8/06/04	DWL	
REVISED & APPROVED FOR CONSTRUCTION	4			

SCALE AS SHOWN

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER
EXTRACTION AND TREATMENT
SYSTEM

PROJ NO. 315994

CH2MHILL

PIPING
PLAN & PROFILE
INFLUENT PIPELINE
STA.10+00 TO 15+00

DWG. NO. TP-PC-10-01-07

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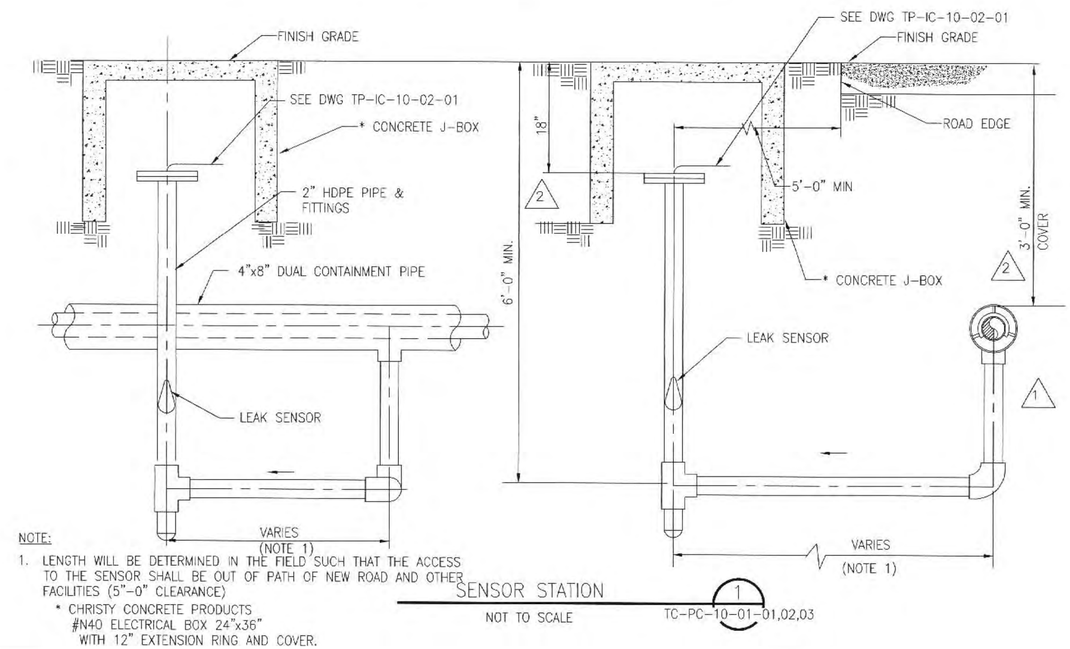

NOTE:
1. LENGTH WILL BE DETERMINED IN THE FIELD SUCH THAT THE ACCESS TO THE SENSOR SHALL BE OUT OF PATH OF NEW ROAD AND OTHER FACILITIES (5"-0" CLEARANCE)

* CHRISTY CONCRETE PRODUCTS #N40 ELECTRICAL BOX 24"x36" WITH 12" EXTENSION RING AND COVER.

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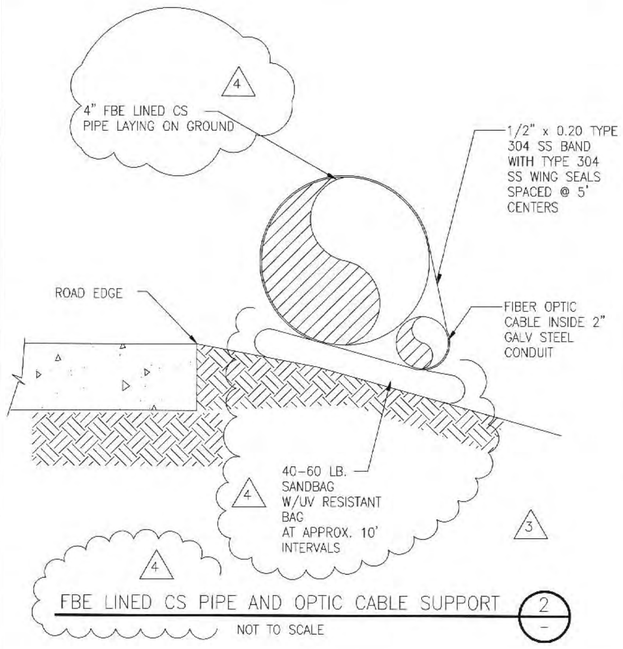

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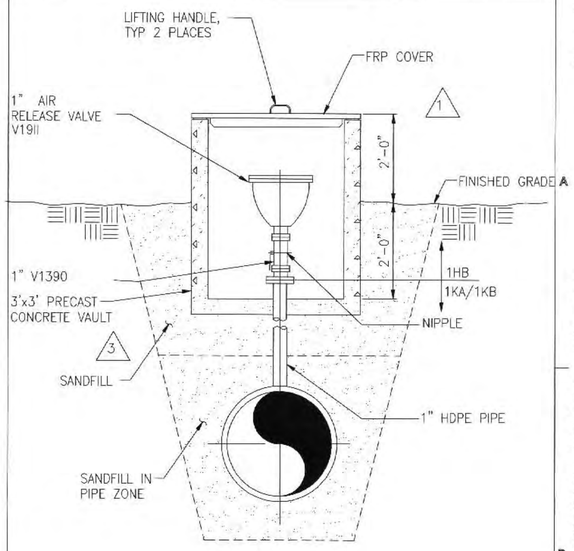
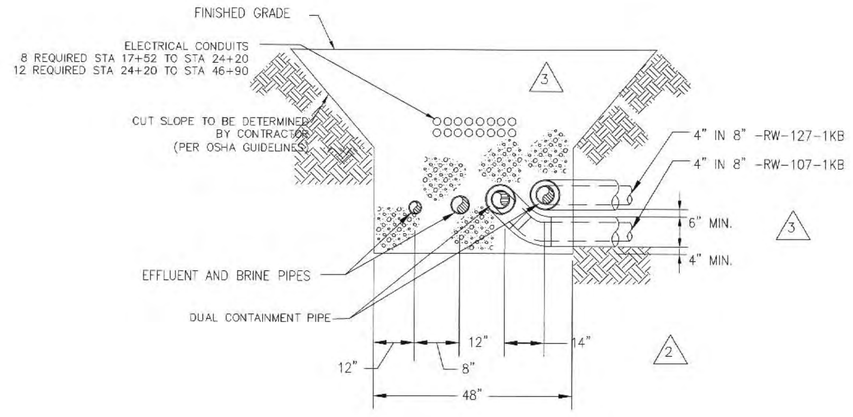
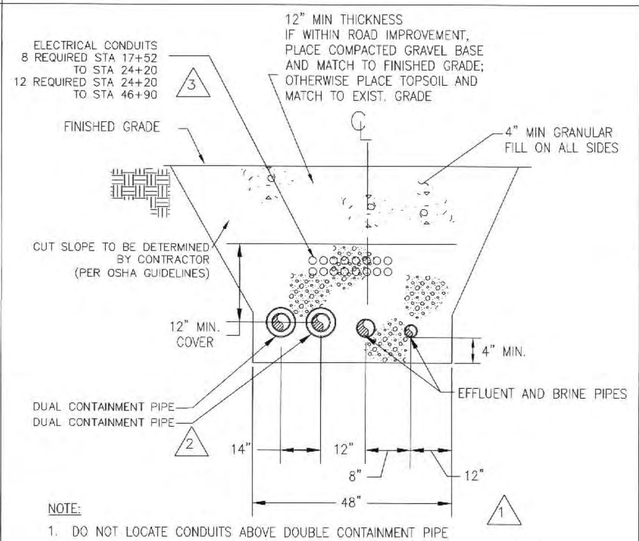


AIR RELEASE VALVE ASSEMBLY — NOT TO SCALE — 3 — TP-PC-10-01-02



CROSS OVER PIPING — NOT TO SCALE — 4 — TP-PC-10-01-01



NOTE:
1. DO NOT LOCATE CONDUITS ABOVE DOUBLE CONTAINMENT PIPE

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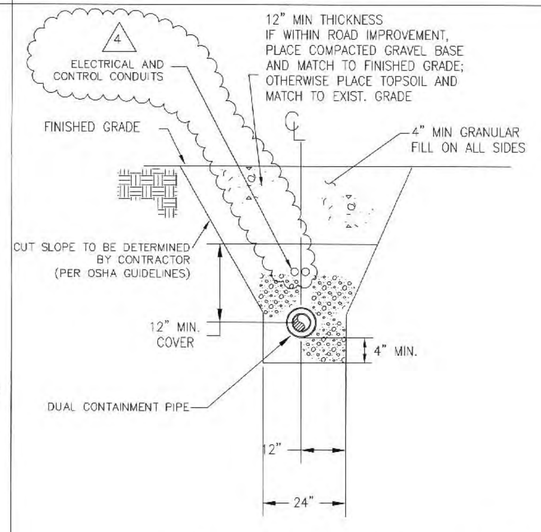

SINGLE PIPE TRENCH DETAIL — NOT TO SCALE — 6 — –

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RESPONSIBLE ENGINEER: DOUGLAS W. LANDFAIR PE# CE-C-66545

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1	8/04	REVISED AS NOTED	ABH	DWL
2	9/04	REVISED AS NOTED	ABH	DWL
3	11/04	REVISED AS NOTED	ABH	DWL
4	02/05	REVISED PIPE MATERIAL	WHD	DWL

REVISION APPROVAL				REV 4	DATE 02/15/05
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PROCESS	—	ENVIRONMENTAL	—	FIELD	
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APPROVED FOR CONSTRUCTION	0	8/06/04	DWL	
REVISED & APPROVED FOR CONSTRUCTION	4	3/8/05	SDH	AJ

SCALE NONE

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

PROJ NO. 315994

CH2MHILL

PIPING
DETAIL SHEET 1

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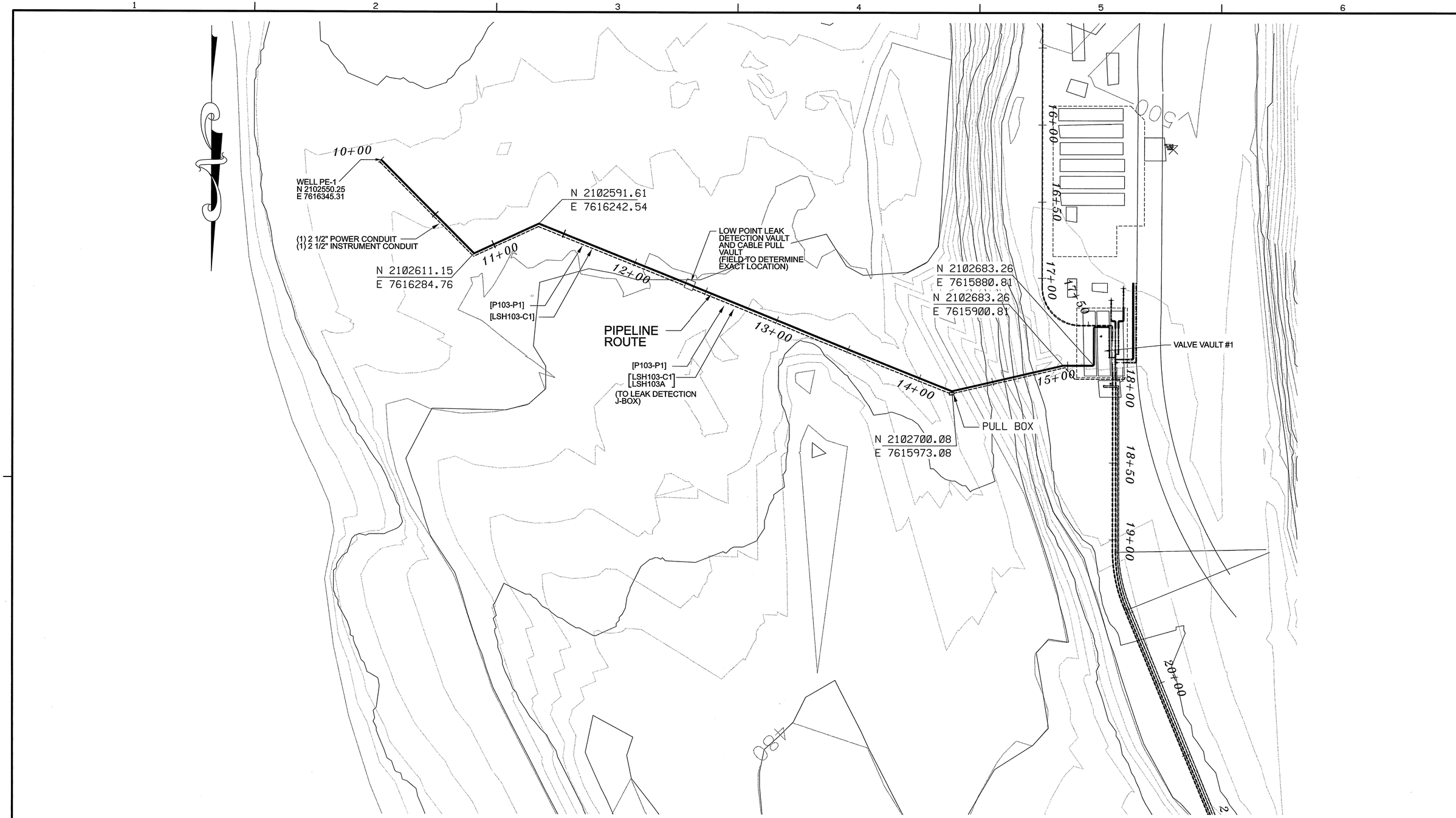

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REVISION APPROVAL — REV A — DATE 07/14/05

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PROCESS	—	ENVIRONMENTAL	—
PIPING	—	GEN. ARRANG.	—

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REVISED & APPROVED FOR CONSTRUCTION		/ /		

SCALE 1"=30'

PACIFIC GAS & ELECTRIC
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER
EXTRACTION AND TREATMENT
SYSTEM

PROJECT NO. 327061

CH2MHILL

ELECRICAL
PLAN VIEW

PE-1 ELECTRICAL CONDUIT ROUTE

DWG. NO. TP-EE-20-01-24 REV. A

REGISTERED PROFESSIONAL ENGINEER
KENNETH C. MAYEUX
E-013804
EXP. 03/31/06
ELECTRICAL
STATE OF CALIFORNIA

RESPONSIBLE ENGINEER
PE #

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FILENAME: 3KTPPE1-2.DLV PLOT DATE: 20-JUL-2005 PLOT TIME:

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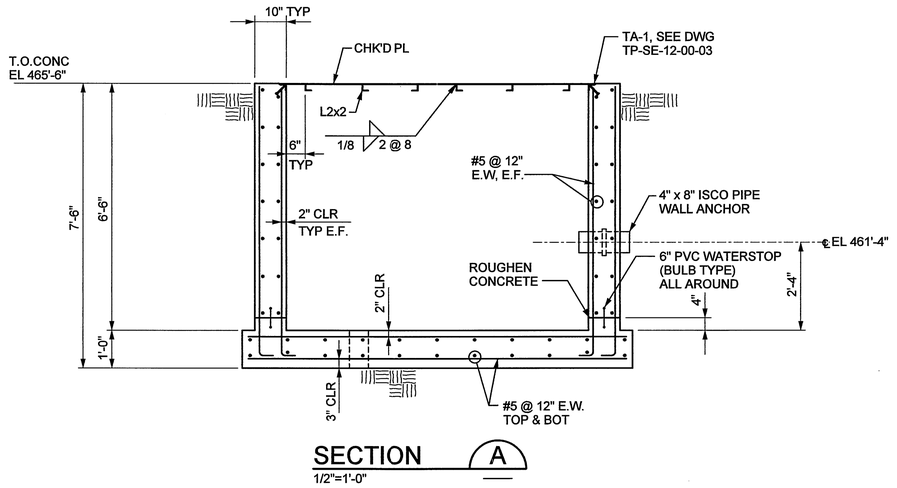

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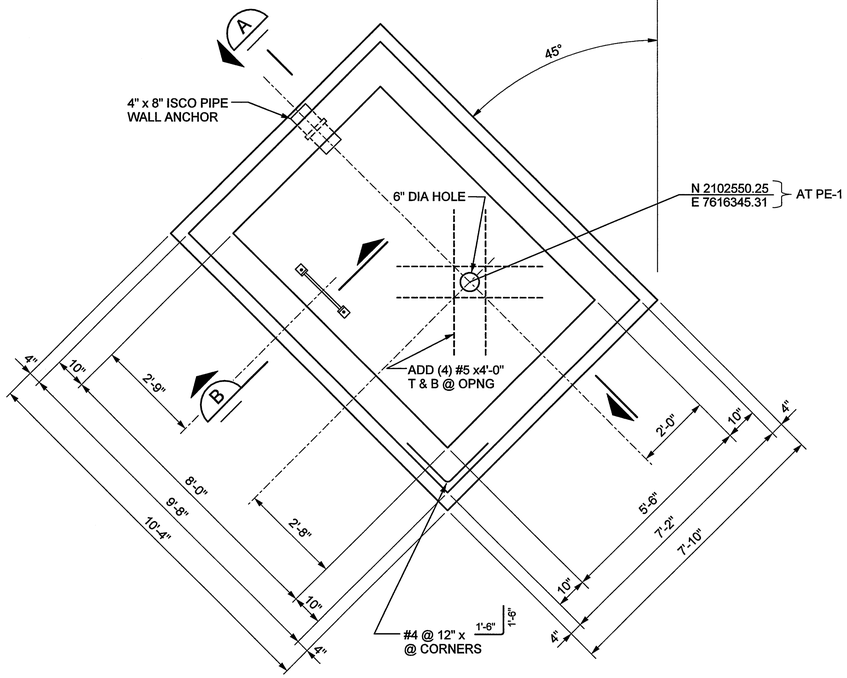

WELL VAULT DETAIL 1

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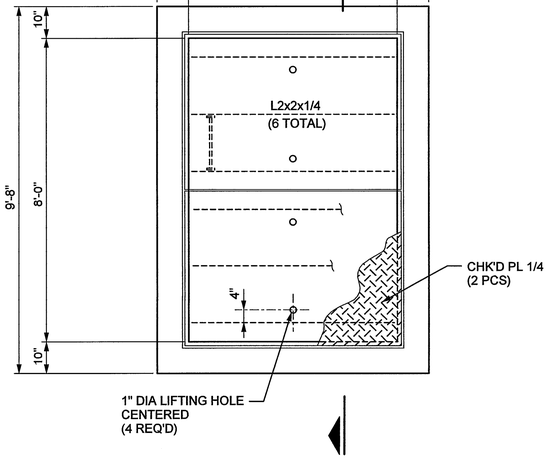

NOTE : 2 REQ'D

WELL VAULT TOP VIEW

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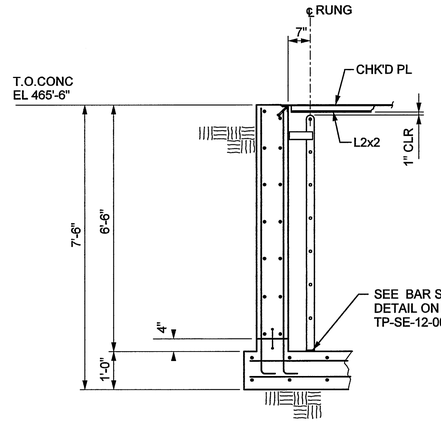

SECTION B

1/2"=1'-0"

NOTES:

1. FOR GENERAL NOTES AND STANDARD DETAILS SEE DRAWINGS TP-SE-12-00-01 THRU 03.
2. WORK THIS DRAWING WITH DWGS TP-SE-20-00-01 THRU 10.

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REGISTERED PROFESSIONAL ENGINEER MARIO N. SCACCO Exp. 12/31/06 No. 37744 CIVIL STATE OF CALIFORNIA 7/18/05

RESPONSIBLE ENGINEER: MARIO N. SCACCO PE# 37744

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TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION
AND TREATMENT SYSTEM

PROJ NO. 315994

CH2MHILL

CONCRETE
PE-1 WELL VAULT #3
SECTIONS & DETAILS
SHEET 1

DWG. NO. TP-SE-20-00-15 REV. 0

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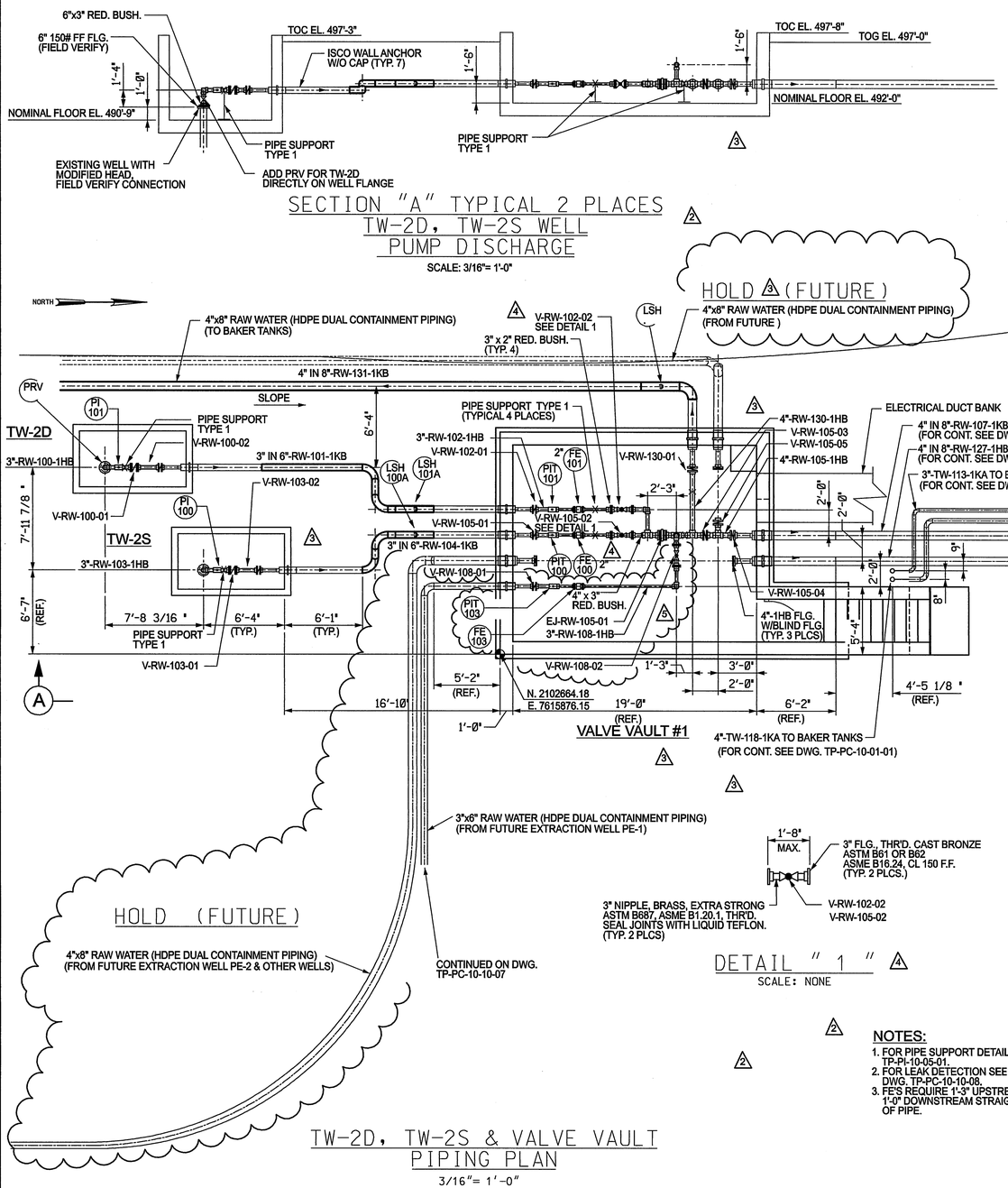

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7/14/05

RESPONSIBLE ENGINEER: STEVEN D. HOYER
RE# CA M31888

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2	10/20/04	REVISED AS NOTED	WHD	SDH
3	01/31/05	REVISED VALVE VAULT PIPING LAYOUT AND ELEVATIONS	WHD	SDH
4	03/08/05	ADDED DETAIL 1	WHD	SDH
5	07/14/05	REVISED VALVE VAULT #1 PIPING PLAN	EFC	
	/ /			
	/ /			

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UNDERGROUND PIPING
EXTRACTION WELLS
TW-2D AND TW-2S WELL VAULTS
BENCH SITE 20 VALVE VAULT

DWG. NO. TP-PI-20-02-02 REV. 5

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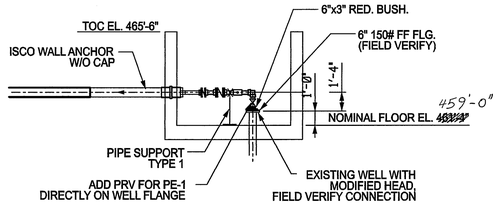
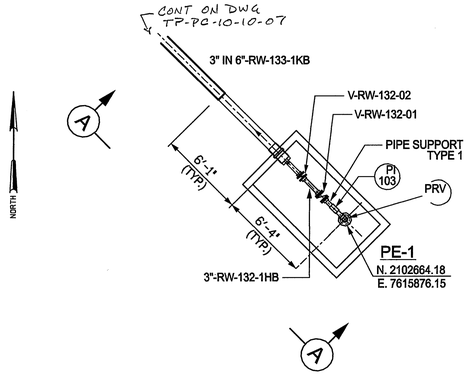


SECTION "A"
PE-1 WELL
PUMP DISCHARGE



PE-1 WELL VAULT
PIPING PLAN

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REGISTERED PROFESSIONAL ENGINEER
STEVEN DOUGLAS HOYER
No. 31888
Exp. 12/31/05
MECHANICAL
STATE OF CALIFORNIA
7/14/05

RESPONSIBLE ENGINEER: STEVEN D. HOYER
PE# CA M31888

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SCALE 1" = 20'

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UNDERGROUND PIPING
EXTRACTION WELLS
PE-1 WELL VAULT

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CONTROL PANEL LCP-100

WELL PE-2 CONTROL

WELL TW-2S CONTROL

WELL TW-2D CONTROL

WELL PE-1 CONTROL

LEAK DETECTION PANEL - 003

LSH LSHH LVL RUN ON RM PRESS FLOW

ALM

-120V

LOR

HS 102

HS 100

HS 101

HS 103

RW 1HB

RW 1KB

LSH 002

LSHH 002

4" IN 8"- RW-139-1KB

FUTURE

4"-RW-138-1HB

V-RW-138-01

VALVE VAULT No. 2

NOTE 1

4" IN 8"- RW-140-1KB

4"-RW-137-1HB

V-RW-137-01

3"-RW-136-1HB

V-RW-136-01

LSH 102A

3" IN 6"-RW-135-1KB

NOTE 1

HOLD

4" IN 8"- FUTURE

LSH 001

LSHH 001

VENT

LT 100

VALVE VAULT No. 1

FE 100

FIT 100

PIT 100

PE 100

3"x2"

V-RW-105-02

MAG

3"-RW-105-1HB

THROTTLING

V-1390

V-RW-105-01

LSH 100A

3" IN 6"-RW-104-1KB

NOTE 1

V-RW-103-02

LT 101

FE 101

FIT 101

PIT 101

PE 101

4" x 3"

EJ-RW-105-01

4"-RW-105-1HB

V-RW-102-02

3"-RW-102-1HB

V-RW-102-01

LSH 101A

3" IN 6"-RW-101-1KB

NOTE 1

V-RW-100-02

LT 103

FE 103

FIT 103

PIT 103

PE 103

V-RW-108-02

4"-RW-130-1HB

V-RW-130-01

V-RW-108-01

3"-RW-108-1HB

V-RW-105-04

V-RW-105-05

V-RW-105-03

4" IN 8" RW-127-1KB SPARE

4" IN 8" RW-127-1KB

TP-PR-10-10-04 [C1]

SPARE TO VALVE VAULT 4

NOTES 1 & 2

4" IN 8" RW-107-1KB

TP-PR-10-10-04 [C1]

TO RAW WATER STORAGE

NOTE 1

LSH

4" IN 8"-RW-131-1KB

TO BAKER TANKS V-RW-131-01

LSH 103A

3" IN 6"-RW-133-1KB

NOTE 1

V-RW-132-02

V-RW-134-03

V-RW-134-02 THROTTLING

LSH 102

LT 102

PRV 102

PI 102

PE 102

PIT 102

FIT 102

FE 102

SET AT 120 PSI

V-1390

3"-RW-134-1HB

V-RW-134-01

3"x2"

MAG

WELL VAULT No. 4

LSH 100

PI 100

3"-RW-103-1HB

V-RW-103-01

WELL VAULT No. 2

LSH 101

PRV 101

PI 101

3"-RW-100-1HB

V-RW-100-01

WELL VAULT No. 1

LSH 103

PRV 103

PI 103

3"-RW-132-1HB

V-RW-132-01

WELL VAULT No. 3

LE 102

P-102

EXTRACTION WELL PE-2

40 GPM x 248 FT. H20

LE 100

P-100

EXTRACTION WELL TW-2S

40 GPM x 180 FT. H20

LE 101

P-101

EXTRACTION WELL TW-2D

90 GPM x 245 FT. H20

LE 103

P-103

EXTRACTION WELL PE-1

40 GPM x 235 FT. H20

NOTES

1. PROVIDE LEAK DETECTION AT LOWS AND/OR EVERY 500 FT.
2. INSTALL AIR RELEASE VALVES AT HIGH POINTS.

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0	09/03/04	APPROVED FOR CONSTRUCTION	EFC	AJ
1	10/13/04	REVISED AND APPROVED FOR CONSTRUCTION	EFC	AJ
2	01/23/05	REVISED AND APPROVED FOR CONSTRUCTION	EFC	AJ
3	03/16/05	DELETED NOTES. APPROVED FOR CONSTRUCTION	EFC	AJ
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REVISED & APPROVED FOR CONSTRUCTION	4	07/20/05		AJ

RESPONSIBLE ENGINEER: Kenneth L. Martins CH4876 Exp. 6-30-05

PE #

REGISTERED PROFESSIONAL ENGINEER — KENNETH L. MARTINS — No. CH04876 — Exp. 06/30/06 — CIVIL — STATE OF CALIFORNIA

SCALE NONE

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

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PROCESS AND INSTRUMENTATION DIAGRAM
SHEET 03
EXTRACTION WELLS
PE-1, PE-2, TW-2D AND TW-2S

DWG. NO. TP-PR-10-10-03 REV. 4

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Appendix C9:
Work Plan for Installation of Extraction Well TW-3D

Pacific Gas and Electric Company®

Yvonne J. Meeks
Site Remediation - Portfolio Manager
Environmental Affairs

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October 7, 2005

Mr. Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

Subject: Final Work Plan for Installation of Extraction Well TW-3D, Interim Measures Groundwater Extraction System, PG&E Topock Compressor Station, Needles, California

Dear Mr. Shopay:

This letter transmits the final *Work Plan for Supplemental Extraction Well TW-3D, Interim Measures Groundwater Extraction System* for the Pacific Gas and Electric Company (PG&E) Topock site. This work plan updates the draft supplemental extraction well work plan submitted on July 29, 2005 in conformance with the California Department of Toxic Substances Control's September 16, 2005 letter. To accelerate the installation of TW-3D, this work plan is being submitted in advance of the conveyance piping design, and in advance of the October 14, 2005 deadline.

If you have any questions, please do not hesitate to contact me. I can be reached at (805) 546-5243.

Sincerely,

Julie Eakins for Yvonne Meeks

Cc: Kate Burger/DTSC
Cathy Wolff-White/BLM

Work Plan for Installation of Extraction Well TW-3D

Interim Measures No. 3 Groundwater Extraction System

PG&E Topock Compressor Station Needles, California

October 7, 2005

Prepared for

California Department of Toxic Substances Control

on behalf of

Pacific Gas and Electric Company

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, CA 94612

Final

Work Plan for Installation of Extraction Well TW-3D
Interim Measures No. 3 Groundwater Extraction System
PG&E Topock Compressor Station
Needles, California

Prepared for
California Department of Toxic Substances Control

on behalf of
Pacific Gas and Electric Company

October 7, 2005

This work plan was prepared under supervision of a

California Certified Engineering Geologist.

Paul Bertucci, C.E.G.
Project Hydrogeologist

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2 Proposed Location for Extraction Well TW-3D
3 Schematic Diagram of TW-3D Extraction Well

Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
bgs	below ground surface
BLM	U.S. Bureau of Land Management
CEQA	California Environmental Quality Act
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
CWG	Topock Consultative Workgroup
DTSC	California Department of Toxic Substances Control
ft/sec	feet per second
gpm	gallons per minute
IDW	investigation-derived waste
IM	Interim Measure
IM-3	Interim Measure No. 3
PG&E	Pacific Gas and Electric Company
PPE	personal protective equipment
PVC	polyvinyl chloride

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station in Needles, California, under the oversight of the California Department of Toxic Substances Control (DTSC). An Interim Measure (IM) consisting of a groundwater extraction and treatment system is being implemented to provide hydraulic control of the plume boundaries near the Colorado River.

In a letter dated June 30, 2005 (DTSC 2005a), DTSC requested PG&E to prepare and submit a work plan to install an additional groundwater extraction well for the IM groundwater extraction system. The purposes of the additional extraction well, as described in DTSC's letter, are to provide redundant pumping capacity for the currently operating extraction well and to allow for pumping and conveyance of groundwater at a maximum rate of 135 gallons per minute (gpm) from the lower interval of the aquifer in the floodplain area to the IM No. 3 (IM-3) treatment plant. The existing extraction system consists of one actively pumped deep well (TW-2D) with a design pumping capacity of 90 gpm, and one standby/inactive shallow well (TW-2S) with design pumping capacity of 40 gpm. The IM-3 treatment facilities were designed to treat a maximum process capacity of 135 gpm.

In response to the June 30 letter from DTSC, PG&E submitted a draft work plan for the installation of a supplemental extraction well for the IM (CH2M HILL 2005a). Six locations were screened, and two locations, identified as TW-3D and PE-3, were found to be viable and were evaluated in the draft work plan. DTSC provided comments on the draft work plan in a letter dated September 16, 2005 (DTSC 2005b). That letter requested a revised work plan for TW-3D, including a final design plan for the conveyance piping, be submitted by October 14, 2005. To accelerate the installation of TW-3D, this revised work plan for TW-3D is being submitted in advance of the conveyance piping design.

This final work plan was prepared in compliance with the conditions set forth in DTSC's June 30 and September 16, 2005 letters. The work plan describes the proposed location, design, and construction methods for the installation of additional extraction well TW-3D that will be incorporated into the IM-3 groundwater extraction system.

1.1 Project Background

The Topock Compressor Station is located in San Bernardino County, approximately 15 miles to the southeast of Needles, California (inset map, Figure 1). In February 1996, PG&E and DTSC entered into a Corrective Action Consent Agreement pursuant to Section 25187 of the California Health and Safety Code. Under the terms of that agreement, PG&E was directed to conduct a Resource Conservation and Recovery Act Facility Investigation and to implement corrective measures to address constituents of concern released in the Bat Cave Wash Area near the PG&E Topock Compressor Station. The primary constituents of concern at Topock are hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]. The source was Cr(VI) salts historically used as a corrosion inhibitor in the station's cooling towers.

DTSC is the lead administrative agency for the project. Assisting DTSC and PG&E with the planning and review of interim remedial measures are the members of the Topock Consultative Workgroup (CWG), constituted under California's Site Designation Process, and consisting of representatives of DTSC, Colorado River Basin Regional Water Quality Control Board, Metropolitan Water District of Southern California, Arizona Department of Environmental Quality, various federal agencies who own or manage adjacent property, and other project stakeholders.

In February 2004, DTSC directed PG&E to initiate an IM in the floodplain area of the site to prevent movement of the chromium plume toward the Colorado River. As stated in DTSC directives, the goal of the IM is "hydraulic control of the plume boundaries near the Colorado River to achieve a net reversal of groundwater gradient from the Colorado River" (DTSC 2005a). Since March 2004, the IM extraction system and associated activities have been continuously operated under DTSC oversight.

Between March 2004 and the present, the IM in the floodplain area included pumping from one or more extraction wells in the MW-20 bench area. In March 2005, an additional extraction well, designated PE-1, was installed in the floodplain area (CH2M HILL 2005b, 2005c), however piping from the extraction well to the treatment system has not yet been constructed and PE-1 has not been operational.

Figure 1 shows the location of the existing IM extraction wells TW-2D, TW-2S, and PE-1, the IM-3 treatment plant, the influent conveyance piping from the MW-20 bench to the treatment plant, and the effluent conveyance piping from the treatment plant to the injection well area (injection wells IW-2 and IW-3). Extraction well TW-2D and proposed additional extraction well TW-3D are located on U.S. Bureau of Reclamation lands that are managed by U.S. Bureau of Land Management (BLM).

1.2 Current IM Extraction System

As directed by DTSC, PG&E is currently pumping groundwater from one deep extraction well (TW-2D), located on the MW-20 bench along the station access road and above the Colorado River floodplain. Other existing extraction wells include one shallow extraction well (TW-2S) located adjacent to TW-2D, and one new extraction well (PE-1) located on the floodplain approximately 450 feet east of TW-2D (Figure 1). The existing pumping rates and operational status of the current extraction well facilities are summarized as follows:

- TW-2D: active pumping well with 4-inch dedicated pump, 90-gpm design pumping rate to the treatment plant,
- TW-2S: connected standby pumping well with 4-inch dedicated pump, 40-gpm design pumping rate to the treatment plant, and
- PE-1: new extraction well, currently awaiting installation of dedicated well pump (40-gpm design pumping rate) and conveyance piping, electrical power and control wiring, and connection to the treatment system pipeline.

1.3 Authorizations

BLM has authorized installation of contingency extraction wells, including additional extraction wells on the MW-20 Bench, for the IM system under a previous Action Memorandum, dated March 3, 2004 (BLM 2004). Implementation of additional extraction wells and piping will require approval of a work plan by the BLM field office. Other permits and approvals are discussed in Section 5 of this work plan.

2.0 Siting and Design of Extraction Well TW-3D

2.1 Summary of Existing IM Extraction Wells on MW-20 Bench

The current active IM extraction well TW-2D is screened from 115 feet to 150 feet below ground surface (bgs), in the lower portion of the Alluvial Aquifer above Miocene conglomerate bedrock. During initial pumping tests, TW-2D was pumped at sustained rates of 90 to 100 gpm. The specific capacity of TW-2D has increased by a factor of two since installation and is currently 8 gpm per foot of drawdown.

Well TW-2D is screened in sandy gravel alluvial deposits that appear to be more conductive than the formations encountered at similar elevations in monitoring wells MW-20 to the south or MW-31 to the north (Figure 2). Although the saturated alluvium above bedrock is thicker to the north of TW-2D, the alluvial deposits at the two monitoring well locations generally had higher clay content and may be less productive than the formation at the TW-2D/TW-2S well pair.

Well TW-2S is screened as a water table extraction well, with the bottom of the screen at 95 feet bgs and the top of the screen at 45 feet bgs. The static water level in both TW-2S and TW-2D is roughly 45 feet bgs under non-pumping conditions. The screened intervals of TW-2S and TW-2D are separated, with TW-2S screened above 95 feet and TW-2D screened below 115 feet. The reason for drilling separate shallow TW-2S and deep TW-2D wells was that an aquitard appeared to be present at the intervening depth in the MW-20 wells, and Consultative Technical Workgroup members expressed concern that a single extraction well should not be screened across the aquitard. However, this aquitard does not appear to be present in the northern portion of the MW-20 bench at the MW-31 location.

2.2 Extraction Well TW-3D Location

The siting and design for the new extraction well TW-3D were based on the successful performance of the TW-2D extraction well. The preferred site for the well is located on the MW-20 bench approximately 15 feet west of well TW-2D, as shown on Figure 2. The results of the review of possible drilling locations summarized in the draft work plan led to selection of TW-3D as the preferred location for a new extraction well. That conclusion was based on:

- The known favorable aquifer conditions near extraction well TW-2D, which has a relatively high specific capacity and has been a successful extraction well. A new appropriately-sized extraction well at the TW-3D location is anticipated to meet the 135-gpm capacity requirement. Other possible locations would have required new hydrogeologic investigation and may not have proven as suitable.
- The TW-3D well site is located in an area of higher chromium concentrations and, based on performance monitoring and groundwater modeling, would be capable of inducing

stronger landward gradients on the plume area in the floodplain than the other evaluated well sites.

- The TW-3D well site is in a previously disturbed area (MW-20 bench) readily accessible to drilling equipment and to the existing IM-3 extraction wells, piping and control facilities.
- The location of TW-3D adjacent to extraction well TW-2D minimizes adjustments to the gradient well pairs used for performance monitoring by maintaining a single pumping center.

2.3 Extraction Well Design

Figure 3 shows a schematic diagram of the well installation and construction specifications for extraction well TW-3D. The boring will be drilled a minimum of 5 feet into the Miocene conglomerate to confirm that bedrock has been encountered. Based on the drilling log for TW-2D, the screened interval is expected to be 40 feet in length, set in the approximate depth range of 110 to 150 feet bgs, in the lower sequence of permeable alluvial deposits that overlie the bedrock surface (Figure 3). The final screen interval for TW-3D will be determined based on the sonic core log in consultation with DTSC. The interval for the TW-3D well screen may be adjusted to exclude potential flowing sands, which were encountered in one of the monitoring wells in the MW-20 well cluster.

The TW-3D well screen will be constructed of 6-inch diameter, Schedule 80 polyvinyl chloride (PVC) 0.050-inch slot-size screen (Boart-Longyear manufacture). This screen has an open area of 27 square inches per foot of screen length. The 8-inch-diameter Schedule 80 PVC riser above the well screen will effectively serve as a pump chamber to enable the use of a 6-inch diameter submersible pump.

For current IM operations, a 135 gpm pump will be installed in TW-3D. However, the maximum potential well capacity for an extraction well at the TW-3D location would be greater than 135 gpm. The estimate of TW-3D capacity is based on the 8 gpm per foot specific capacity measured in nearby well TW-2D. With a pump intake set at 100 feet below land surface, TW-3D would have at least 45 feet of available drawdown. Assuming the same specific capacity as TW-2D and allowing for a 30 percent decrease in well efficiency at higher pumping rates, TW-3D is expected to yield about 250 gpm. For a 40-foot length of 0.50 slot PVC well screen, an entrance velocity of 0.040 feet per second is calculated at a 135 gpm flow rate. As a general rule, wells designed with an entrance velocity less than 0.10 feet per second (ft/sec) will experience less corrosion and encrustation. At 250 gpm, the entrance velocity in the TW-3D well screen would be about 0.07 ft/sec, still below the recommended optimum 0.10 ft/sec value.

Details of the procedures and specifications proposed for the drilling, installation, and completion of TW-3D are provided in Section 3.

3.0 Well Drilling, Construction, and Completion

3.1 Site Preparation

Well TW-3D will be located in an open area of the MW-20 bench, which has been previously disturbed by IM No. 2 operations and TW-2D and TW-2S installation. No grading or clearing of vegetation would be required. The well drilling contractor staff will be provided cultural and natural resources sensitivity training before starting work. All activities associated with TW-3D drilling activities will be coordinated with BLM, to ensure the protection of cultural and biological resources.

Site preparation shall take place prior to execution of drilling and well installation tasks. Site preparation shall include identifying and avoiding biologically and/or culturally sensitive areas and site hazards. The drill rig shall be cleaned prior to mobilizing to the MW-20 bench, as described in Section 4.2. After the drill rig is set up on the drilling site, short-term staging areas will be established (see Figure 2 for location of staging area). The unused IM No. 2 spill containment area south of TW-3D will be temporarily pulled back to provide drill rig access from the south, and replaced after drilling and piping are completed. The underground piping from TW-3D to the Valve-Vault 1 will pass beneath the location of three 20,000-gallon storage tanks that are used to load IM-3 treatment brine onto trucks at the MW-20 bench for offsite disposal (see Figure 2 for location of the brine tanks). To prepare for underground piping and conduit installation between TW-3D and Valve-Vault 1, the southern and eastern brine tanks will be lifted by crane and moved to the PG&E Topock Compressor Station property for temporary storage. The tanks will remain empty while in temporary storage.

Plastic sheeting will be laid on the ground surface in the staging areas as necessary to keep the drilling materials and equipment clean, and to minimize impacts to the ground surface from the drilling materials and equipment. Materials to be temporarily stored at the well site include drilling equipment and well construction materials (for example, casing, sand, bentonite, and grout). Additional supplies and equipment not in use will be stored at the Topock Compressor Station, near the core storage area.

3.2 General Drilling Requirements

Drilling and well installation shall conform to state and local regulations. CH2M HILL will obtain all permits, applications, and other documents required by state and local authorities. Utility clearances will also be obtained prior to commencement of drilling. The drilling, core/borehole logging, and well construction will be performed under the supervision of a California Professional Geologist. The drilling and well installation activities will be conducted in accordance with methods and procedures in the *Field Procedures Manual* (CH2M HILL 2005d) and associated *Health and Safety Plan* (CH2M HILL 2005e).

3.2.1 Drilling Method

The new extraction well TW-3D will be drilled using sonic drilling equipment similar to that used to install the floodplain extraction well PE-1 and monitoring wells. The sonic drilling method has proven to be effective at the PG&E Topock site. The two most common alternative methods, mud rotary and air rotary drilling, have serious drawbacks for this particular drilling task. Drilling using mud rotary methods close to extraction well TW-2D would require shutting down TW-2D during drilling to prevent drilling mud from being drawn into the pumping well. The air rotary drilling method includes discharge of drill cuttings and groundwater which would produce a fine mist of groundwater from the top of the cyclone. Hexavalent chromium could be present in this mist and this would pose a potential hazard to drilling crews, likely requiring the use of respirators and waterproof Tyvek suits. This level of personal protective equipment (PPE) would require measures to control heat stress, which would limit the working time and greatly slow the progress of the drilling. Sonic drilling will provide a safe and effective method for installation of the additional extraction well at the anticipated depth.

The sonic drilling technique involves advancing a rotating and vibrating drill head or core barrel through the subsurface. This method can produce a continuous core, generates minimal drilling wastes, and can typically drill through gravel, cobble, and competent bedrock formations. The continuous core obtained from sonic drilling will facilitate the final screened interval selection for the new extraction well.

The pilot boring for selective core logging will be approximately 7 inches in diameter. The borehole will be drilled out to approximately 12.8 inches in diameter from the ground surface to a minimum depth of 50 feet bgs (Figure 3). The lower section of the borehole for extraction well installation will be drilled out to approximately 10.7 inches in diameter, and straight enough to allow the constructed extraction well to accommodate the installation of a pump.

Potable water from the Topock Compressor Station may be added during drilling to assist with lifting cuttings from the well when advancing casing. The driller will keep the amount of water added to a minimum. The field geologist will record the volume of water added and ensure that this water volume, at a minimum, is removed from the well during development. Controls will be established to contain excess water at the drill site.

The location of the proposed extraction well in the MW-20 bench area will allow use of truck-mounted drilling equipment. A truck-mounted sonic drilling rig similar to the type that was used to construct the previous IM monitoring wells will be used to drill the new extraction well.

To support the drilling rig, a forklift and one or more pickup truck crew vehicles will be used to transport crew, equipment, and materials from staging areas near the compressor station to the drill site. The forklift will also be used to transport cuttings and excess core generated from drilling the soil borings to lined, steel rolloff soil bins that will be temporarily staged on the MW-20 bench, on PG&E property. Disposal procedures for the investigation-derived waste (IDW) are discussed in Section 4.

3.2.2 Core Logging

The core logging of the pilot borings will be performed under the supervision of a California Professional Geologist. The field log will document the following information at each pilot boring:

- Unique soil boring or well identification
- Purpose of the soil boring (for example, extraction well)
- Location in relation to an easily identifiable landmark
- Names of the drilling subcontractor and logger
- Start and finish dates and times
- Drilling method
- If applicable, types of drilling fluids and depths at which they were used
- Diameters of surface casing, casing type, and methods of installation
- Depth at which saturated conditions were first encountered
- Lithologic descriptions (based on the Unified Soil Classification System)
- Other geologic information including clast rounding and lithology
- Sampling-interval depths
- Zones of caving or heaving
- Depth at which drilling fluid was lost and the volume lost
- Changes in drilling fluid properties
- Drilling rate
- Drilling rig reactions, such as chatter, rod drops, and bouncing

The initial pilot boring will be cored from a depth of 80 feet bgs to bedrock, which is expected to be approximately 150 feet bgs at the TW-3D drill site. The field log from this coring will be used to select the final screen interval in consultation with DTSC. Particular attention will be paid to identifying the bottom of a fine-grained unit that forms a local aquitard. This unit was encountered at a depth between 100 and 110 feet bgs in TW-2D. Well TW-3D will be screened below this depth. Flowing sands were encountered within the fine-grained horizon during drilling at well MW-20. The TW-2 wells were drilled using mud rotary methods, which did not allow for identification of flowing sands. It is therefore not known if flowing sands exist at the TW-3D location. If any flowing sand zone more than 2 feet thick is observed in the core from TW-3D, the well screened interval may be modified to avoid screening across the flowing sands.

3.2.3 Geophysical Logging, Spinner Logging, and Depth-Specific Sampling

A suite of electric logs and a natural gamma log was run in the mud-filled borehole at TW-2D, located approximately 15 feet away from TW-3D. A spinner log was also run in well TW-2D. Considering the proximity of the two boreholes, geophysical logging and spinner logging in TW-3D would provide relatively little value, and would not be used in any decision making about the design or operation of the well. Geophysical logging is therefore not proposed.

Depth specific sampling during drilling has been performed in monitor wells at Topock to provide data on intervals that were not screened and in some cases to assist with screened interval selection. Since the screened interval at TW-3D is determined by the need to pump

the maximum amount of water, depth-specific sampling would be of little value. It would also delay the construction of the well. Therefore, depth-specific sampling is not proposed.

3.3 Extraction Well Construction

The TW-3D extraction well will be installed and constructed with the base of the well at an approximate depth of 150 to 160 feet bgs, the estimated lowest depth of permeable deposits in the alluvial aquifer. It is anticipated that the extraction well will be selectively screened in the deep portion of the aquifer with approximately 40 feet of screen (Figure 3). The final depth and quantities of material will be determined by the onsite CH2M HILL representative following drilling of a pilot hole.

3.3.1 Casing Requirements

The extraction well will be completed with 6-inch-diameter Schedule 80 PVC screen coupled to 8-inch-diameter Schedule 80 PVC blank casing using a casing adaptor (Figure 3). Casing requirements are as follows:

- All casing will be new, unused, and decontaminated.
- Glue will not be used to join casing, and casings will be joined only with compatible threads that will not interfere with the planned use of the well.
- All PVC will conform to American Society for Testing and Materials (ASTM) Standard F 480-88A or the National Sanitation Foundation Standard 14 (Plastic Pipe System Components and Related Materials).
- The casing will be straight and plumb.

3.3.2 Well Screen Requirements

Well screen requirements are as follows:

- All requirements that apply to casing will also apply to well screen, except for strength requirements.
- The well screen will be 6-inch-diameter Schedule 80 PVC slotted screen, with 0.050-inch slot size (equivalent open area of 27 square inches per foot of screen length).
- The bottom of the screen will be capped with a blank casing sump (sediment trap) of 2 to 5 feet in length.

As noted in 3.2.2 above, the screened interval will be below the bottom of an aquitard that is expected to be encountered around 100 to 110 feet bgs. The screened interval may be modified to avoid screening zones of flowing sand. Modifications could include raising, lowering, or shortening the screened interval if the flowing sand zone is near the top or bottom. If the flowing sand zone is in the middle of the screened interval, a short section of blank casing may be installed within the screened interval across the depth of the flowing sand zone, to prevent the sand from entering the well and impacting pumping operations.

3.3.3 Annular Space Requirements

The annular space will be filled with a filter pack, a transition sand, a bentonite seal, or casing grout between the well casing and the borehole wall. Centralizers will be used as appropriate to assure a straight and true well installation.

3.3.4 Filter Pack Requirements

The filter pack will consist of Lonestar 6-12 sand (or equivalent) and will extend from the bottom of the hole to approximately 5 to 7 feet above the top of the well screen. The top of the sand pack will be sounded to verify its depth during placement. A tight-fitting swab will be used to surge the well during placement of the filter pack. Additional filter pack will be placed as required during swabbing to bring the level of the pack to 5 to 7 feet above the screen. A minimum 2-foot-thick layer of fine sand will be placed above the 6-12 sand filter pack to minimize the potential for the bentonite slurry (seal) material to invade the filter pack adjacent to the top of the well screen during well construction.

The contractor will record the volume of the filter pack emplaced in the well. With the approval of the field geologist, potable water, obtained from the Topock Compressor Station may be used to emplace the filter pack.

3.3.5 Bentonite Seal Requirements

The bentonite seal requirements are as follows:

- The bentonite seal will consist of at least 2 feet of bentonite between the filter pack and the casing grout.
- Only 100 percent sodium bentonite chips or pellets will be used.
- Once deposited, bentonite chips or pellets will be hydrated with potable water if the transition seal is not below the water table; alternately, a bentonite slurry (1 gallon of water for 2 pounds bentonite) will be applied.

3.3.6 Casing Grout Requirements

The casing grout requirements are as follows:

- The casing grout will extend from the top of the bentonite seal to ground surface.
- Based on design requirements, the grout will either be a 30 percent solids bentonite grout or a cement mixture in the following proportions:
  - 94 pounds of neat Type I or II Portland or American Petroleum Institute Class A cement per 6 gallons of potable water
  - 2 to 3 pounds of 100 percent sodium bentonite powder per bag of cement

- All grout will be pumped into place using a tremmie pipe.
- The expected volume of each ingredient in the grout mixture will be precalculated and documented.
- No accelerator compounds will be used in the grout mixture.

The San Bernardino County well inspector will be notified in advance of grouting operations to provide an opportunity to observe this activity.

3.3.7 Surface Completion Requirements

The supplemental extraction well(s) will be initially completed with a temporary above-ground locking stove-pipe well monument. After well development and testing, the surface completions will be converted to a below-grade utility vault similar to those installed at extraction wells TW-2D and TW-2S. The vaults will be constructed with provisions for connecting the existing underground conveyance piping to the IM-3 treatment system. The piping design plan will be completed and submitted under separate cover by October 14, 2005.

3.3.8 Well Development

Following well construction and annular seal placement, the new extraction well will be developed using a combination of surge block, bailer, and pumping. Development will not begin until at least 48 hours after placement of the grout. During development, temperature, pH, specific conductance, and turbidity will be measured using field instruments. Well development will continue until field parameters stabilize and turbidity is reduced to less than 50 nephelometric turbidity units. The purge water produced during well development will be collected in phase separator bins or storage tanks in the staging area. Disposal procedures for the IDW are discussed in Section 4.1. Well development activity will be documented; information to be recorded will include development procedure, time and date of development, volume of water removed, and field parameters measurements.

3.3.9 Well Completion Diagrams

A completion diagram will be prepared for the extraction well. It will include the following information:

- Well identification
- Drilling method
- Installation date(s)
- Elevations of ground surface and the measuring point
- Total boring depth
- Lengths and descriptions of the screen and casing
- Lengths and descriptions of the filter pack, bentonite seal, casing grout, and any back filled material

3.4 Extraction Well Initial Sampling

At the end of the step-drawdown test, the test pump will be throttled down to its lowest sustainable flow and the well will be sampled for initial water quality characterization. The sampling activity will follow the procedures, analytical methods, reporting limits, and quality control plan used for the Topock groundwater sampling and drilling investigation activities, as described in the Topock program *Field Procedures Manual* (CH2M HILL 2005d).

Groundwater samples from the new extraction well will be analyzed for Cr(VI), Cr(T), total dissolved solids, total suspended solids, specific conductance, pH, chloride, sulfate, alkalinity, carbonate/bicarbonate, nitrate, field-filtered metals (calcium, magnesium, manganese, sodium, potassium, barium, strontium, iron), fluoride, ammonium, total phosphate, silica (reactive), and total organic carbon. Field water quality parameters (temperature, pH, specific conductance, oxidation-reduction potential, and turbidity) will also be measured.

Following connection to the conveyance system and commissioning, extraction well TW-3D will be incorporated into the IM operations and performance monitoring programs (CH2M HILL 2005f, 2005g). New well TW-3D will be sampled at the same frequency as well TW-2D.

3.5 Well Testing

Initial estimates of the well capacity and hydraulic properties of TW-3D will be obtained by pumping the well in stages during the latter portion of well development to accomplish a step test. During the step test (approximate duration 2 hours), water levels in nearby deep-monitoring wells will be recorded using pressure transducer data loggers. Steps on the order of 50, 80, 110, and 140 gpm will be used for this testing. Based on the results of the step-test that was performed on well TW-2D, a 10-minute duration for each step will be sufficient for water level to stabilize. The estimated 4,000 gallons of water pumped from the well during development and step testing will be managed as described in Section 4.1. Hydraulic testing will be conducted in accordance with methods and procedures described in the *Field Procedures Manual* (CH2M HILL 2005d).

3.6 Well Connection and Piping

TW-3D will be completed with a below-grade vault similar to the TW-2S and TW-2D well pair. Underground piping with double-walled construction will be installed to connect the new extraction well to the IM-3 system Valve-Vault 1 on the MW-20 bench. The design for the conveyance piping and well connection will be submitted separately from this well installation work plan.

4.0 Waste Management and Equipment Decontamination

4.1 Waste Management

Several types of waste materials will be generated during the drilling, development, and sampling of the supplemental extraction wells. IDW materials that will be generated include groundwater, drill cuttings, and incidental trash.

Water generated during drilling, development, and testing activities will be collected in bins or portable storage tanks temporarily located on the north end of the MW-20 bench (see Figure 2). Secondary containment will be setup at the drilling area for the portable storage tanks or bins. After characterization, water generated from the TW-3D installation will be introduced to the IM-3 treatment facility, or transported offsite to a permitted disposal facility.

Drill cuttings include the fragments of rock and soil that are removed to create the borehole. The cuttings will be contained in lined roll-off bins at the IDW staging area during the drilling and sampling activities. After sampling and characterization, all cuttings bins will be removed from the IDW staging area for disposal in a permitted offsite disposal facility. It is estimated that the soil IDW bins temporarily staged at the drill site will not remain in excess of 45 days.

Incidental trash will be collected at the end of each drilling shift and hauled off the drill site to an appropriate offsite disposal facility.

4.2 Equipment Decontamination

The back of the drilling rig and all downhole drilling tools will be decontaminated prior to arrival at the site, and subsequent to finishing the well installation. Decontamination will be accomplished by steam cleaning the core barrel, drill stem, drive casing, and back of the drilling rig. Steam cleaning will be conducted on a temporary decontamination pad located on PG&E Compressor Station property near the core storage sheds (Figure 2). Rinsate from the decontamination operation will be collected on the containment pad and transferred to the cuttings bin or IDW water tanks located at the IDW staging area at the MW-20 bench (see Figure 2). The decontamination rinsate will be managed along with the cuttings or IDW water.

5.0 Permits and Approvals

Table 1 provides a listing of permits and approvals applicable to the installation of extraction well TW-3D at the MW-20 bench on the BLM-managed land at the Topock site. All applicable and necessary permits and approvals will be documented prior to moving drilling equipment to the drilling site.

TABLE 1
Permits, Approvals, and Certifications for TW-3D Extraction Well
Interim Measure No. 3 Groundwater Extraction System
PG&E Topock Compressor Station, Needles, California

Agency	Permits, Approvals and Certifications
U.S. Bureau of Land Management	BLM Action Memorandum dated March 3, 2004, authorized potential extraction wells including additional extraction wells on the MW-20 bench. Implementation of additional extraction wells and piping will require approval of a work plan by the BLM field office.
California DTSC	California Environmental Quality Act (CEQA) Notices of Exemption dated February 10, 2004 and June 30, 2004 (emergency project).
U. S. Fish and Wildlife Service	Informal Consultation not anticipated, subject to final BLM decision.
State Historic Preservation Office	30-day Tribal consultation not anticipated – subject to final BLM decision.
San Bernardino County	Well Drilling Permit.

6.0 Schedule and Reporting

On September 30, 2005, PG&E submitted a proposed schedule for the design, construction, and commissioning activities for the TW-3D extraction well (CH2M HILL 2005h). Based on discussions with DTSC, the schedule for submittal of the final work plan and design report was updated and a target start date for site preparation and contractor mobilization on October 17, 2005 was selected. Delays in mobilization beyond October 17 will result in likely delays in completing each of the subsequent activities. Following agency approvals, the well installation field activities are estimated to take approximately 15 days to complete. All work will be completed during daylight hours.

The anticipated durations for the TW-3D drilling, well completion, testing, and sampling are listed below.

1 day	Driller mobilization and staging
3 to 4 days	Well drilling
1 day	Well screen decision call with DTSC; begin to ream borehole
3 days	Well construction
1 day	Driller demobilization
2 to 3 days	Well development and step test (using development rig)

Following completion of the fieldwork, a summary report will be prepared to document the installation, and results of sampling and testing of the new extraction well. The report will include the drilling and well completion logs, and the results and records for well development, step-testing, and initial groundwater sampling. The summary report will be submitted approximately 6 weeks after completion of the fieldwork.

7.0 References

CH2M HILL. 2004. Field Activity Summary for Supplemental Interim Measures No. 2 Well Installation. December 22.

_____. 2005a. Draft Work Plan for Supplemental Extraction Well, Interim Measures Groundwater Extraction System, PG&E Topock Compressor Station, Needles, California. July 29.

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Department of Toxic Substances Control (DTSC). 2005a. Letter to Yvonne Meeks, PG&E, from Norman Shopay, DTSC. June 30.

_____. 2005b. Letter to Yvonne Meeks, PG&E, from Norman Shopay, DTSC. September 16.

U.S. Bureau of Land Management (BLM). 2004. Time Critical Removal Action, Pacific Gas and Electric Topock Compressor Facility. March 3.

Figures

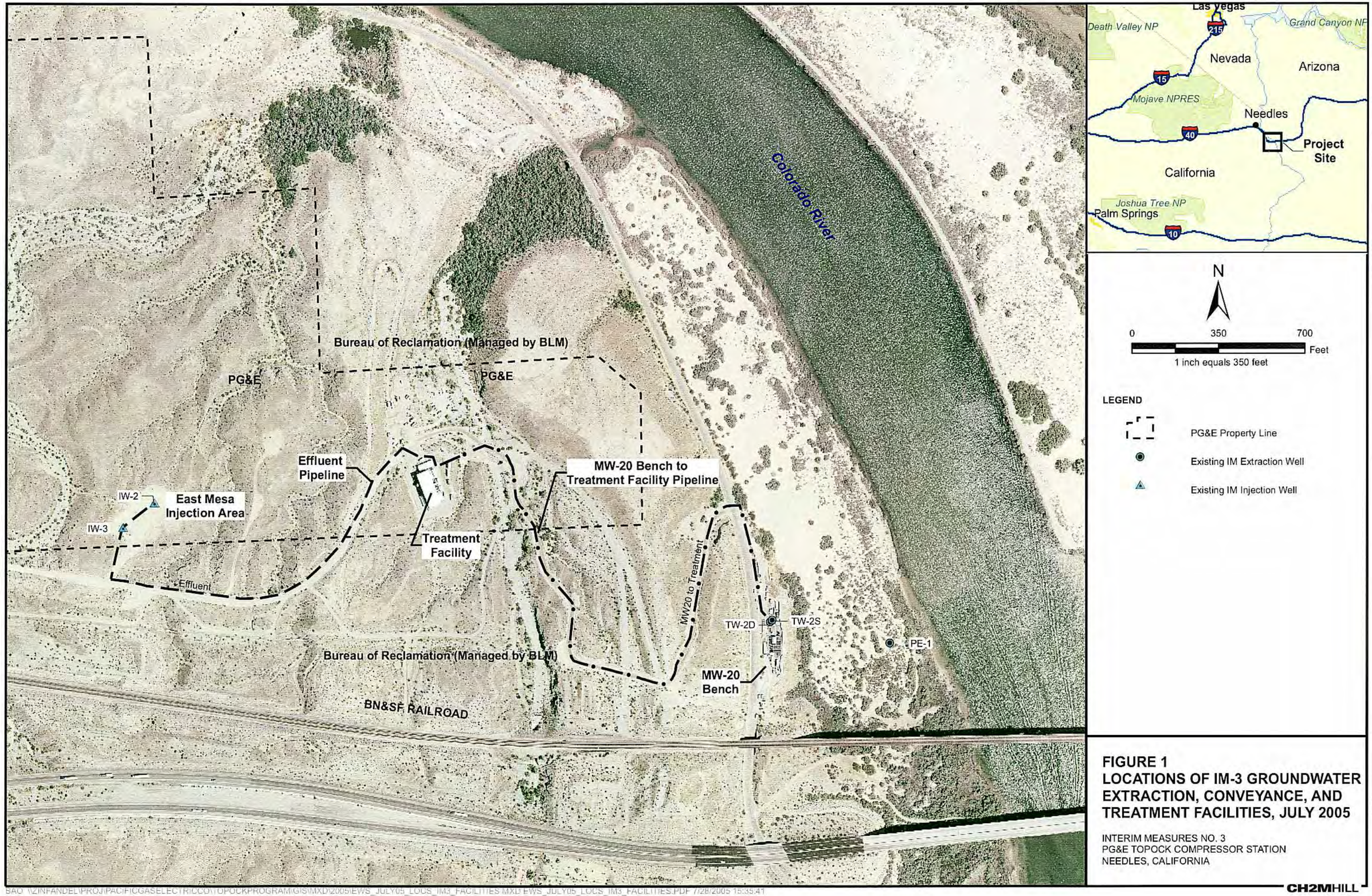

FIGURE 1
LOCATIONS OF IM-3 GROUNDWATER EXTRACTION, CONVEYANCE, AND TREATMENT FACILITIES, JULY 2005

INTERIM MEASURES NO. 3
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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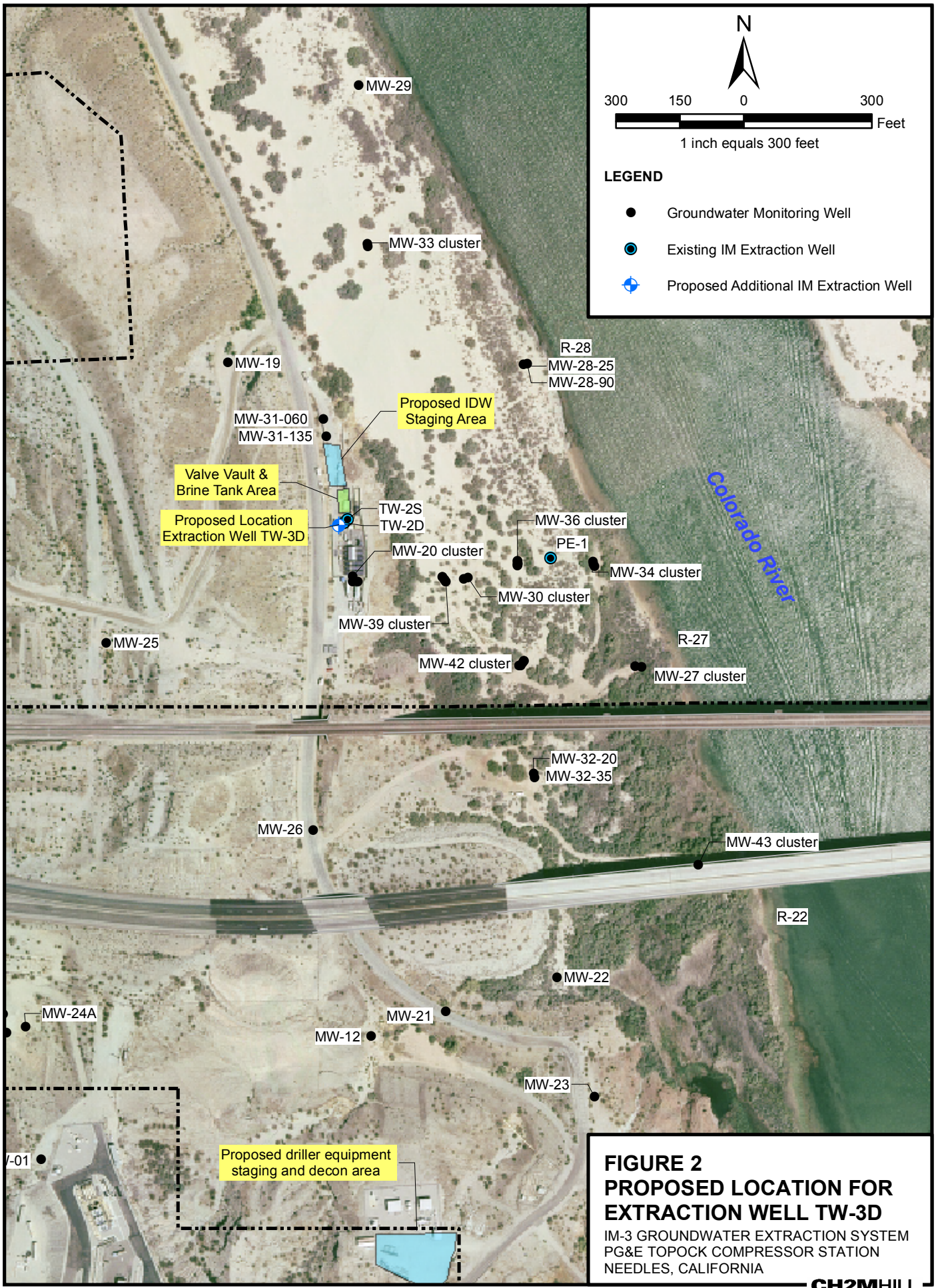

FIGURE 2
PROPOSED LOCATION FOR EXTRACTION WELL TW-3D
IM-3 GROUNDWATER EXTRACTION SYSTEM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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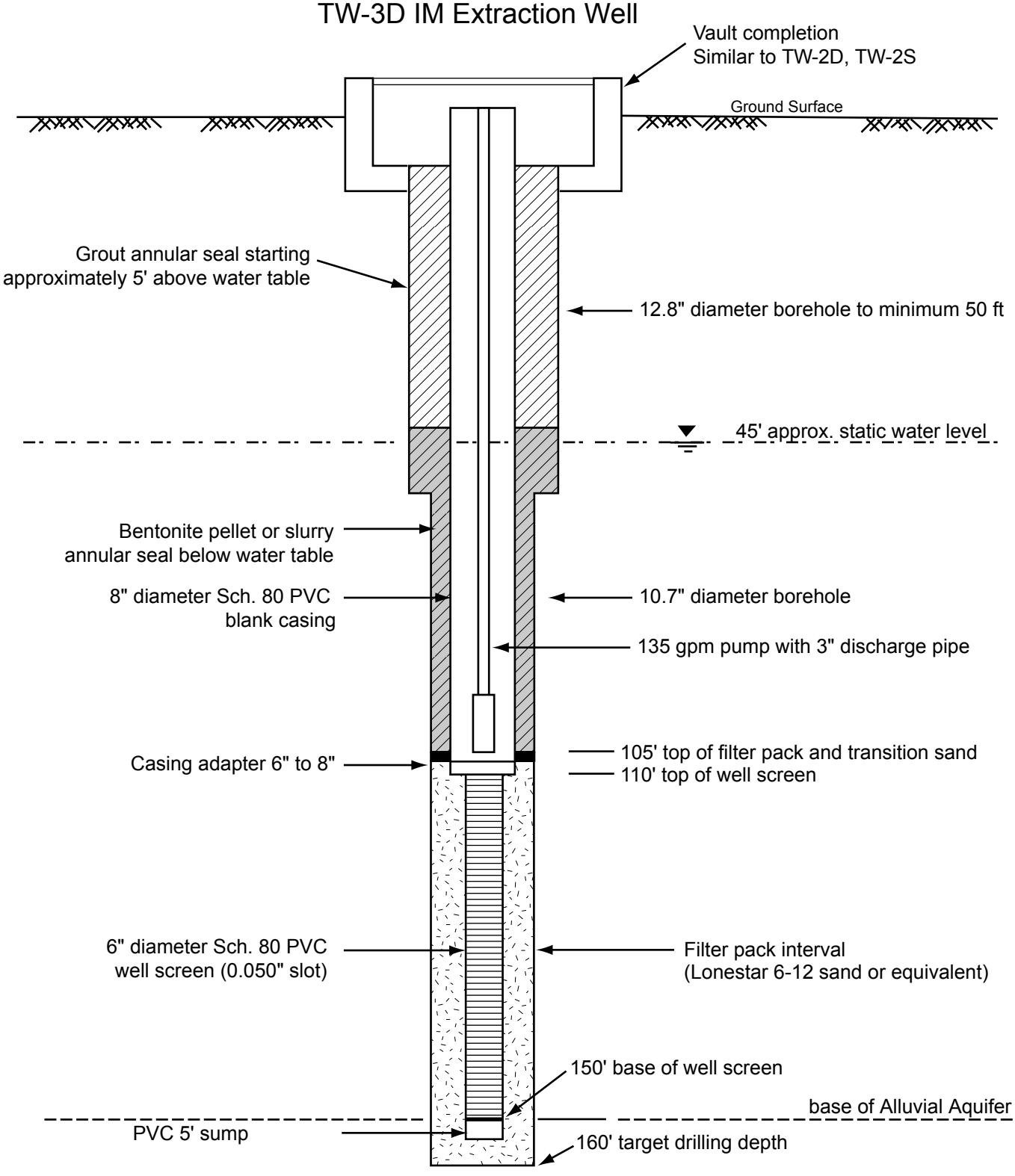

DIAGRAM NOT TO SCALE
All depths are approximate.

Actual depths for extraction wells will be determined based on field conditions in consultation with DTSC.

FIGURE 3
SCHEMATIC DIAGRAM OF TW-3D EXTRACTION WELL
IM NO. 3 GROUNDWATER EXTRACTION SYSTEM
PG&E TOPOCK COMPRESSOR STATION

CH2MHILL

Appendix D:
Planned Projects

Appendix D1:
IM No. 3 Draft Soil Sampling Work Plan

Pacific Gas and Electric Company®

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February 3, 2006

Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue, Suite 200
Berkeley, California 94710

Subject: Interim Measures No. 3 Closure Planning - Baseline Soil Sampling Work Plan
PG&E Topock Compressor Station, Needles, California

Dear Mr. Shopay:

Enclosed is a copy of the revised final Interim Measures No. 3 (IM3) Closure Planning Baseline Soil Sampling Work Plan. A copy of this work plan was provided to you and the Bureau of Land Management (BLM) on January 5, 2006. This work plan has been revised in response to comments received from DTSC on January 17, 2006. We look forward to your approval of this work plan. If you have any questions regarding this document, please contact me at (805) 546-5243.

Sincerely,

Julie Eakins for Yvonne Meeks

Enclosure

Interim Measures No. 3 Closure Planning - Baseline Soil Sampling Work Plan

PREPARED FOR: Pacific Gas & Electric

PREPARED BY: CH2M HILL

DATE: February 3, 2006

Introduction

Pacific Gas and Electric Company (PG&E) is addressing hexavalent chromium [Cr(VI)] in groundwater at the Topock Compressor Station located in Needles, California under the Resource Recovery and Conservation Act (RCRA) corrective action program. PG&E is performing these activities under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). On July 8, 2004, PG&E submitted the *Summary of Proposed Project for Interim Measures No. 3* to manage increased volumes of extracted groundwater, in compliance with DTSC directives (CH2M HILL 2004). In a letter dated June 30, 2004, DTSC approved with conditions the *Summary of Proposed Project for Interim Measures No. 3* (DTSC 2004). The goal of Interim Measure No. 3 (IM No. 3) is hydraulic control of the plume boundaries near the Colorado River to maintain a landward gradient. The IM No. 3 system consists of a treatment facility, piping to carry untreated groundwater from the extraction wells to the treatment facility, and piping to carry treated water from the treatment facility to injection wells for re-injection.

As part of PG&E's planning for the ultimate closure and restoration of the areas used for interim measures to conditions consistent with those existing on the property prior to facility operation, this work plan has been developed to provide a scope of work and schedule to collect soil samples from the vicinity of the IM No. 3 system to assess background concentrations of metals and inorganic compounds in this area.

This baseline soil sampling work plan was originally distributed to DTSC and the United States Bureau of Land Management (BLM) on July 5, 2005. Comments received from the DTSC (DTSC 2005) and BLM (BLM 2005) were incorporated into a revised work plan, dated January 5, 2006, distributed to DTSC and BLM. Additional comments received from DTSC on January 17, 2006 (DTSC 2006) have been incorporated into this work plan.

Objectives

The primary objective of the IM No. 3 soil sampling program is to determine naturally-occurring background concentrations of metals, including Cr(VI), total chromium [Cr(T)], and other inorganic compounds in soil in the immediate vicinity of the IM No. 3 system. As part of future IM No. 3 closure activities, or in the event of a release of wastewater and/or treatment chemicals from the treatment system or pipelines during

operation that necessitates some cleanup prior to closure, such baseline data will be used to assess impacts, determine the appropriate level of site restoration, and guide remediation efforts (if necessary).

Project Background

For the purposes of this work plan, the IM No. 3 system can be divided into three primary components, based on location and the types of materials handled in each area. The four primary components consist of:

- PE-1 pipeline.
- MW20 Bench to Treatment Plant Pipelines (collectively referred to as "influent pipelines").
- Treatment facility.
- Effluent pipeline.

Locations of these four components are shown on Figure 1 and described below.

PE-1 Pipeline

The PE-1 pipeline runs from the PE-1 extraction well located in the eastern portion of the floodplain to the MW-20 bench (Figure 1). The pipeline is constructed of double-wall, high-density polyethylene pipe with an outer diameter of 6 inches (the inner pipe is 3 inches in diameter), and it is buried from about 3 to 5 feet below ground surface (bgs). This pipeline conveys untreated groundwater from the extraction well (PE-1) to the MW-20 bench where it is combined with the groundwater extracted from well TW2D. In general, untreated groundwater from PE-1 may contain metals, including Cr(VI) and Cr(T). In addition, naturally-occurring total dissolved solids (TDS), composed primarily of sodium chloride, are also present. Based on these data, analytes for background soil sampling in the vicinity of the PE-1 pipeline include Cr(VI) and Cr(T), sodium, chloride, electrical conductivity, and pH.

MW20 Bench to Treatment Plant

Three separate pipelines run in a single alignment between the MW20 bench and the treatment facility:

- The influent pipeline carries untreated groundwater from extraction well TW2D to the treatment facility.
- The effluent pipeline to MW-20 bench conveys treated water from the treatment facility to the MW-20 bench for storage prior to offsite disposal, in the event that effluent is not being conveyed to injection wells for disposal.
- The reverse osmosis concentrate pipeline conveys reverse osmosis concentrate from the treatment plant to the MW-20 bench for storage prior to offsite disposal.

IM No. 3 currently collects extracted groundwater at the valve vault located at the MW-20 bench adjacent to Park Moabi Road and just north of the railroad line (Figure 1). From the MW-20 bench, the pipelines run first along Park Moabi Road and then along an unpaved access road to the treatment facility located on the west side of Bat Cave Wash. The influent pipeline is constructed of double-contained high-density polyethylene pipe, the effluent pipeline is a 4-inch aluminum pipe, and the reverse osmosis concentrate pipeline is a 3-inch pipe. All three pipelines are buried at approximately 3 feet bgs.

Representative concentrations of constituents found in influent, effluent, and reverse osmosis concentrate are summarized in Table 1. Influent groundwater contains metals including Cr(VI), Cr(T), and naturally-occurring TDS. Following treatment, the effluent contains Cr(VI) and Cr(T) concentrations that are orders of magnitude lower than the untreated water, and below maximum contaminant levels for drinking water. Reverse osmosis concentrate has elevated TDS, approximately the same as that found in seawater. Based on these data, analytes for background soil sampling in the vicinity of the influent pipelines will consist of metals, sodium, chloride, and electrical conductivity. Metals to be included in the analyses consist of antimony, arsenic, barium, beryllium, cadmium, Cr(T), Cr(VI), cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc.[1]

Treatment Facility

The treatment facility is located just west of Bat Cave Wash (Figure 1). Extracted groundwater is treated at this facility to remove chromium (through reduction and precipitation) and lower TDS (using reverse osmosis). Treatment facilities include process equipment such as storage tanks (influent, effluent, and chemical), pumps, piping, reactors, and instrumentation installed on a concrete slab foundation. Other features include electrical power supply, security fencing, operator facilities, and equipment storage.

The treatment facility handles both untreated and treated groundwater. Treatment chemicals and treatment byproducts are also handled at this facility. An inventory of materials and wastes handled at the treatment facility is provided in Table 2. Based on these data, analytes for background soil sampling in the vicinity of the treatment facility include Cr(VI) and Cr(T), sodium, chloride, electrical conductivity, and pH.

Effluent Pipeline to Injection Wells

The effluent pipeline, which was constructed at ground surface, conveys treated groundwater from the treatment facility to the injection wells. Injection wells IW-2 and IW-3 are located west of the treatment facility (Figure 1). From the treatment facility, the effluent pipeline runs along the north side of old Route 66. This pipeline is laid at ground level and partially covered with soil. The pipeline goes underground where it turns to the north toward the injection wells and departs from old Route 66.

The chemical characteristics of the treated effluent are presented in Table 1. The treated effluent will contain trace concentrations of Cr(IV) and Cr(T), low concentrations of

[1] Although some of these metals may not be present in influent, effluent, or reverse osmosis brine at significant concentrations, obtaining baseline concentrations of all of these metals in soil will allow PG&E to definitively assess potential affects to soil associated with operation of the IM No. 3 system.

naturally-occurring metals, and moderate TDS. Based on these data, analytes for background soil sampling in the vicinity of the effluent pipeline consist of Cr(VI) and Cr(T), sodium, chloride, and electrical conductivity.

Soil Sampling Locations and Depths

The following assumptions were made when selecting sampling locations and depths:

- The depth to groundwater is greater than 10 feet bgs.
- The depth to bedrock is greater than 40 feet bgs.
- Undifferentiated sandy soil exists down to approximately 10 feet bgs in the upland areas.
- Undifferentiated sands exists down to depths greater than 20 feet bgs in the floodplain.
- Lateral transport of potential spills/releases may occur within Bat Cave Wash. Other likely drainage areas will also be identified and sampled during the field effort as appropriate.
- Maximum possible exposure for human receptors is conservatively assumed to be no deeper than 10 feet bgs and no deeper than 6 feet bgs for burrowing ecological receptors.

Background soil samples will be collected from each of the four components of the IM No. 3 system and in an area of potential impact (down the wash), as described below. Table 3 provides a summary of the number of samples recommended for each area.

PE-1 Pipeline

The influent pipeline consists of approximately 500 linear feet of pipe buried approximately 3 to 5 feet bgs. Several soil borings will be drilled in the direct vicinity of the PE-1 pipeline as part of the floodplain *in-situ* study. Soil samples will be collected from three of the *in-situ* borings that are situated near the route of the PE-1 pipeline to support this baseline study, as shown in Figure 2. No additional soil borings for collection of background soil samples will be required beyond those in the currently approved *in-situ* workplan. Soil samples will be collected from each of the *in-situ* borings at the surface (0 to 6 inches bgs) and at 3, 6, 10, 15, and 20 feet bgs.

MW-20 Bench to Treatment Plant

The influent pipeline consists of approximately 3,000 linear feet of pipe buried approximately 3 feet bgs. There are sensor stations approximately every 500 linear feet along the pipeline and at least one air vent valve. Five locations are proposed to be sampled along the influent pipeline at approximately 500-foot intervals and including potential spill/break points such as sensor stations or vent valves (Figure 2). Samples will be collected in the hillside and wash areas to represent background conditions of the different landforms and associated soil types. Soil samples will be collected at the surface (0 to 6 inches bgs) and at 3 and 6 feet bgs.

Area of Potential Impact (Bat Cave Wash)

If a release occurred along the influent pipeline, some portion of it could travel laterally down Bat Cave Wash. Therefore, four locations within the wash are proposed for sampling (Figure 2). Soil samples will be collected at the surface (0 to 6 inches bgs) and at 3 and 6 feet bgs.

Treatment Facility

Four locations will be sampled adjacent to this facility (Figure 2). At a minimum, four samples will be collected on the perimeter of the facility, one per side. Soil samples will be collected at the surface (0 to 6 inches bgs) and at 3 and 6 feet bgs.

Effluent Pipeline to Injection Wells

The effluent pipeline consists of approximately 2,000 linear feet of aboveground piping. Five sampling locations are recommended at approximately 500-foot intervals along the effluent pipeline, with the last sampling location at the injection well site (Figure 2). Sample locations along old Route 66 will be collected just off the shoulder of the road to avoid impacts to the road surface. Soil samples will be collected at three depths at each location along the effluent pipeline—one at the surface (0 to 6 inches bgs) and at 3 and 6 feet bgs.

Soil Sampling Methods

Preliminary sampling locations are specified in Figure 2; however, the exact locations and access routes will be determined in the field based on such factors as topography, cultural resources, and biological resources. To the extent possible, sample locations will be situated near existing roads or in other disturbed areas to minimize the potential for impacts to cultural and/or biological resources. Cultural and biological resource monitors will be consulted during the selection of access routes and final sampling locations. DTSC and BLM approval will then be obtained for all final sampling locations and access routes prior to sample acquisition. The horizontal location and elevation of each sample location will be documented using a handheld global positioning system unit. A sketch of the sampling location will also be entered into the logbook, if necessary, with any reference points labeled including distances to the sampling location. Cultural and biological resource monitors will be employed during sampling to minimize the potential for impacts to these resources.

Soil sample collection and handling activities will follow the standard operating procedures (SOPs) included in Appendix B of the *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* (CH2M HILL 2005). SOPs to be employed during this sampling effort include:

- SOP-B2 (Soil Classification and Logging Procedures)
- SOP-B3 (Borehole Sampling and Logging of Soil Borings)
- SOP-B4 (Soil Boring Drilling and Abandonment)

- SOP-B5 (Decontamination of Personnel and Equipment, Well Drilling and Subsurface Sampling and Investigations)
- SOP-B6 (Disposal of Waste Fluids and Solids)
- SOP-B7 (Homogenization of Soil and Sediment Samples)
- SOP-B9 (Drilling – Sonic Method)
- SOP-B14 (Soil Sampling)

Additional details on sample collection and handling are provided below.

Surface Soil Sampling

Sampling by Hand Trowel

Surface soil samples will be collected from each sampling location from 0 to 6 inches bgs. Procedures for surface soil sampling with a hand trowel are summarized here and described in detail in SOP-B14 *Soil Sampling* (Attachment A), to be incorporated into the next revision of the *Field Procedures Manual*. Surface soil samples will be collected using a stainless-steel hand trowel or equivalent equipment and transferred directly to appropriate containers. The soils will be described and classified on a soil sampling log in accordance with SOP-B2 *Soil Classification and Logging Procedures*. Since the samples will be analyzed for metals, the samples will be homogenized in accordance with SOP-B7 *Homogenization of Sediment and Soil Samples*. The soils will be transferred to pre-cleaned, wide-mouth glass jars and filled to the top, taking care to prevent soil from remaining in the lid threads prior to being sealed to prevent potential contaminant migration from the sample.

Surface soil samples will be labeled, chilled, and documented in accordance with SOP-B14. Decontamination and investigation-derived waste (IDW) disposal are covered in SOP-B5 *Decontamination of Personnel and Equipment, Well Drilling and Subsurface Sampling and Investigations*, and SOP-B6 *Disposal of Waste Fluids and Solids,* respectively.

Subsurface Soil Sampling

Subsurface soil samples will be collected from each sampling location using either a sonic drilling rig (floodplain area), an auger rig (upland area), or a hand auger (all samples collected from within Bat Cave Wash will be collected using a hand auger).

Sampling by Drilling

Drilling within the floodplain area will be performed using a sonic drilling rig, while drilling in the upland areas will be performed using an auger rig equipped with either solid-stem or hollow-stem augers. Procedures for various sampling methods by drilling are described in SOP-B3 *Borehole Sampling and Logging of Soil Borings* and SOP-B9 *Drilling – Sonic Method*. The SOPs provide details on drilling methods and procedures, soil sampling documentation, sample labeling, split-spoon sampling, direct-push sampling, and split-barrel sampling.

Sampling by Hand Auger

Procedures for subsurface soil sampling with a hand auger are summarized here and described in detail in SOP-B14 *Soil Sampling* (Attachment A). The hand auger shall be advanced to the top of the sampling interval by rotating the auger and applying downward pressure. When the barrel is filled, the auger is removed from the cavity and a sample may be collected from the barrel with clean, stainless-steel utensils. The soil will be described and classified on a soil sampling log following procedures in SOP-B2. Since the sample will be analyzed for metals, the sample will be homogenized following SOP-B7. Other sampling devices, such as push tubes or split-spoon samplers, may be used as an option. Refer to SOP-B3 for procedures on these methods. The soils will be transferred to pre-cleaned, wide-mouth glass jars and filled to the top, taking care to prevent soil from remaining in the lid threads prior to being sealed to prevent potential contaminant migration from the sample.

Soil samples will be labeled, chilled, and documented in accordance with SOP-B3. Decontamination and IDW disposal are covered in SOP-B5 and SOP-B6, respectively. Because the upland sampling locations are situated within unimpacted areas, the shallow boreholes will be backfilled with the native drill cuttings. The *in-situ* borings located in the floodplain will be converted to monitoring points for use in the *in-situ* study; therefore, abandonment of these borings will not be necessary. The MW-20 bench area will be used for the staging of all equipment, personnel, and materials used during this field effort.

Analytical Program

The soil samples collected during this effort will be analyzed for the parameters listed in Table 3. Table 3 also provides information regarding the analytical methods that will be used for the analyses. A Quality Assurance Project Plan (QAPP) addendum has been prepared to support this effort and is included as Attachment B.

Data Management

The electronic data will be used to generate validation reports, data summary tables, and other figures. This program will follow CH2M HILL standard procedures for environmental data collection. These proven procedures result in providing the data users with simple procedures to get rapid access to stored data; provide methods of data entry with known accuracy and efficiency; apply well-documented validation procedures to an electronic database; manage sample data using unique sample identification numbers; establish a sample inventory of new data collected and provide methods of sample inventory reconciliation; store and provide sample-specific attributes, including location identifiers, sample type and media, and sample date; and provide reporting and delivery formats to support data analysis and reduction.

Data Validation

Data validation will be carried out when the data packages are received from the laboratory. It will be performed on an analytical batch basis using the summary results of calibration

and laboratory quality control, as well as those of the associated field samples. Data packages will be reviewed for all analytes. Raw data will be reviewed when deemed necessary. Data validation procedures will include:

- Review of the data package for completeness.
- Review of chain-of-custody records for discrepancies that might degrade data quality.
- Review for compliance with holding time and quality control frequency requirements.
- Evaluation of all calibration and quality control summary results against the project requirements.
- Verification of analyte identification and calculations for at least 10 percent of the data.
- Qualification of the data using appropriate qualifier flags, as necessary, to reflect data usability limitations.
- Initiation of corrective actions, as necessary, based on the data review findings.

Data validation will be patterned after the United States Environmental Protection Agency (USEPA) *Contract Laboratory National Functional Guidelines for Inorganic Data Review* (USEPA 2002) and *Contract Laboratory National Functional Guidelines for Organic Data Review* (USEPA 1999), substituting the calibration and quality control requirements specified in this QAPP for those specified in the Guidelines.

Data Evaluation

In general, the upper 6 feet of soil is expected to be of relatively consistent characteristics at all sampling locations. During sample collection, detailed notes will be taken regarding soil type and characteristics. This information will be used to assess whether certain samples should be evaluated separately based on soil type, depth, and/or spatial location. Preliminary statistical evaluations will also be performed to help identify any potential spatial and/or depth specific differences. An extensive statistical evaluation will not be performed until the ultimate use of these data is defined.

Reporting

CH2M HILL will present the results of the soil sampling in a technical memorandum summarizing the sampling event and analysis results. The technical memorandum will consist of a discussion of the sampling, laboratory analytical results, and discussion of uncertainties in the data. Field documentation, summary tables of laboratory results, and laboratory analytical data sheets will be included as attachments or appendices.

Schedule for Implementation

Following approval of this work plan, the following schedule is anticipated:

Task	Time to Complete Task
Preparation for Sampling	2 weeks
Sampling	3 days
Laboratory Analysis	2 weeks
Report Preparation	3 weeks

Access and Permits

Portions of the areas to be sampled are owned by the BLM. Because the baseline data set that will be generated from this work will be an integral component of IM No. 3 operations, closure, and restoration, it is presumed that the activities described herein are authorized by the BLM per the Action Memorandum dated September 17, 2004. Similarly, it is our understanding that DTSC has determined that these activities are covered by the California Environmental Quality Act Notice of Exemption filed by DTSC on June 30, 2004.

Approval by BLM and DTSC of the soil sampling program activities would occur through review and approval of this work plan. Cultural and biological resource monitors will be employed as appropriate during all field activities. Access and resource clearance issues will be coordinated with BLM prior to and throughout the field work. No other permits or approvals have been identified.

References

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Certification

This report was prepared by CH2M HILL under the supervision of the professional whose seal and signature appears hereon, in accordance with currently accepted professional practices; no warranty, expressed or implied, is made.

Richard Sturm
Professional Geologist

Tables

Table 1
Summary of Influent and Effluent Quality
PG&E Topock Interim Measures No. 3

			Influent		RO Concentrate		Effluent	
Group	Analyte	Units	Frequency of Detection	Range of Concentration	Frequency of Detection	Range of Concentration	Frequency of Detection	Range of Concentration
Anion	Chloride	mg/L	5 / 5	2110 - 3390	2 / 2	9590 - 11200	5 / 5	1400 - 1840
	Fluoride	mg/L	8 / 8	0.906 - 3.07	5 / 5	11.8 - 12.7	8 / 8	1.47 - 2.09
	Nitrite as Nitrogen	mg/L	3 / 4	ND (0.005) - 0.0143	1 / 1	0.0298 - 0.0298	4 / 4	0.0053 - 0.0211
	Sulfate	mg/L	8 / 8	569 - 727	3 / 3	2450 - 2970	8 / 8	302 - 518
General	Alkalinity, total as caco3	mg/L	9 / 9	47.6 - 75	1 / 1	227 - 227	9 / 9	27 - 47
	Ammonia as nitrogen	mg/L	2 / 4	ND (0.5) - 1.43	1 / 2	ND (0.5) - 0.51	3 / 4	ND (0.5) - 7.84
	Bicarbonate	mg/L	9 / 9	87.8 - 91.5	1 / 1	277 - 277	9 / 9	32.9 - 57.3
	Carbonate	mg/L	0 / 9	ND (5) - ND (5)	0 / 1	ND (5) - ND (5)	0 / 9	ND (5) - ND (5)
	Nitrate as Nitrogen	mg/L	8 / 8	4.9 - 5.69	3 / 3	15 - 17.8	8 / 8	2.82 - 3.93
	pH	pH Units	22 / 22	6.98 - 7.72	22 / 22	7.76 - 7.98	23 / 23	7.57 - 8.12
	Soluble silica	mg/L	10 / 10	18.5 - 21.5	1 / 1	39.9 - 39.9	10 / 10	3.2 - 8.15
	Specific conductance	µS/cm	22 / 22	7060 - 10790	22 / 22	30400 - 46900	23 / 23	4380 - 8140
	Temperature	ºC	1 / 1	28.1 - 28.1	0 / 0	---	0 / 0	---
	Total dissolved solids	mg/L	21 / 21	4390 - 6360	21 / 21	18600 - 28400	26 / 26	2640 - 4620
	Total organic carbon	mg/L	0 / 9	ND (0.5) - ND (0.3)	0 / 0	---	0 / 9	ND (0.5) - ND (0.3)
	Total phosphorus as p	mg/L	7 / 10	ND (0.02) - 0.219	0 / 0	---	10 / 10	0.0655 - 0.258
	Total suspended solids	mg/L	0 / 10	ND (25) - ND (10)	0 / 0	---	0 / 10	ND (25) - ND (10)
	Turbidity	NTU	11 / 21	ND (0.1) - 0.87	0 / 1	ND (0.1) - ND (0.1)	5 / 23	ND (0.1) - 0.256
Metals - Filtered	Chromium	mg/L	2 / 2	5 - 5.54	2 / 2	0.0055 - 0.0065	0 / 0	---
	Hexavalent chromium	mg/L	21 / 21	3.6 - 4.54	13 / 21	ND (0.002) - 0.0056	12 / 23	ND (0.001) - 0.00046
Metals-Unfiltered	Aluminum	mg/L	0 / 7	ND (0.2) - ND (0.052)	0 / 2	ND (0.2) - ND (0.052)	0 / 7	ND (0.2) - ND (0.052)
	Antimony	mg/L	0 / 8	ND (0.005) - ND (0.003)	0 / 4	ND (0.0104) - ND (0.0104)	0 / 8	ND (0.005) - ND (0.003)
	Arsenic	mg/L	0 / 8	ND (0.01) - ND (0.005)	0 / 4	ND (0.0104) - ND (0.0104)	0 / 8	ND (0.01) - ND (0.005)
	Barium	mg/L	6 / 8	ND (0.3) - 0.027	3 / 5	ND (0.3) - 0.057	6 / 8	ND (0.3) - 0.104
	Beryllium	mg/L	0 / 5	ND (0.0052) - ND (0.003)	0 / 4	ND (0.0104) - ND (0.003)	0 / 5	ND (0.0052) - ND (0.003)
	Boron	mg/L	8 / 8	1.02 - 1.59	2 / 2	1.89 - 2.5	8 / 8	1.13 - 1.62
	Cadmium	mg/L	0 / 5	ND (0.0042) - ND (0.003)	0 / 4	ND (0.0104) - ND (0.0052)	0 / 5	ND (0.0042) - ND (0.003)

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Table 1
Summary of Influent and Effluent Quality
PG&E Topock Interim Measures No. 3

Group	Analyte	Units	Influent		RO Concentrate		Effluent	
			Frequency of Detection	Range of Concentration	Frequency of Detection	Range of Concentration	Frequency of Detection	Range of Concentration
Metals-Unfiltered	Calcium	mg/L	5 / 5	193 - 296	3 / 3	775 - 1130	5 / 5	84.6 - 179
	Chromium	mg/L	19 / 19	3.27 - 7.14	9 / 19	ND (0.0104) - 0.0087	3 / 23	ND (0.0021) - 0.0068
	Cobalt	mg/L	0 / 5	ND (0.0052) - ND (0.003)	0 / 4	ND (0.0104) - ND (0.0104)	0 / 5	ND (0.0052) - ND (0.003)
	Copper	mg/L	2 / 8	ND (0.01) - 0.0202	1 / 4	ND (0.0104) - 0.0125	3 / 8	ND (0.01) - 0.0147
	Iron	mg/L	0 / 8	ND (0.5) - ND (0.3)	0 / 2	ND (0.5) - ND (0.3)	0 / 8	ND (0.5) - ND (0.3)
	Lead	mg/L	0 / 8	ND (0.0042) - ND (0.002)	0 / 4	ND (0.0104) - ND (0.0052)	0 / 8	ND (0.0042) - ND (0.002)
	Magnesium	mg/L	5 / 5	19.1 - 23.2	3 / 3	63.3 - 81.2	5 / 5	6.9 - 14.7
	Manganese	mg/L	0 / 8	ND (0.5) - ND (0.05)	2 / 2	0.233 - 0.237	0 / 8	ND (0.5) - ND (0.05)
	Mercury	mg/L	0 / 5	ND (0.0002) - ND (0.0002)	0 / 4	ND (0.0002) - ND (0.0002)	0 / 5	ND (0.0002) - ND (0.0002)
	Molybdenum	mg/L	8 / 8	0.0214 - 0.028	4 / 4	0.0622 - 0.0743	7 / 8	ND (0.005) - 0.0111
	Nickel	mg/L	5 / 8	ND (0.02) - 0.0079	2 / 4	ND (0.02) - 0.0318	2 / 8	ND (0.02) - 0.0093
	Potassium	mg/L	5 / 5	20.4 - 37.8	3 / 3	70.9 - 128	5 / 5	13.3 - 25.2
	Selenium	mg/L	0 / 5	ND (0.01) - ND (0.01)	1 / 4	ND (0.0208) - 0.0209	0 / 5	ND (0.01) - ND (0.01)
	Silver	mg/L	0 / 5	ND (0.0042) - ND (0.003)	1 / 4	ND (0.0104) - 0.0107	0 / 5	ND (0.0042) - ND (0.003)
	Sodium	mg/L	5 / 5	1140 - 1990	3 / 3	5910 - 6960	5 / 5	582 - 1260
	Strontium	mg/L	5 / 5	4.28 - 8.44	2 / 2	25.4 - 26.8	5 / 5	2.17 - 4.27
	Thallium	mg/L	0 / 5	ND (0.015) - ND (0.015)	0 / 4	ND (0.015) - ND (0.0052)	0 / 5	ND (0.015) - ND (0.015)
	Vanadium	mg/L	5 / 5	0.017 - 0.0223	4 / 4	0.0332 - 1.15	5 / 5	0.0046 - 0.0078
	Zinc	mg/L	5 / 8	ND (0.0261) - 0.043	1 / 4	ND (0.052) - 0.0252	4 / 8	ND (0.0261) - 0.0985
OTHER	Color	COLORUNIT	1 / 1	37 - 37	1 / 1	2 - 2	0 / 1	ND (1) - ND (1)

NOTES:

mg/L	milligrams per liter
µS/cm	microSiemens per centimeter
NTU	nephelometric turbidity units
ND	parameter not detected at the listed reporting limit
(---)	not sampled

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Table 2
Interim Measures No. 3 Treatment Plant Material and Waste Inventory
PG&E Topock Interim Measures No. 3

Material/Waste	Maximum Quantity	Size of Largest Container	Units
Extracted groundwater	56,000	27,000	gallons
Sulfuric acid	2,600	55	pounds
Ferrous chloride solution	1,200	200	gallons
Sodium hydroxide solution	1,000	330	gallons
Anionic or non-ionic polymer	200	50	pounds
Anti-scalant, boiler water treatment	110	55	gallons
Gravity-settled solids from sludge holding tank	6,000	6,000	gallons
10-30% dewatered solids in phase separators	15,000	7,500	gallons
Reverse osmosis concentrate	8,000	8,000	gallons
Sodium hypochlorite solution	110	55	gallons
Citric acid cleaner	110	55	gallons
Diesel #2	150	150	gallons

Table 3
Analytical Plan Summary, Baseline Soil Sampling
PG&E Topock Interim Measures No. 3

Location	Number of Locations	Number of Samples per Location	Total Number of Samples	Cr(VI) SW3060A/ SW7199	Title 22 Metals[1] SW6010B/ SW7471A	Sodium[2]	Chloride[3]	Electrical Conductivity SW9050A	pH SW9045C
PE-1 Pipeline	3	5	15	15	15	15	15	15	
MW20 Bench to Treatment Facility Pipelines	5	3	15	15	15	15	15	15	
Treatment Facility	4	3	12	12	12	12	12	12	12
Effluent Pipeline	3	2	6	6	6	6	6	6	
Area of Potential Impact	4	3	12	12	12	12	12	12	
Field QA/QC									
Duplicates				5	5	5	5	5	1
Rinsate Blanks				4	4	4	4	4	1
Total Number of Locations/Samples:	19		60	69	69	69	69	69	14

Notes:

(1) Title 22 metals consist of antimony, arsenic, barium, beryllium, cadmium, chromium (total), cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc
(2) Sample preparation will be performed using method USBR 514.8.2. The soil paste extract will be prepared in accordance with USBR 514.2.5B followed by analysis using SW846 6010B.
(3) Sample preparation will be performed using method USBR 514.8.2. The soil paste extract will be prepared in accordance with USBR 514.2.5B followed by analysis using EPA method 300.0 or 325.3.

Figures

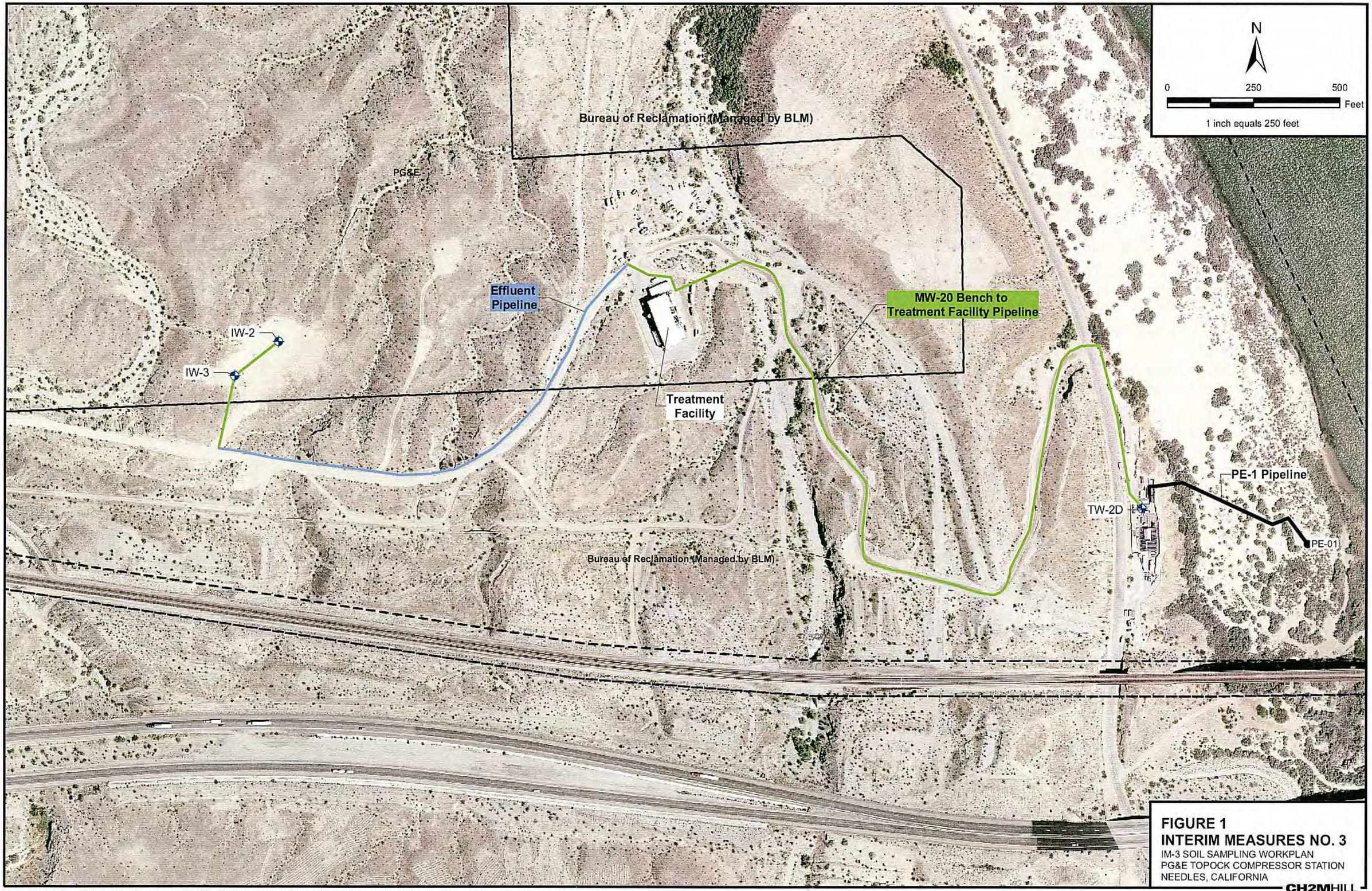

FIGURE 1
INTERIM MEASURES NO. 3
IM-3 SOIL SAMPLING WORKPLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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N

0 250 500 Feet

LEGEND 1 inch equals 250 feet

Proposed Soil Sampling Locations

Foot Access Route

Note: All samples collected from Bat Cave Wash will be collected by hand.

Bat Cave Wash

Bureau of Reclamation (Managed by BLM)

PG&E

Effluent Pipeline

MW-20 Bench to Treatment Facility Pipeline

IW-2

IW-3

Treatment Facility

Bat Cave Wash

Bureau of Reclamation (Managed by BLM)

TW-2D

PE-1 Pipeline

(PT-2)

(PT-5)

(PT-4)

PE-01

FIGURE 2
PRELIMINARY SOIL SAMPLING LOCATIONS
IM-3 SOIL SAMPLING WORKPLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Attachment A
SOP-B14 *Soil Sampling*

SOP-B14

Soil Sampling
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) provides guidance for sample collection from soil at the surface and shallow subsurface. Detailed guidance for sample collection, preservation and handling is provided in Section 4.0 of the site Quality Assurance Project Plan (QAPP) and in the Topock Program *Sampling, Analysis, and Field Procedures Manual* (Procedures Manual). SOP-B2 provides additional guidance for soil characterization and logging.

Required Documents

1) Event-specific sampling and analysis plan (SAP), work plan or event-specific field instructions, and planned soil sampling depth.
2) Applicable project work plan or monitoring plan. Refer to the Procedures Manual and QAPP, as required.
3) Topock Program Health and Safety Plan (HSP).
4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available.
5) Blank sampling log and field notebook.

Preparation and Setup

6) Review event-specific work plan or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.
7) Coordinate with laboratory for coolers and courier for pickup of samples.
8) Initiate field logbook for sampling activity.
9) Review sampling procedures and equipment, and planned sample depths field crew.

Equipment List

- Soil sample containers appropriate for sample analysis and preservation as called for in SAP and QAPP (glass jars, auger sleeves, sealed plastic bags, etc.)
- Soil sampling equipment (hand auger, auger extensions, stainless steel trowel, spatula or putty knife, stainless steel compositing bowl, etc.)
- Field logbook
- Sediment sampling logs
- Blue or black waterproof or permanent ink pens
- Trash bags
- Paper towels
- Decontamination equipment (Alconox® solution in spray bottle, brushes, buckets, rinse water spray bottle)

- Water level indicator
- Distilled water
- Coolers with ice
- Protective waterproof gloves (nitrile or latex)

SOIL SAMPLING LOGS DOCUMENTATION

Soil sampling logs will be completed at the time of sample collection. An example of a soil sampling log is attached to this SOP. Items to be documented on the sampling log include:

1) **Sample Interval:** The top and bottom depth of each sample run should be recorded on the log. Sampling includes samples collected for analysis as well as retrieved for logging purposes.

2) **Sample Type and Number:** Enter the sample type and number consistent with the sampling and analysis plan at the correct depth intervals. An "x" should be placed across the vertical interval where the environmental soil, grab groundwater, or geotechnical sample was collected.

3) **Sample Recovery:** Enter the length of retrieved sample to the nearest inch of sample recovered. Record total length and percent of sample recovered.

4) **Sampling:** Sampling difficulties shall be noted. The top of the sample shall be marked on the container.

5) **Water Levels:** Water-level measurements, where groundwater is encountered, are required for each boring. Changes in soil moisture shall be noted and, if there is no water encountered, a note to that effect shall be included on the sediment sampling log. The date and time of water-level measurements shall be documented.

At a minimum, sample identifiers (IDs) should be noted on sampling logs at the depth collected. When time and space allows, a summary of analytical sample information can be included.

SOIL SAMPLING BY HAND TROWEL —GENERAL PROCEDURE

Sampling with a pre-cleaned stainless steel or disposable hand trowel may be used to collect soil up to 6 inches deep for samples that will be not analyzed for volatile organics.

1) Use the hand trowel to remove the upper 2 inches of soil and acquire a representative sample of deeper materials to a depth of 6 inches.

2) The soil sample should be placed in an 8-ounce clear glass jar after homogenizing (if applicable) and placed in a plastic bag inside a cooler maintained at 4˚C.

3) The sample should be classified, labeled, and documented in accordance with SOP B3 *Borehole Sampling and Logging of Soil Borings*.

4) Labels shall be affixed to the sample containers with job designation, time, sample number, sample depth interval, sample number, date sampled, and the initials of the sampler clearly marked.

5) Sample information shall be placed on the chain-of-custody, the soil sample log, and the field logbook. All samples shall be handled in accordance with *Chain of Custody Procedures* and the QAPP.

6) Decontaminate equipment in between samples in accordance with SOP-B5 Decontamination of Personnel and Equipment, Well Drilling and Subsurface Sampling and Investigations, and dispose of IDW in accordance with SOP-B6 Disposal of Waste Fluids and Solid.

SOIL SAMPLING BY HAND AUGER – GENERAL PROCEDURE

Hand auger soil sampling procedures shall be executed in accordance with American Society for Testing and Materials (ASTM) D4700-91, "Standard Guide for Soil Sampling in the Vadose Zone" (ASTM 1984). For dry, sandy soils it may be necessary to use a variation of the regular barrel auger that includes a specially-formed bit to retain the sample in the barrel. Sand augers with 2, 3, 4-inch diameters are available. These procedures may be modified as field conditions dictate. Ultimately, the method that yields the best results should be used.

1) Assemble hand auger pieces and extension rods to desired length.

2) Pre-cleaned sample liners may be loaded into the core barrel before sampling, if applicable. These liners are used to acquire samples and serve as the sample container.

3) The hand auger shall be advanced to the top of the sampling interval by rotating the auger and applying downward pressure.

4) When the barrel is filled, the auger is removed from the cavity and a sample may be collected from the barrel with clean, stainless steel utensils. Another potential method when sampling for metals is to auger down to depth and then remove the auger and accumulated soil and set aside in a 1-gallon pail. Then a stainless steel slide hammer is inserted into the hole and the sample is collected.

5) The sample should be classified, labeled, and documented in accordance with SOP-B3 *Borehole Sampling and Logging of Soil Borings*.

6) In general, the deeper part of the soil sample is collected for laboratory analysis, and 10 percent of the liners (if any) are collected for quality assurance testing. If a liner was used for sampling, it shall be placed in a re-sealable plastic bag. Otherwise, the soil sample will be placed in an 8-ounce clear glass jar after homogenizing (see SOP-B7 *Homogenization of Soil and Sediment Samples*) and placed in a plastic bag.

7) Labels shall be affixed to the sample containers/liners with job designation, time, sample number, sample depth interval, sample number, date sampled, and the initials of the sampler clearly marked.

8) The samples should be placed in a cooler maintained at 4˚C.

9) Sample information shall be placed on the chain-of-custody, the sample log, and the field logbook. All samples shall be handled in accordance with *Chain of Custody Procedures*.

10) Decontaminate sampling equipment prior to the beginning of work and between each sample in accordance with SOP-B5 *Decontamination of Personnel and Equipment, Well Drilling and Subsurface Sampling and Investigations*.

11) All materials generated during sampling (debris, PPE, decontamination liquids, etc.) will be placed in 55-gallon drums or roll-off bins for storage pending analysis and disposal off site, as outlined in SOP B-6 *Disposal of Waste Fluids and Solids* (IDW) in Appendix B, and in SOP 39, Standard of Practice H-83, and Appendix D of the project *Soil and Groundwater Management Plan*.

SURFACE AND SHALLOW SOIL SAMPLE LOG

Project Number	Project Name	Date	Time

Sample Identification Number and Time	Checked by
Sampled by	**Recorded by**

Method of Collection

Surface Description

Notes

Soil Sample Data

Location

Coordinates	Elevation

LITHOLOGY	DEPTH (FEET)	DESCRIPTION	USCS SYMBOL	Est. % of G	S	F	COMMENTS

Attachment B
QAPP Addendum

Addendum to the Topock Quality Assurance Project Plan

PREPARED FOR: Rick Sturm/SFO

PREPARED BY: Dan Moore/ABQ

COPIES: Vito D'Aurora/RDD
Shawn Duffy/RDD

DATE: July 7, 2005

This addendum to the Topock Quality Assurance Project Plan (QAPP) has been prepared to address a few analyses associated with the Interim Measures Number 3 Background Study that are not included in the document. The laboratories will be required to adhere to the QAPP and then use the reporting limits, QC limits and corrective action procedures outlined within this addendum. The following soil analyses are addressed herein:

- Total Title 22 Metals by SW3050A/SW6010B/SW7471A
- Hexavalent Chromium by SW3060A/SW7199
- Specific Conductance by SW9050A
- pH by SW9045C
- Chloride[1]/ Sodium[2]

The following tables present the reporting limits, QC limits and corrective action requirements that will be used for this sampling event.

TABLE 1-1
Reporting Limit Objectives for Metals (SW6010B/SW7471A)
Addendum to PG&E Topock Quality Assurance Project Plan

Analyte	Reporting Limits Soil/Sediments (mg/kg)
Antimony	0.2
Arsenic	0.5
Barium	0.1
Beryllium	0.1
Cadmium	0.1

[1] Sample preparation and analysis will be performed by one of the following methods or equivalent:: Diamond, D. 2001. Determination of Chloride by Flow Injection Analysis Colorimetry. QuikChem Method 10-117-07-1-H. Lachat Instruments, Milwaukee, WI. Rhoades, J. D. 1982. Soluble salts. p. 167-179. In: A. L. Page et al. (ed.) Methods of soil analysis: Part 2. Chemical and microbiological properties. ASA Monograph Number 9.

[2] Sample preparation and analysis will be performed by one of the following methods or equivalent:
Knudsen, D., G. A. Peterson and P. F. Pratt. 1982. Lithium, sodium and potassium. p. 225-246. In: A. L. Page et al. (ed.) Methods of soil analysis: Part 2. Chemical and microbiological properties. ASA Monograph Number 9.
Soltanpour, P. N. Benton Jones, Jr., J. and S. M. Workman. 1982. Optical emission spectrometry. p. 29-65. In: A. L. Page et al. (ed.) Methods of soil analysis: Part 2. Chemical and microbiological properties. Monograph Number 9 (Second Edition). ASA, Madison, WI

TABLE 1-1
Reporting Limit Objectives for Metals (SW6010B/SW7471A)
Addendum to PG&E Topock Quality Assurance Project Plan

Analyte	Reporting Limits Soil/Sediments (mg/kg)
Chromium	0.2
Cobalt	0.1
Copper	0.2
Lead	0.2
Mercury (SW7471A)	0.1
Molybdenum	0.2
Nickel	0.3
Sodium (soil paste extract only)	1.5 mg/Kg
Selenium	1
Silver	0.1
Thallium	0.1
Vanadium	1
Zinc	2.5

TABLE 1-2
Reporting Limit Objectives for General Chemistry and Other Parameters
Addendum to PG&E Topock Quality Assurance Project Plan

Analyte	Method	Reporting Limits Soil (mg/kg)
Chloride	Soil paste extract/EPA 300.0	3
PH	EPA150.1/SW9040	0.1 pH units
Chromium (hexavalent)	SW3060ASW7196A or SW7199	0.5

NA – Not applicable

TABLE 1-3
Accuracy and Precision for Metals (SW6010B/SW7471A)
Addendum to PG&E Topock Quality Assurance Project Plan

Analyte	LCS Accuracy Soil (% R)	MS/MSD Accuracy Soil (% R)	Precision Soil (% RPD)
Antimony	80-120	75-125	≤ 20
Arsenic	80-120	75-125	≤ 20
Barium	80-120	75-125	≤ 20
Beryllium	80-120	75-125	≤ 20
Cadmium	80-120	75-125	≤ 20
Chromium	80-120	75-125	≤ 20
Cobalt	80-120	75-125	≤ 20
Copper	80-120	75-125	≤ 20
Lead	80-120	75-125	≤ 20
Mercury(SW7471A)	75-125	75-125	≤ 20
Molybdenum	80-120	75-125	≤ 20
Nickel	80-120	75-125	≤ 20
Selenium	80-120	75-125	≤ 20
Silver	80-120	75-125	≤ 20
Thallium	80-120	75-125	≤ 20
Vanadium	80-120	75-125	≤ 20
Zinc	80-120	75-125	≤ 20

R = Recovery
RPD = Relative percent difference

TABLE 1-4
Accuracy and Precision Limits for SW7196A/SW7199
Addendum to PG&E Topock Quality Assurance Project Plan

Analyte	LCS Accuracy Water (% R)	LCS Accuracy Soil (% R)	MS/MSD Accuracy Water/Soil (% R)	Precision Water/Soil (% RPD)
Hexavalent Chromium	90-110	80-120	80-120	≤ 20

TABLE 1-5
Calibration and QC Requirements for SW6010B
Addendum to PG&E Topock Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Initial calibration (a blank and at least one standard)	Before sample analysis, every 24 hours, whenever modifications are made to the system, or when continuing calibration verification fails	If more than one standard is used, correlation coefficient must be > 0.995	N/A
Second-source calibration verification	Immediately following each initial calibration	All analytes within ±10% of expected value for SW6010B and within ±5% of expected value for EPA200.7	Correct problem and repeat initial calibration.
Calibration blank	After every Second-source or Continuing calibration verification analysis	No analytes detected at or above the reporting limit	Correct the problem, then reanalyze previous 10 samples.
Continuing calibration verification	After every 10 samples and at the end of the analysis sequence	All analytes within ±10% of expected value for SW6010B and within ±10% of expected value for EPA200.7	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification
Method Blank	At least one per analytical batch	No analytes detected at or above the reporting limit	Correct the problem and re-prep and reanalyze all associated samples
Interference check standard	At the start and end of each analytical sequence or twice during an 8-hour period, whichever is more frequent	All analytes within ±20% of expected value	Correct the problem, recalibrate, reanalyze ICS and all affected samples.
MS/MSD	One set per 20 project-specific samples. MSD is optional if a laboratory sample duplicate is performed	All analytes within limits specified in Accuracy and Precision table	None
Laboratory sample duplicate	Once per analytical batch if MSD not performed	Concentration of reported analytes are > 5 times the reporting limit in either sample and RPD >20% One sample result < RL and a difference of ±2 times the reporting limit	None
LCS	At least one per analytical batch	All analytes within limits specified in Accuracy and Precision table	Correct the problem, and re-prep and reanalyze the LCS and all samples in the analytical batch.
Dilution test	Each new sample matrix	Result from 1:5 dilution must be within ±10% of the undiluted sample result (applies only if undiluted sample result is at least 25 times the reporting limit)	Perform post-digestion spike addition.
Linear Range Calibration check standard	Once per quarter	All analytes within ± 10% of expected value	Correct problem then reanalyze or re-set linear range
Post-digestion spike addition	When dilution test fails	Recovery within 75-125% of expected value	None

TABLE 1-6
Calibration and QC Requirements for SW7000 series
Addendum to PG&E Topock Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multi-point initial calibration (a blank and at least five standards)	Before initial sample analysis, every 24 hours, whenever modifications are made to the analytical system, or when continuing calibration verification fails	Correlation coefficient of linear regression is ≥ 0.995	Correct the problem and repeat the initial calibration.
Second-source calibration verification	Immediately following each initial calibration	All analytes within ±20% of expected value	Correct the problem and repeat initial calibration.
Calibration blank	After every Second-source or Continuing calibration verification analysis	No analytes detected at or above the reporting limit	Correct the problem, then reanalyze previous 10 samples.
Continuing calibration verification	After every 10 samples and at the end of the analysis sequence	All analytes within ±20% of expected value	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification
Method Blank	At least one per analytical batch	No analytes detected at or above the reporting limit	Correct the problem and re-prep and reanalyze all associated samples
MS/MSD	One set per 20 project-specific samples. MSD is optional if a laboratory sample duplicate is performed	All analytes within limits specified in Accuracy and Precision table	None
Laboratory sample duplicate	Once per analytical batch if MSD not performed	Concentration of reported analytes are > 5 times the reporting limit in either sample and RPD >20%. One sample result < RL and a difference of ±2 times the reporting limit	None
LCS	At least one per analytical batch	All analytes within limits specified in Accuracy and Precision table	Correct the problem, and re-prep and reanalyze the LCS and all samples in the analytical batch
Dilution test	Each new sample matrix	Result from 1:5 dilution must be within ±10% of the undiluted sample result (applies only if undiluted sample result is at least 25 times the reporting limit)	Perform recovery test
Recovery test	When dilution test fails	Recovery within 85-115% of expected value	Analyze all samples by MSA

TABLE 1-7
Calibration and QC Requirements for General Chemistry Parameters
Addendum to PG&E Topock Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multi-point initial calibration (a blank and at least five standards)	Before initial sample analysis, every 24 hours, whenever modifications are made to the analytical system, or when continuing calibration verification fails	Correlation coefficient of linear regression is ≥ 0.995	Correct the problem and repeat the initial calibration.
Second-source calibration verification	Immediately following each initial calibration	Analytes within ±15% (±10% for SW9056/EPA300.0) of expected value	Correct the problem and repeat initial calibration.
Calibration blank – does not apply to titrimetric method	After every Second-source or Continuing calibration verification analysis	No analytes detected at or above the reporting limit	Correct the problem, then reanalyze previous 10 samples.
Continuing calibration verification	After every 10 samples and at the end of the analysis sequence	Within ±15% (±10% for SW9056/EP300.0) of expected value	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification
Method Blank	At least one per analytical batch	No analytes detected at or above the reporting limit	Correct the problem and re-prep and reanalyze all associated samples
MS/MSD	One set per 20 project-specific samples. MSD is optional if a laboratory sample duplicate is performed	All analytes within limits specified in Accuracy and Precision table	None
Laboratory sample duplicate	Once per analytical batch if MSD not performed	Concentration of reported analytes are > 5 times the reporting limit in either sample and RPD >20%. One sample result < RL and a difference of ±2 times the reporting limit	None
LCS	At least one per analytical batch	All analytes within limits specified in Accuracy and Precision table	Correct the problem, and re-prep and reanalyze the LCS and all samples in the analytical batch

Appendix D2:
Work Plan for Installation of Shallow Groundwater Compliance Monitoring Wells

Pacific Gas and Electric Company®

Yvonne J. Meeks
Site Remediation - Portfolio Manager
Environmental Affairs

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October 28, 2005

Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

Subject: Interim Measures Compliance Monitoring Program,
Work Plan for Installation of Shallow Groundwater Compliance Monitoring Wells, PG&E Topock Compressor Station, Needles, California

Dear Mr. Shopay:

Enclosed is the *Work Plan for Installation of Shallow Groundwater Compliance Monitoring Wells* for the Interim Measure Compliance Monitoring Program at the PG&E Topock Compressor Station. This document presents both the results of the updated injection area groundwater flow model and a work plan to install four shallow monitoring wells at the existing compliance well locations. The work plan is submitted for review in conformance with Condition 17 in DTSC's July 15, 2005 letter "Conditional Approval for the Start Up and Operation of the Interim Measures No. 3 Treatment System and Injection Wells".

An additional requirement of Condition 17 in DTSC's July 15, 2005 letter is that the shallow compliance wells be installed within 90 days of work plan approval. The available data does not support the need for installation of new monitoring wells within this short time frame. Modeling simulations indicate that the effects of injection may not be seen at the radius of the compliance wells for several years. Monitoring data also indicate that it will be years before the injection front reaches the compliance monitoring points.

In submitting this document, PG&E is keenly aware of the sensitivity of cultural areas to the potential disturbance that would be caused by this work. The compliance well network is located within a sacred landscape. Drilling of additional wells and the associated management of waste cuttings, storage of materials, and vehicle traffic in and out of the well sites has the potential to affect an irreplaceable resource, and as such the necessity for these activities should be weighed carefully against the impacts of the work. Waiting until sufficient data are available to evaluate the need for new wells, and making informed decisions about their locations, would be a more prudent course of action, considering the potential for damage to cultural resources.

In recognition of these potential impacts, PG&E respectfully requests that DTSC reconsider the need to install shallow compliance wells within the current 90-day requirement. In the May 24, 2005 DTSC letter regarding "Interim Measures No. 3 Injection Well Field

Investigation and Monitoring," results of the groundwater model were used to determine appropriate timing, with a maximum installation time set at 545 days following the startup of injection. While it is not evident that shallow groundwater at the compliance points would be affected even within this time frame, the additional information obtained from the ongoing sampling program would be useful in evaluating the need for these wells.

Please contact me at (805) 546-5243 if you have any questions on the work plan or our request for a change to the installation schedule.

Sincerely,

Paul Bethke for
Yvonne Meeks

cc. Kate Burger/ DTSC

Enclosure

Work Plan for Installation of Shallow Groundwater Compliance Monitoring Wells

Waste Discharge Requirements
Order No. R7-2004-0103

PG&E Topock Compressor Station
Needles, California

Prepared for

California Regional Water Quality Control Board
Colorado River Basin Region

and

California Department of Toxic Substances Control

on behalf of

Pacific Gas and Electric Company

October 28, 2005

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, CA 94612

Work Plan for Installation of Shallow Groundwater Compliance Monitoring Wells
Waste Discharge Requirements Order No. R7-2004-0103
PG&E Topock Compressor Station
Needles, California

Prepared for
California Regional Water Quality Control Board, Colorado River Basin Region
and
California Department of Toxic Substances Control

on behalf of
Pacific Gas and Electric Company

October 28, 2005

This work plan was prepared under supervision of a
California Certified Engineering Geologist.

Paul Bertucci, C.E.G.
Project Hydrogeologist

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Attachments

A Technical Memorandum: Selection of Locations for Compliance Monitoring Wells (Revised), Pacific Gas and Electric Company, Topock Project, Prepared for Department of Toxic Substances Control, November 9, 2004

Acronyms and Abbreviations

ASTM	ASTM International, formerly American Society for Testing and Materials
bgs	below ground surface
BLM	United States Bureau of Land Management
CMP	Compliance Monitoring Plan
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
CRBRWQCB	Regional Water Quality Control Board, Colorado River Basin
CW-#	Compliance Monitoring Well
CWG	Consultative Workgroup
DTSC	California Department of Toxic Substances Control
gpm	gallons per minute
IDW	investigation-derived waste
IM	Interim Measure
IW-#	injection wells
MRP	Monitoring and Reporting Program
PG&E	Pacific Gas and Electric Company
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RO	reverse osmosis
TDS	total dissolved solids
TDS	Total Dissolved Solids
WDR	Waste Discharge Requirements

SECTION 1.0

Introduction

Pacific Gas and Electric Company (PG&E) is implementing an Interim Measure (IM) to address chromium concentrations in groundwater at the Topock Compressor Station near Needles, California under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). The IM consists of groundwater extraction for hydraulic control of the plume boundaries near the Colorado River floodplain, and management of extracted groundwater. The groundwater extraction, treatment, and injection systems are collectively referred to as Interim Measure No. 3 (IM No. 3). Currently, the IM No. 3 facilities include a groundwater extraction system, conveyance piping, a groundwater treatment plant, and an injection well field for the discharge of the treated groundwater. Figure 1-1 shows the location of the IM extraction, conveyance, treatment, and injection facilities.

On October 13, 2004, the California Regional Water Quality Control Board Colorado River Basin Region (CRBRWQCB) adopted Waste Discharge Requirements (WDR) Order No. R7-2004-0103, which authorizes PG&E to re-inject treated groundwater into injection wells located in the East Mesa area of the Topock site. The WDRs specify effluent limitations, prohibitions, specifications, and provisions for subsurface injection. Provision 6 of the Board Order required that a design plan for a representative groundwater compliance monitoring system in the vicinity of the subsurface injection wells be approved, and construction of the groundwater monitoring system be implemented prior to initiation of injection. The *Final Design Plan for Groundwater Compliance Monitoring* for IM-3 was approved by DTSC on December 23, 2004, with installation of the system being complete by March, 2005.

Four well clusters consisting of 2 wells each were installed during the December 2004 field program. This included CW-1M/D, CW-2M/D, CW-3M/D, and CW-4M/D. Screen intervals were chosen to correspond to coarser grained layers within the same general depth range as the injection wells, which are screened from about 60 feet below the water table to near the bottom of the alluvial aquifer (approximately 350 feet bgs). The measured water levels in the vicinity of the compliance wells range from approximately 60 to 110 feet below ground surface (bgs), while installed top of screen intervals for the medium depth wells range from 120 to 170 feet bgs.

On June 17, 2005, the Groundwater Compliance Monitoring Plan (CMP) for the IM-3 Injection Wellfield (CH2M HILL 2005c) was submitted to DTSC and CRBRWQCB, in accordance with the requirement in the Monitoring and Reporting Program (MRP) No. R7-2004-0103 associated with the Board Order. As per DTSC's requirement by letter of May 24, this plan outlined the conceptual framework for the installation of four monitoring wells, to provide additional shallow-depth information for the aquifer in the vicinity of the existing compliance monitoring well clusters (CW-wells). At that time, DTSC directed that the timing for installation was to be evaluated after considering groundwater flow simulation results from the updated injection area model, but no later than 545 days after

start-up of IM-3 treatment. DTSC's conditional approval letter for the start-up of the IM-3 treatment system dated July 15, 2005, subsequently revised the installation schedule requirement for the shallow compliance wells to within 90 days of workplan approval.

This workplan meets the conditions of DTSC's May 24 and July 15 approval letter by providing the results of the updated groundwater flow model simulations for the vicinity of the injection system, the proposed design of four shallow groundwater compliance monitoring wells, and the scope of work and schedule to install and initially sample the wells.

1.1 Project Background

The Topock Compressor Station is located in San Bernardino County, approximately 15 miles to the southeast of Needles, California (inset map, Figure 1-1). In February 1996, PG&E and DTSC entered into a Corrective Action Consent Agreement pursuant to Section 25187 of the California Health and Safety Code. Under the terms of that agreement, PG&E was directed to conduct a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and to implement corrective measures to address constituents of concern released in the Bat Cave Wash Area near the PG&E Topock Compressor Station. The primary constituents of concern at Topock are hexavalent chromium [Cr(VI)] and total chromium [Cr(T)]. The source was Cr(VI) salts historically used as a corrosion inhibitor in the station's cooling towers.

DTSC is the lead administering agency for the project. Assisting DTSC and PG&E with the planning and review of interim remedial measures are the members of the Topock Consultative Work Group (CWG), constituted under California's Site Designation Process, and consisting of representatives of DTSC, CRBRWQCB, Metropolitan Water District of Southern California, Arizona Department of Environmental Quality, various federal agencies who own or manage adjacent property, and other project stakeholders.

In March 2004, as directed by the DTSC PG&E began implementation of an Interim Measure consisting of groundwater extraction and management of extracted groundwater. Components of the current IM-3 system include continued groundwater extraction, piping, and conveyance of extracted groundwater to a treatment system; treatment of extracted groundwater using reduction-precipitation-filtration and reverse osmosis; and disposal of treated groundwater water by injection wells. Operation of the treatment system was conditionally approved on July 15, 2005, and injection began at the IM-3 Injection well field on July 31, 2005.

The injection well program includes two injection wells (IW-2 and IW-3). Four observation well clusters consisting of three wells each were installed to monitor changes in water levels and water quality in the immediate vicinity of the injection wells. Figure 1-2 shows the locations of the existing mid-depth and deep compliance monitoring wells (CW-1, CW-2, CW-3, and CW-4 clusters). Four compliance well clusters consisting of two wells each were located based on a ranking of four criteria, which included groundwater travel time, equipment access, cultural resource risk, and biological resource risk. Compliance wells were installed to monitor changes in water levels and water quality at the predetermined compliance points.

1.2 Project Objectives

The overall objective of this project is to provide adequate means to determine compliance with WDR Order No. R7-2004-0103, with respect to monitoring injection impacts on shallow groundwater surrounding the IM-3 injection wells. Previous model simulations estimated the time for impacted water to reach the compliance points to be from 3 to 9 years. Mid-depth and deep wells were installed at the compliance points with an assumption that shallow compliance wells could be installed at a later date - should monitoring of shallow depth, mid-depth and deep observation wells and compliance wells indicate that they were needed. In light of this, the specific objectives of this project are to:

- Use the available water quality and water level data to evaluate the current effects of injection on compliance point shallow groundwater.
- Prepare a workplan for the installation of shallow monitoring wells at the existing compliance monitoring well surface locations.
- Reduce impacts of future data collection activities on local cultural and biological resources. While ongoing data assessment may indicate the need for additional sampling frequency or the installation of additional monitoring points, reducing the impact of collecting data on sensitive resources will be taken into consideration to the extent possible during the scoping of additional work.

1.3 Overview of Recent Activities

Injection of IM-3 treatment plant effluent began on July 31, 2005. Approximately 80 gpm is currently being injected into injection well IW-2 on a continuous basis. The surrounding wells are monitored for water level and water quality changes as defined in the CMP, which specifies continuous water level monitoring using transducers and monthly analytical sampling until December 2005 (after December 2005, sampling frequency changes to quarterly).

Observation well clusters OW-1S/M/D, OW-2S/M/D and OW-5S/M/D were sampled for water quality in July, August and September 2005. Compliance monitoring well clusters CW-1M/D, CW-2M/D, CW-3M/D and CW-4M/D were sampled for groundwater quality in September 2005. All wells were continuously monitored for water levels, using dedicated transducers. The sampling methods, procedures, field documentation of the CMP sampling, water level measurements, and field water quality monitoring were performed in accordance with the *Sampling, Analysis, and Field Procedures Manual, Revision 1* (CH2M HILL 2005b).

Results of monthly sampling in July, August and September 2005 show that the water quality effects of injection have not been observed at the medium or deep wells at the compliance points. The water levels have increased slightly in the medium and deep compliance wells, although this increase occurred almost simultaneously with the start of injection and has not shown an increasing trend after two months of injection. Water levels in the shallow wells at the observation clusters close to the injection wells have not increase due to injection, so it is likely that water levels in the shallow groundwater at the compliance points have also been unaffected by the injection.

SECTION 2.0

Groundwater Modeling

2.1 Introduction

The purpose of this section is to provide information with respect to the timing of shallow compliance well installation. The existing compliance monitoring wells are designed to provide mid-depth and deep groundwater quality data, and to meet the Waste Discharge Requirements for a compliance monitoring program after injection begins. Specifically, the objective of future shallow compliance monitoring wells is to provide information on the effects of injecting effluent treated by the IM-3 treatment plant on the surrounding shallow groundwater quality in the East Mesa area.

A previous technical memorandum (CH2M HILL 2004b) selected the existing compliance well sites based on a ranking of four potential criteria (groundwater travel time, equipment access, cultural resource risk and biological resource risk). While this current modeling work will not re-visit the evaluation of compliance monitoring well site locations, the availability of post-injection water levels and water quality data presented an opportunity to refine the travel time estimates for IM-3 effluent-effected water to reach the previously selected well sites. To minimize any potential impacts to site resources, timing for the installation of shallow compliance monitoring wells should be based on these updated estimates.

The CRB RWQCB WDR R7-2004-0103 requires a minimum of one upgradient and two downgradient compliance monitoring wells associated with each injection well field. The DTSC has indicated that, where possible, compliance monitoring wells should be located within a distance representing about 2 years of groundwater travel time from the injection well fields. As previously mentioned, the computer groundwater flow model developed for design of the IM-3 extraction and treatment system was used to simulate the groundwater flow patterns from the injection well fields. The travel time and direction from the injection well fields were considered the most important criteria for selection of preferred compliance monitoring well locations, with the first-simulated advective front travel times as follows: CW-1 cluster, 3 years; CW-2 cluster, 3 years; CW-3 cluster, 6 years; CW-4 cluster, 9 years. These travel times were simulated using a combined injection rate of 21 gpm into IW-2 and IW-3.

2.2 Model Simulations of Groundwater Travel Time

Groundwater modeling was conducted to estimate the travel times through the aquifer between the East Mesa injection well field and the proposed shallow compliance monitoring well locations. Particle tracking was used to show groundwater flow paths in a steady-state groundwater flow field.

The model uses four vertical layers to simulate a total aquifer thickness of about 250 feet near the injection wells. Model parameter values for each model layer in the East and West

Mesa areas were estimated from aquifer tests conducted shortly after the injection and observation wells were installed. These values were assigned to this area of the aquifer, and verified with data obtained from transducers during the first several days of injection.

It was assumed for the newer simulations presented here that the treatment plant would be operating at its designed capacity of 135 gpm. However, the treatment system includes a reverse osmosis (RO) process that removes salts from the water. The byproduct of RO is a concentrated salt solution known as RO concentrate. This concentrate, which represents approximately 10 percent of the water passing through the RO unit, is not re-injected to the aquifer. Consequently, the injection rate used in the new model simulations was 120 gpm, about 10 percent less than the assumed pumping rate.

Injection simulations assumed 60 gpm flow into each of the IW-2 and IW-3 wells. The injection wells were simulated as fully penetrating wells, screened through all four model layers. The rate of injection into each layer is proportional to that layer's contribution to total transmissivity, which was estimated from the spinner test results obtained from wells IW-2 and IW-3 (CH2M HILL 2005d).

The effective porosity value used in these newer simulations was calibrated using the specific conductance breakthrough data recently collected at well OW-2D. The specific conductance in Well OW-2D began to change within 3 days of the start of injection. Within 2 weeks, the specific conductance in OW-2D was identical to that of the water being injected into IW-2, located about 50 feet away. To incorporate the transport velocity indicated by the observed breakthrough at OW-2D, the effective porosity in the model was set to a value of 5.2 percent. Typical values of effective porosity in sand and gravel would be 10 to 15 percent. Using a value of 5.2 percent provides equivalent transport velocities to a condition where most of the aquifer is lower-permeability silty and clayey sands, while higher-permeability cleaner sands and gravels make up about one third of the saturated thickness in the vicinity of the injection wells.

In alluvial fan depositional environments, sand and gravel zones that constitute higher-permeability zones are typically localized. The chaotic nature of alluvial deposition does not favor the development of laterally extensive layers or channels across large distances. It is therefore very unlikely that the higher-permeability material that exists between IW-2 and OW-2D extends laterally to the radius of the compliance wells. Hence, actual travel times to the compliance wells are likely to be much longer than the model projections, which are currently based on the 5.2 percent effective porosity calculated from injectate breakthrough at OW-2D. As more data become available, observation of breakthrough in multiple observation wells will be used to develop a much more accurate understanding of the range of effective porosity at the site. This will improve the accuracy of future model projections.

Using the current estimate of an effective porosity of 5.2 percent, particle tracking was used to simulate groundwater flow paths in a steady-state groundwater flow field. The results are provided in Figure 2-1. To simplify the figure, only representative particle flowpaths reaching each of the four proposed shallow compliance wells are shown. The deflections in the pathlines generally correspond to locations where particles move between model layers. This provides estimates of travel times for advective fronts to reach the compliance wells. Newly simulated advective front travel times are as follows: CW-1S, 4.2 years; CW-2S, 2.9 years; CW-3S, 2.4 years; CW-4S, 5.0 years. Heterogeneities in the aquifer between the

injection wells and the proposed compliance wells could significantly alter actual travel times.

As the injection progresses and more data become available, model parameter values can be refined and the accuracy of projected travel times can be improved. At present, it appears unlikely that the travel times will be considerably less than recent projections. As discussed above, the effective porosity used in recent simulations is probably lower than the average value for this formation, and model-projected groundwater velocities are therefore likely to be higher than the actual average velocity.

SECTION 3.0

Effects of Injection on Groundwater

The compliance monitoring points were designed to provide additional site characterization and baseline groundwater quality data to satisfy the conditions of the Waste Discharge Requirements for a compliance monitoring program after injection began. Mid-depth and deep wells were installed to monitor the same strata as the screened interval of the injection wells. The top of the IW-2 and IW-3 well screens are 170 and 160 feet below ground surface, respectively. The top of the compliance well screens are 140 (CW-1M), 152 (CW-2M), 172.4 (CW-3M) and 119.5 (CW-4M) feet below ground surface. Injected water was anticipated to spread out largely in a horizontal direction from the injection points, moving in a vertical direction only as groundwater mounding developed around the injection wells (which have not yet been observed to a significant degree).

The compliance wells were scheduled to be monitored on a regular basis (semi-annually), to ensure that there are no unexpected adverse effects on water quality as a result of the injection. The observation wells are monitored more frequently, to track the hydraulic and water quality effects of injection in the vicinity of the injection wells.

3.1 Observation Well Response

3.1.1 Groundwater Quality

Water quality and water level information for the IM-3 monitoring wells can be found in *Compliance Monitoring Program Groundwater Monitoring Report for the Third Quarter 2005* (CH2M HILL 2005f). Observation wells were sampled in the months of July, August and September 2005. Preliminary review of these data shows that well OW-2D had been affected by injection waters by the August 2005 sampling event, and well OW-2M had been affected by the September 2005 sampling event. No other wells showed significant changes from pre-injection chemistry. Well OW-2S, a shallow depth groundwater well approximately co-located with OW-2M and OW-2D at a radius of approximately 50 feet from the IW-2, did not show any effects of injection after approximately 2 months. It is anticipated that shallow wells would be less affected than mid-depth or deep wells, because they are screened above the screened interval of the injection wells, and the vertical permeability of most sedimentary aquifers is much less than the horizontal permeability.

3.1.2 Water Level

Water level response for the mid-depth and deep observation and compliance wells was almost simultaneous with the start of injection. In contrast, shallow observation wells have not shown any discernible response to injection, when the system was operated at high and low flow rates. Shallow depths appear to be responding under unconfined conditions, while the deeper depths are responding under semi-confined conditions. The implication is that physical mounding, or increases in the water level, at shallow depths will be slow and will not propagate rapidly from the injection well through the shallow groundwater.

Prior to injection, vertical gradients at observation well clusters were variable, with gradient direction varying from upward to downward between surface locations. Post injection, all observation wells show upward gradients. Compliance well clusters all show this upward gradient both pre and post injection, with post injection gradients increasing in magnitude. This may be a transient effect, because the water levels in shallow wells are slower to respond to injection. The upward gradients suggest that water will tend to move upwards in the aquifer over time and shallow wells may eventually be affected by the injection. Impacts to shallow wells are expected occur long after they are seen in the deep and mid-depth wells, if at all.

3.2 Summary of Injection Effects on Shallow Groundwater

A preliminary review of the available water quality and water level data shows the following effects of injection on compliance point shallow groundwater:

- Water quality has not been affected at the closest shallow observation well, OW-2S. Since OW-2M and OW-2D have shown a progressive effect, it is likely that OW-2S will be the first shallow well to be affected. Using distance from the injection point as a guide, OW-1S would be the next shallow well, followed by OW-5S. Shallow wells will most likely not be affected until after their deep counterparts, with OW-1M and OW-1D showing effects prior to OW-1S, and OW-5M and OW-5D before OW-5S.
- Flow from the injection well appears to be as predicted, relative to the permeability of the formation with depth. Velocity logs for IW-2 were interpreted to show a relatively high permeable zone at depth corresponding to the screened interval of the deep observation wells, with permeability over the remaining screened interval being moderate. Injection wells were not screened in the shallow depth, so no water is being directly injected into that interval. Water will move quickest through the deeper interval, and less rapidly through the mid-depth interval. Little or no water will move directly from the injection well into the shallow depth interval.

Once injected into the formation, water follows horizontal and vertical gradients. Injection has created upward vertical gradients throughout the monitoring network, even in areas that previously showed downward gradients. The rate at which water moves vertically is expected to be much smaller than the rate at which it moves horizontally, because vertical permeability is typically much less than horizontal permeability in sedimentary aquifers. Upward gradients will tend to slowly move water from deeper to shallow depths, so the water quality in the shallow wells could eventually show the effects of injected water chemistry. This effect would likely not be the same as the mid-depth or deep wells (i.e., displacement by injected water), because the water is not being directly injected at shallow depths. Current data does not show that shallow wells have been impacted, but in the event that an effect does occur, the likely response would reflect a mixing of injected with mid- and shallow depth water chemistry.

SECTION 4.0

Well Design and Installation

4.1 Well Locations

The primary objective of the compliance monitoring wells is to monitor for any adverse effects on aquifer water quality due to the operation of the injection wells. DTSC has directed that four shallow monitoring wells (CW-1S, CW-2S, CW-3S, and CW-4S), one at each of the four existing compliance well clusters CW-1, CW-2, CW-3, and CW-4 respectively, are to be installed to provide additional shallow-depth information for the aquifer in the vicinity of the injection wells. Figure 1-2 shows the proposed locations of these shallow compliance monitoring wells.

4.2 Site Preparation and Access

The access routes and the work area at the proposed shallow compliance well sites were previously surveyed for biological and cultural resources prior to drilling the existing compliance monitoring wells. Results of these surveys and specific mitigation measures for access and for working in area locations of compliance monitoring well clusters CW-1, CW-2, CW-3, and CW-4 are outlined in *Topock Project: Review of Access Routes for Groundwater and Surface Water Data Collection Locations, and Proposed Mitigation Measures* (CH2M HILL 2005e) and *Action Memorandum on Time Critical Removal Action No. 3: Mitigation Measures* (Bureau of Land Management 2004). These mitigation measures, which must be applied on a year-round basis, are to be followed to prevent impacts on biological and cultural resources, as well as to prevent enlargement of previously used areas during construction of the shallow compliance monitoring wells. In general, personnel and vehicles are required to stay within the areas that were previously used and within the inclusive fencing used to mark the boundaries of allowable access routes to or work areas at these locations.

When accessing the CW-4 well cluster site, driving is to occur only in the active channel area of the wash. Due to recent rains, the access route to CW-4 has been slightly modified at the point where it first enters the wash. To the extent possible, all terrain support equipment (ATVs, "quadrunners," or "Gators") will be used for crew access to the CW-4 well cluster location to minimize rutting of the wash bottom, since the support vehicles typically make multiple trips in and out of the drilling area. For CW-2 and CW-3 well cluster locations, driving is to be one-way only on the access track and vehicles are to only use the established turnaround at CW-3. To minimize traffic to and from the drilling sites, fire hoses may be used to supply water as needed for drilling, and to transport water produced during well development to or from a remote tank located on the east mesa injection area. Any tanks and hoses will be located in areas previously cleared for cultural and biological resources. In addition, all well drilling, construction, and sampling work is to be conducted in accordance with the protective measures described in the *Transportation Management Plan for Cultural Resource Protection for Interim Measures No. 3* (CH2M HILL 2004a).

4.3 Drilling Requirements

Drilling and well installation shall conform to state and local regulations. CH2M HILL will obtain all permits, applications, and other documents required by state and local authorities. Utility clearances will also be obtained prior to commencement of drilling. The drilling, core/borehole logging, and well construction will be performed under the supervision of a California Professional Geologist. The drilling and well installation activities will be conducted in accordance with methods and procedures in the *Sampling, Analysis and Field Procedures Manual* (CH2M HILL 2005b).

4.3.1 Drilling Method

Sonic drilling methods will be used to install the compliance monitoring wells. Sonic drilling has been used for previous well drilling at the Topock site. It offers the advantages of minimal waste production, ability to penetrate through cobbles and caliche layers, and results in wells that are easier to develop than wells drilled by the mud rotary method. The drilling rig and drill casing/coring tools will be decontaminated prior to the start of the compliance well drilling program and prior to starting drilling at each well. Decontamination will be accomplished as outlined in Section 5.2.

In addition to the drilling rig, a large support/water truck and one or more 4-wheel drive pickup trucks, all terrain forklifts, or all-terrain vehicles (ATV) will be used for crew and equipment and material transfer to the drill sites. Short-term material storage in the area will be necessary to accommodate the drilling operations. Materials to be stored at the well site include drilling equipment and well construction materials (casing, sand, bentonite, cement grout, etc.). These materials will be stored on pallets near the drilling sites or in staging areas on the East Mesa.

The cuttings and excess core generated from drilling the borings will be transferred to lined steel roll-off soil bins temporarily stored at the drilling site or at the staging area on the East Mesa. The minimal water produced from sonic drilling will be contained in portable tanks at the drill site and transferred to larger storage tanks at the East Mesa. Disposal procedures for the investigation-derived waste (IDW) are discussed in Section 5.0.

4.3.2 Drilling Logs and Coring

A general drilling log will be prepared for each of the shallow compliance monitoring wells to document the drilling observations and activity. However, coring or detailed soil boring logs will not be performed since continuous coring and geophysical logging were performed at each of the compliance monitoring well clusters deep wells (CW-1D, CW-2D, CW-3D, and CW-4D) (CH2M HILL 2005d). The shallow well drilling logs will reference the existing core and geophysical logs obtained from the deep wells at the CW locations. The cores from the initial compliance well drilling program are currently stored on-site.

4.4 Compliance Monitoring Well Requirements

The compliance monitoring wells are to be installed in accordance with The *Final Design Plan for Groundwater Compliance Monitoring, PG&E Topock Compressor Station, Needles, California* (CH2M HILL 2005a). Monitoring wells will be installed and developed

sequentially. The proposed shallow compliance monitoring wells will be named CW-1S, CW-2S, CW-3S, and CW-4S in accordance with the existing naming convention, with the S denoting the well is a shallow well. Table 4-1 lists the target depths of each planned soil boring/monitoring well. The final well constructions will be based on conditions encountered in the field and might deviate from details listed in Table 4-1. Figure 4-1 presents a schematic of the proposed shallow compliance monitoring well construction detail contrasted with the existing mid-depth and deep compliance monitoring wells.

TABLE 4-1
Target Depths of Planned Monitoring Wells
Work Plan for Installation of Shallow Compliance Monitoring Wells, PG&E Topock Compressor Station, Needles, California

Location/Property Owner	Well ID	Approximate Well Depth (ft bgs)	Approximate Screened Interval (ft bgs)
BLM	CW-1S	145	100-140
PG&E	CW-2S	128.5	83.5-123.5
PG&E	CW-3S	113	68-108
PG&E	CW-4S	98	53-93

Notes:

All monitoring wells will be 2-inch Schedule 40 PVC completed within an above-ground casing monument. Guard posts will be used for well monument CW-3S since the proposed location is adjacent to an access road.

All monitoring well screens will be 40 feet in length, made of 2-inch, slotted Schedule 40 PVC with 0.020-inch openings.

For compliance monitoring well CW-4S, surface steel casing to be installed a minimum of 8 feet bgs since the proposed location is in a wash.

ft = feet

bgs = below ground surface

BLM = Bureau of Land Management

4.4.1 3.3.1 Casing Requirements

The shallow compliance monitoring wells will be constructed with 2-inch diameter Schedule 40 PVC casing and screen. The well casing and screen will be installed in the borehole through the sonic drill casing (approximate 7-inch outside diameter). The anticipated total depth is anticipated between 98 to 145 feet for the shallow compliance monitoring wells.

- All casing will be new, unused, and decontaminated.
- Glue will not be used to join casing, and casings will be joined only with compatible threads that will not interfere with the planned use of the well.
- All polyvinyl chloride (PVC) will conform to American Society for Testing Materials (ASTM) Standard F 480-88A or the National Sanitation Foundation Standard 14 (Plastic Pipe System).
- The casing will be straight and plumb.

For compliance monitoring well CW-4S, surface steel casing will be installed to a minimum depth of 8 feet bgs, since the proposed location is in a wash.

4.4.2 Well Screen Requirements

Well screen requirements for the shallow compliance monitoring wells are as follows:

- 40-foot screen will be installed across the water table, with approximately 30 feet of screen installed below the water table and 10 feet installed above the water table. Depth to groundwater is estimated to be approximately 75 to 110 feet bgs for well clusters in upland areas (CW-1, CW-2, and CW-3) and approximately 60 feet bgs for the well cluster in the wash bottom (CW-4).
- All requirements that apply to casing will also apply to well screen, except for strength requirements.
- Screens will be factory slotted.
- Screen slot size will be 0.020 inch.
- The bottom of the screen will be capped with a threaded casing cap that will be joined to the screen by thread.

4.4.3 Annular Space Requirements

The annular space will be filled with a filter pack, a bentonite seal, or casing grout between the well casing and the borehole wall. In shallow-depth wells more than 50-feet deep, at least two stainless steel centralizers will be used, one at the bottom and one at the top of the screen.

4.4.4 Filter Pack Requirements

The filter pack will consist of No. 3 silica sand (consistent with other compliance monitoring wells) and will extend from the bottom of the hole to approximately 7 feet above the top of the well screen. The filter pack will be poured into the annulus from the ground surface and a weighted tape will be used to monitor the level of the filter to avoid bridging. The top of the sand pack will be surged with a surge block during placement. After surging, additional filter pack will be placed as required to return the level of the pack to 7 feet above the screen. A minimum 3-foot-thick layer of fine transition sand will be placed above the No. 3 sand filter pack to minimize the potential for the bentonite slurry (seal) material to invade the filter pack adjacent to the top of the well screen during well construction.

4.4.5 Bentonite Seal Requirements

A bentonite seal of at least 2 feet in thickness, composed of bentonite chips or pellets, will be placed over the filter pack. Only 100 percent sodium bentonite is to be used. Bentonite chips or pellets will be hydrated with potable water for at least 30 minutes before grouting.

4.4.6 Casing Grout Requirements

The casing grout will extend from the top of the bentonite seal to ground surface. The grout will consist of a Portland Type II cement slurry mixed with five percent bentonite powder. All grout will be pumped into place using a tremie pipe. The casing grout requirements are as follows:

- The casing grout will extend from the top of the bentonite seal to ground surface.
- The grout will be cement mixture in the following proportions:
  - 94 pounds of neat Type I or II Portland or American Petroleum Institute Class A cement per 6 gallons of potable water
  - 2 to 3 pounds of 100 percent sodium bentonite powder per bag of cement.
- All grout will be pumped into place using a tremie pipe.
- The expected volume of each ingredient in the grout mixture will be pre-calculated and documented.
- No accelerator compounds will be used in the grout mixture.

San Bernardino County will be notified in advance of grouting operations to provide them the opportunity to observe this activity.

4.4.7 Surface Completion Requirements

The shallow compliance wells will be completed with a steel, locking wellhead monument surface completion. A watertight expanding rubber seal type locking cap will be provided for each well. The wellhead monument (steel stovepipe) completion will be placed over the casing and cap and seated in a 3-foot by 3-foot by 4-inch-thick concrete pad. The ground surface will be freed of grass and scoured to a depth of 2 inches before setting the concrete pad. The diameter of the sleeve or stovepipe will be at least 4 inches greater than the diameter of the casing. The concrete pad will be sloped away from the well sleeve. The identity of the well will be permanently marked on the casing cap and the protective sleeve. Guard posts will be used for the CW-3S well monument since it is proposed to be installed adjacent to an access road.

All wells will be secured as soon as possible after drilling by using corrosion-resistant locks. The locks will be keyed for opening with one master key.

4.4.8 Well Development and Geophysical Logging

After well construction and annular seal placement, the compliance wells will be developed using a surge block, bailer, and submersible pump. Development will not be conducted until the grout in the wells has set for a minimum of 48 hours. During development, temperature, pH, specific conductance, and turbidity will be measured using field instruments. Well development will continue until at least 3 well volumes have been removed and field measurements of temperature, pH, and specific conductance stabilize within 10 percent between subsequent measurements, and turbidity is reduced to less than 50 nephelometric turbidity units. Geophysical logging is not planned for the shallow wells

because geophysical logs were previously obtained from the nearby deep wells at each location.

4.4.9 Well Completion Diagrams

A completion diagram will be prepared for each monitoring well installed. It will include the following information:

- Well identification
- Drilling method
- Installation date(s)
- Elevations of ground surface and identification of the measuring point
- Total boring depth
- Lengths and descriptions of the screen and casing
- Lengths and descriptions of the filter pack, bentonite seal, casing grout, and any back filled material

4.5 Initial Groundwater Sampling

After well development, the new monitoring wells will be sampled for the initial water quality characterization. The sampling activity will follow the procedures, analytical methods, reporting limits, and quality control plan used for the Topock groundwater monitoring program as described in the Topock program *Sampling, Analysis and Field Procedures Manual* (CH2M HILL 2005b).

Samples from the new compliance monitoring wells will be analyzed for Cr(VI), Cr(T), Total Dissolved Solids (TDS), specific conductance, pH, aluminum, ammonia (as nitrogen), antimony, arsenic, barium, boron, calcium, chloride, carbonate/bicarbonate, copper, fluoride, lead, magnesium, manganese, molybdenum, nickel, nitrate/nitrate (as nitrogen), total Kjeldahl nitrogen, potassium, selenium, sodium, sulfate, total iron, and zinc. Groundwater samples for metals analyses will be filtered to obtain dissolved metals concentrations. Field water quality parameters (temperature, pH, specific conductance, oxidation-reduction potential, and turbidity) will also be measured.

SECTION 5.0

Waste Management

5.1 Waste Management

Several types of waste materials will be generated during the drilling, development, and sampling of the shallow compliance monitoring wells. Investigation-derived waste (IDW) materials that will be generated include drill cuttings, groundwater, decontamination water, and incidental trash. The incidental trash will consist of empty paper and plastic bags, cardboard boxes, wooden pallets, and miscellaneous debris. Figure 5-1 presents the proposed location of staging areas for the temporary storage of IDW. The area in between observation wells OW-1, OW-2 and OW-5 is proposed as the main temporary storage area for this material, with secondary storage being proposed at the CW-1 well site north of Route 66. The storage of material at the individual CW well drilling sites will be kept to the minimum needed for daily operations.

Water generated during drilling, development, and decontamination activity will be contained in temporary storage tanks and transferred by truck to storage bins or tanks located on the East Mesa for characterization, potential treatment, and appropriate disposal. Temporary storage of this IDW will be in the proposed areas presented in Figure 5-1. Based on available data, it is unlikely that groundwater from the proposed monitoring wells will contain chromium at concentrations above the 50 micrograms per liter California maximum contaminant level for drinking water. Therefore, secondary containment will not be necessary for tanks containing groundwater from the compliance wells. Water generated from the CW installations will be introduced to the IM No. 3 treatment facility, or transported offsite to a permitted disposal facility.

Drilling cuttings include the fragments of rock and soil that are removed to create the borehole. The cuttings will be contained in lined roll-off bins at the drill sites during drilling operations, and transferred to the proposed staging areas as filled, and at the completion of drilling activities. After sampling and characterization, all cuttings bins will be removed from the staging area for disposal at an appropriate facility. The cuttings will be screened for chromium, the main constituent of concern for the site. If the cuttings are characterized as having chromium above background levels, they will be transported offsite for disposal at a permitted waste disposal facility. It is estimated that the soil IDW bins will not remain on site for more than 45 days.

Incidental trash will be collected at the end of each drilling shift, and hauled off the drill site to an appropriate disposal facility.

5.2 Equipment Decontamination

The back of the drilling rig and all downhole drilling tools will be decontaminated prior to starting each new borehole. Decontamination will be accomplished by steam cleaning the core barrel, drill stem, drive casing, and back of the drilling rig. Steam cleaning will be

conducted on a decontamination pad located on PG&E Compressor Station property at the East Mesa staging area, so all rinsate can be contained and collected. Rinsate from the decontamination operation will be transferred to the cuttings bin or purge water tank that contains materials from the borehole last drilled by the rig. The decontamination rinsate will be managed along with the cuttings or purge water.

SECTION 6.0

Schedule and Reporting

The schedule for installation of the four shallow compliance monitoring wells at existing compliance monitoring wells clusters CW-1 through CW-4 will be 90 days after approval of this workplan. The schedule for the installation of the four shallow compliance monitoring wells is provided in Table 6-1. All drilling and development work associated with the compliance monitoring wells will be conducted during normal daylight hours, and therefore no night time work lighting will be required. The schedule assumes use of one rig for drilling and well installation. Permitting activities and schedules may be extended based on events not within PG&E control.

Following completion of the fieldwork, a summary report will be prepared to document the well installation, and the results of sampling and testing of the monitoring wells. The report will include the drilling, well completion, well development, and initial groundwater sampling records and results. The investigation report will be submitted approximately 8 weeks after the wells are installed and sampled.

TABLE 6-1
Anticipated Duration of Well Installation Activities
Work Plan for Installation of Shallow Compliance Monitoring Wells, PG&E Topock Compressor Station, Needles, California

Activity	Duration
DTSC Review of Draft Work Plan	As Necessary
Revise Draft Work Plan and Submit Final to DTSC	3 weeks
Permitting	9 weeks
Mobilization (including procurement)	2 weeks
Monitoring Well Drilling, Installation and Sampling (4 locations)	5 weeks
Summary Report	8 weeks

SECTION 7.0

Permits and Approvals Required

Table 6-1 provides a listing of permits and approvals that have been identified as applicable to the installation of the shallow compliance monitoring wells. All applicable and necessary permits/approvals will be obtained prior to moving drilling equipment to the site.

TABLE 7-1
Permits, Approvals, and Certifications for Compliance Monitoring Wells
Work Plan for the Installation of Shallow Monitoring Wells, PG&E Topock Compressor Station, Needles, California

Agency	Permits, Approval, Certifications, etc.
Federal BLM	Authorization was provided by BLM in a September 17, 2004 Action Memorandum, subject to subsequent approval of a work plan by the BLM Lake Havasu Field office.
California DTSC	CEQA Notice of Exemptions dated February 10, 2004 and June 30, 2004 (emergency project)
State Water Resources Control Board/ Colorado River Basin Regional Water Quality Control Board	Notice of Intent and Storm Water Pollution Prevention Plan for Construction Activities; covered under statewide general permit
United States Fish & Wildlife Service (USFWS)	BLM may consult with USFWS, pursuant to Section 7 of the Endangered Species Act (ESA).
State Historic Preservation Office (SHPO)	BLM may choose to consult with tribes for 30 days, followed by a 30 day consultation with SHPO, pursuant to Section 106 of the National Historic Preservation Act (NHPA).
San Bernardino County	Well Permits

SECTION 8.0

References

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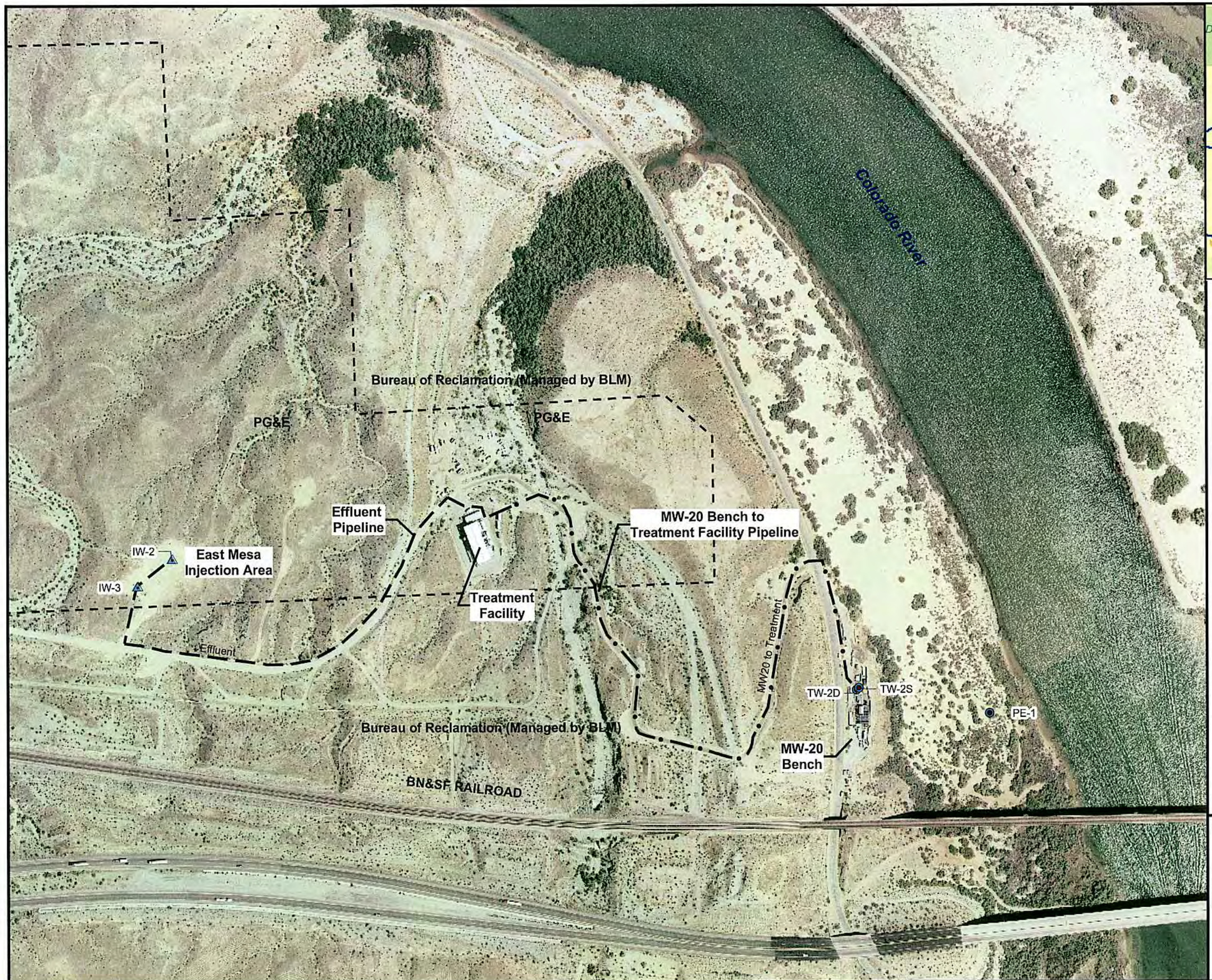
Figures



N

0 350 700 Feet

1 inch equals 350 feet

LEGEND

- PG&E Property Line
- Existing IM Extraction Well
- Existing IM Injection Well

FIGURE 1-1
LOCATIONS OF IM-3 GROUNDWATER EXTRACTION, CONVEYANCE, AND TREATMENT FACILITIES, JULY 2005

INTERIM MEASURES NO. 3
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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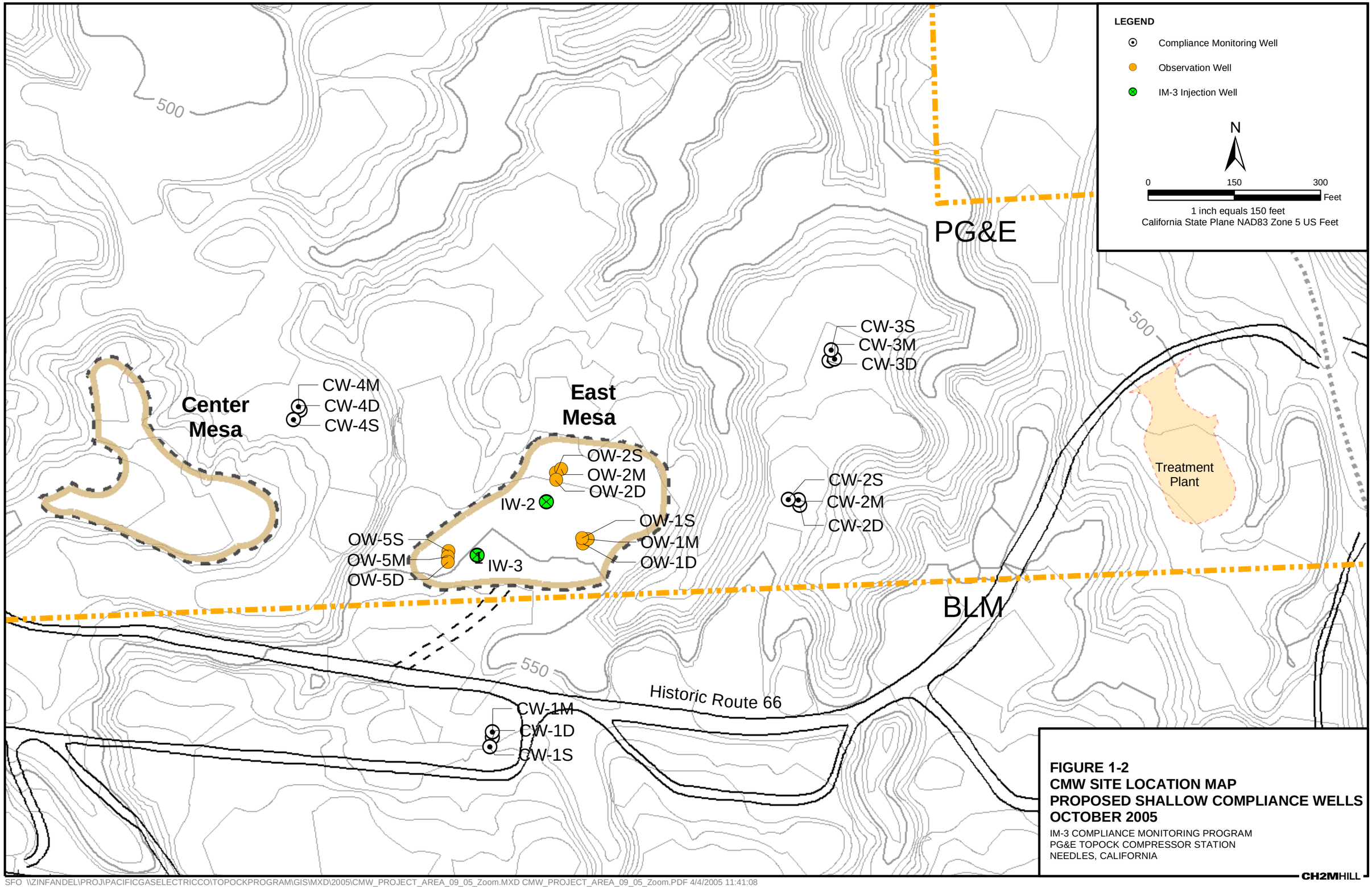

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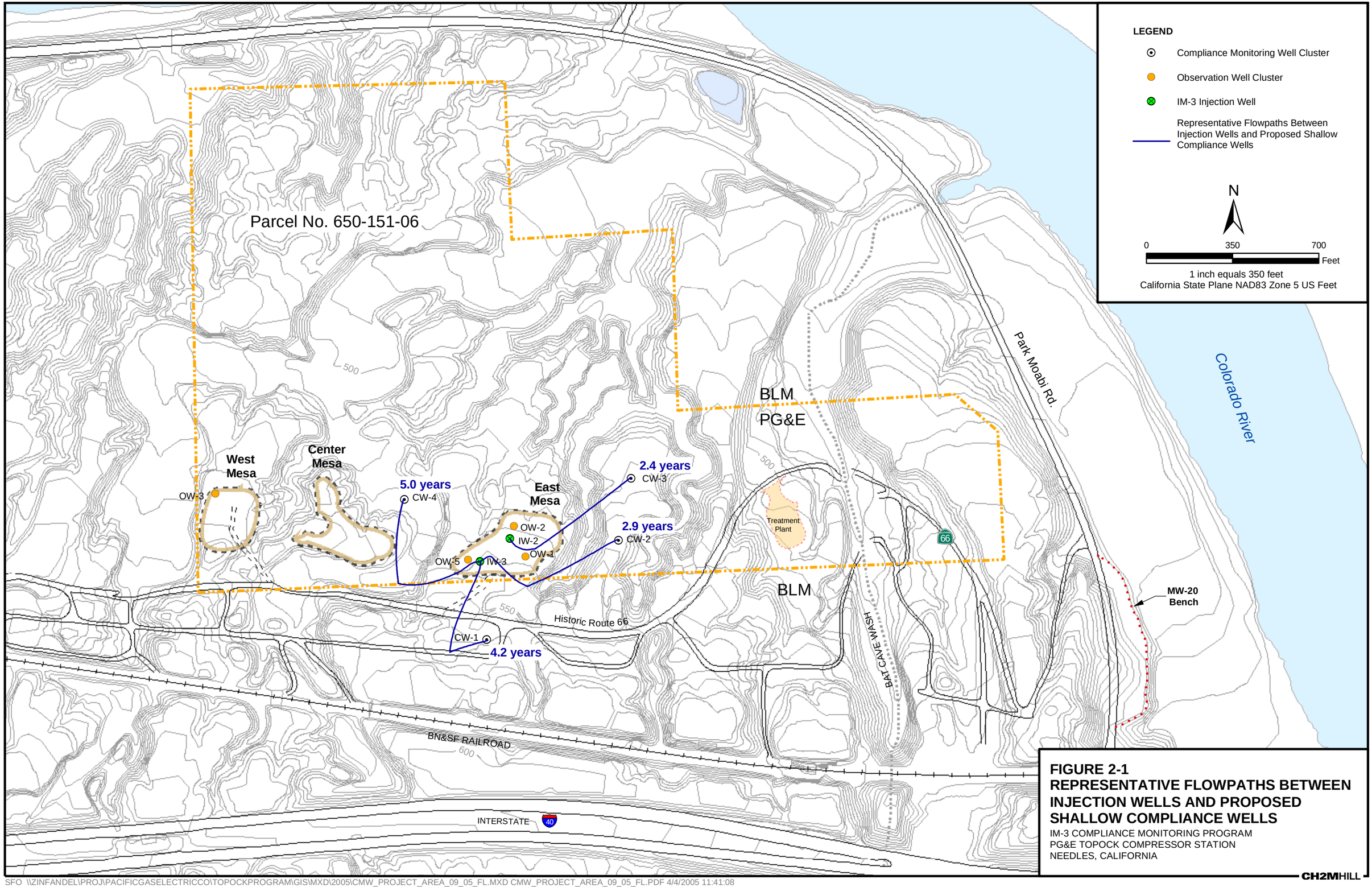

FIGURE 2-1
REPRESENTATIVE FLOWPATHS BETWEEN INJECTION WELLS AND PROPOSED SHALLOW COMPLIANCE WELLS
IM-3 COMPLIANCE MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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Revision 10/10/05

Proposed
Compliance Monitoring Well Cluster

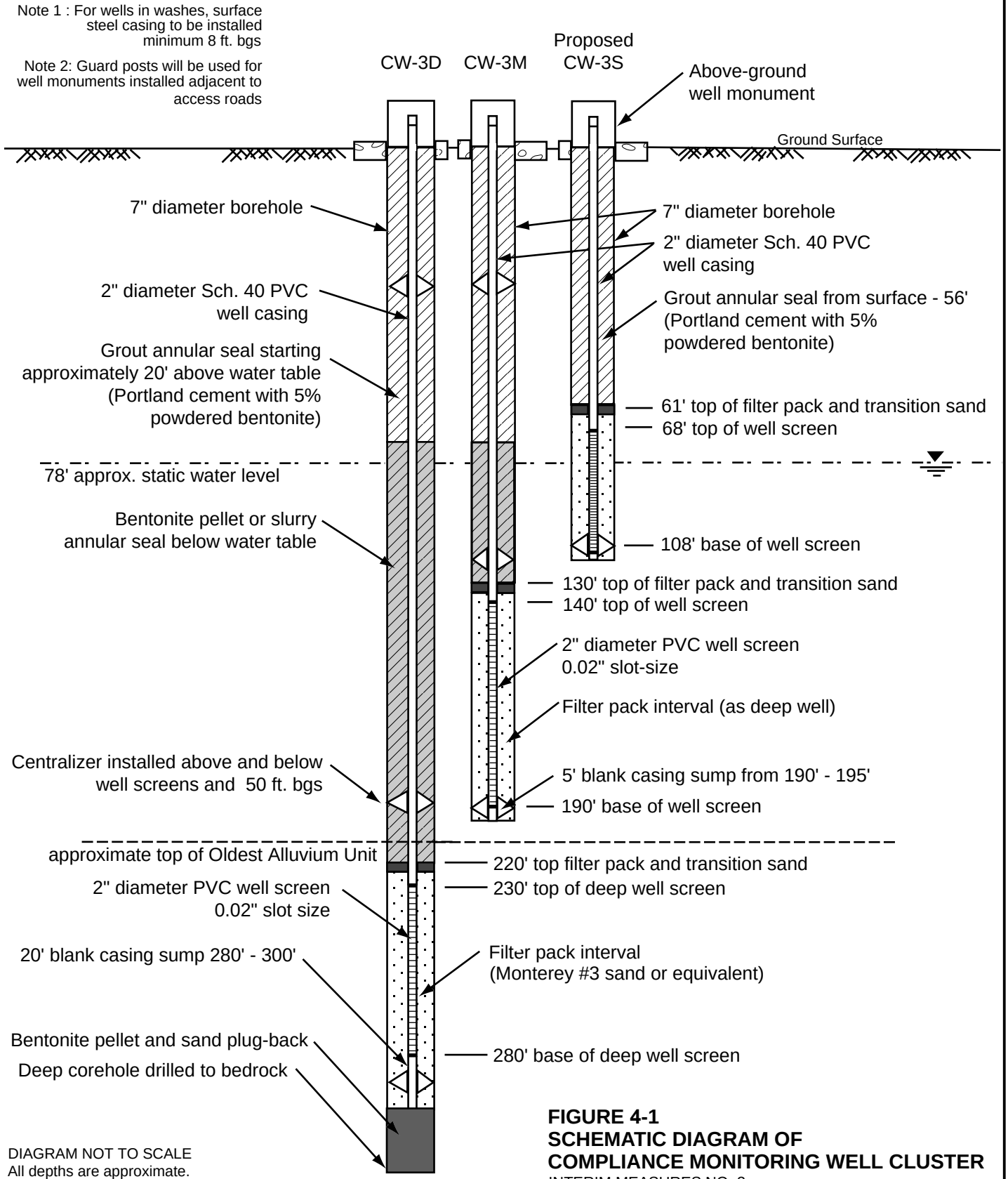

DIAGRAM NOT TO SCALE
All depths are approximate.

Actual depths for each well will be determined based on field conditions in consultation with DTSC and RWQCB.

FIGURE 4-1
SCHEMATIC DIAGRAM OF COMPLIANCE MONITORING WELL CLUSTER
INTERIM MEASURES NO. 3
PG&E TOPOCK COMPRESSOR STATION

CH2MHILL

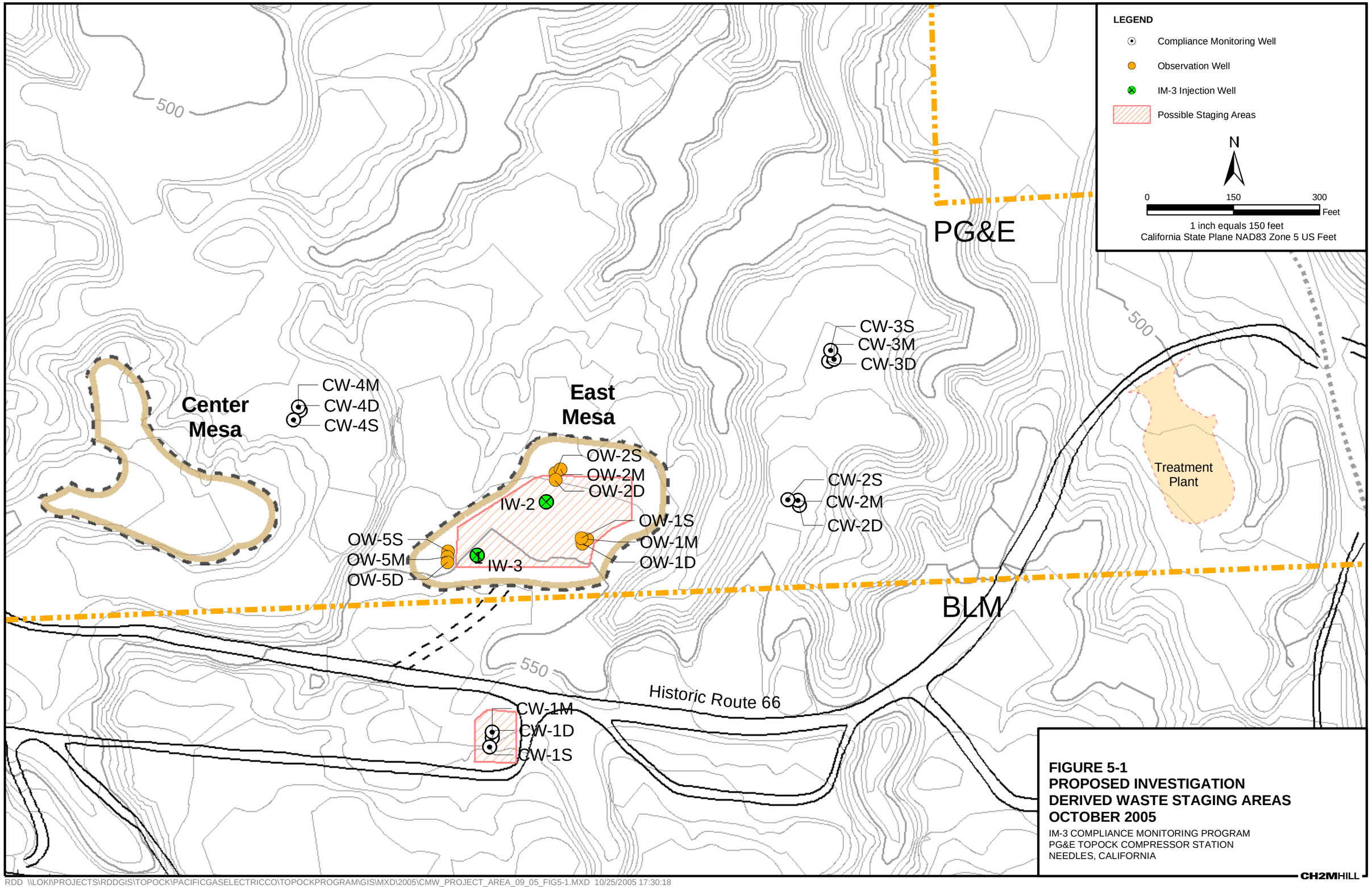

FIGURE 5-1
PROPOSED INVESTIGATION DERIVED WASTE STAGING AREAS
OCTOBER 2005

IM-3 COMPLIANCE MONITORING PROGRAM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\TOPOCK\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2005\CMW_PROJECT_AREA_09_05_FIG5-1.MXD 10/25/2005 17:30:18

Attachment A

Selection of Locations for Compliance Monitoring Wells, Pacific Gas and Electric Company, Topock Project

PREPARED FOR: Department of Toxic Substances Control

DATE: November 9, 2004

Introduction

The purpose of this memorandum is to provide information on the potential locations for compliance monitoring wells associated with the planned injection wells on PG&E property at the Topock site. The compliance monitoring wells are designed to provide additional site characterization and baseline groundwater quality data and to meet the Waste Discharge Requirements for a compliance monitoring program after injection begins. This technical memorandum focuses on the issues regarding siting of the compliance monitoring wells. After the well locations are approved, a work plan will be prepared that will describe in detail the design, construction, sampling, and schedule for installation of these wells. This work plan is due to the Regional Water Quality Control Board (RWQCB) no later than November 27th, 2004. Consequently, PG&E is requesting an expedited review of this technical memorandum so that we may proceed with preparation of the work plan.

The presence of sensitive cultural and biological resources and the steep terrain provide significant constraints on siting monitoring wells in the vicinity of the injection wells. A site survey was conducted to identify potential well locations that could be made accessible to drilling equipment without the need for extensive road building or grading. A reconnaissance level archeological survey had previously identified several large areas of the site where injection well and observation well drilling activities could not be conducted without adverse impact to cultural resources. As such, these areas are not candidate sites for compliance monitoring well drilling. Due to frequent scouring by floods, significant cultural resources are typically not found in wash bottoms at this site. Washes do, however, provide wildlife corridors and habitat for several sensitive species of plants and animals. By careful selection of well sites, planning of access routes, and diligent monitoring of drilling activities we believe it is possible to conduct drilling activities in some wash bottoms without adverse impacts to the biological resources. Potential well locations in the wash bottoms were chosen to be out of the main flow channels and in areas accessible without cutting trees.

A total of 18 potential compliance monitoring well locations were identified. These potential locations, labeled A through R, are shown on Figure 1. Figure 1 also shows the areas of the site that were considered unavailable for well drilling due to inaccessible terrain, cultural resources, or wetland habitat. A more detailed archeological survey conducted after the initial selection of well locations showed that location labeled "I" on Figure 1 was in fact not accessible due to cultural resources not mapped in the original, reconnaissance level survey. The outline of the "Compliance Monitoring Well Project Site" shown on Figure 1 was determined based on distance from the injection well fields. There may be locations

accessible for compliance monitoring wells outside the project site boundary, but groundwater travel times to wells at this distance would be greater than 10 years.

Colorado River Basin RWQCB Waste Discharge Requirements R7-2004-0103 require a minimum of one upgradient and two downgradient compliance monitoring wells associated with each injection well field. The DTSC has indicated that, where possible, compliance monitoring wells should be within a distance representing about 2 years of groundwater travel time from the injection well fields. The computer groundwater flow model developed for design of the Interim Measures 3 pump and treat system was used to simulate the groundwater flow patterns from the injection well fields. The travel time and direction from the injection well fields were considered the most important criteria for selection of preferred compliance monitoring well locations from among the 18 potential locations.

If both the East and West Mesa injection fields are developed, PG&E is proposing to install a total of 7 compliance monitoring wells in the "preferred" locations shown on Figure 1. If it is determined through aquifer testing that sufficient injection capacity can be provided by wells on the East Mesa alone, the West Mesa injection field may not be built. In that case, only 4 compliance monitoring wells would be installed in those preferred locations that surround the East Mesa, labeled as J, O, Q, and M on Figure 1. It is understood that the DTSC or the RWQCB may require additional compliance monitoring wells in the future based on the performance monitoring data collected during operation of the injection wells.

Model Simulations of Groundwater Travel Time

Groundwater modeling was conducted to estimate the travel times through the aquifer between the injection wellfields and the compliance monitoring well locations. To simplify the modeling task and to make the graphics more legible, the injection at each mesa was simulated as if it were a single injection well. Particle tracking was used to show groundwater flow paths in a steady state groundwater flow field.

The groundwater model can be used to simulate pumping rates needed to maintain an average monthly landward gradient throughout the year, based on the changing levels of the river. The projected average monthly pumping rate requirements in gallons per minute (gpm) are shown in the table below. These requirements are subject to change as the model calibration is refined.

TABLE 1
Model Projected Monthly Average Pumping Rates for 2004 in gpm.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
20	20	20	20	20	20	22	38	33	55	28	39	**28**

Although the model predicts that little or no pumping would be necessary to maintain landward gradients during the months of January through June, it was assumed that a minimum of 20 gpm would be pumped during these months, as directed by DTSC, to provide a margin of safety for possible system downtime in other months. To estimate

groundwater travel times, the groundwater model was run in a steady state mode using the projected average annual pumping rate of 28 gpm.

The treatment system includes a reverse osmosis (RO) process that removes salts from the water. The byproduct of reverse osmosis is a concentrated salt solution known as RO concentrate. This concentrate, which may represent approximately 25 percent of the water passing through the RO unit, will not be re-injected to the aquifer. Consequently, the injection rate used in the model is only 21 gpm, 25 percent less than the average pumping rate.

Based on data available from drilling and testing of small diameter observation wells on the East and West Mesas, it appears likely that sufficient injection capacity will be obtained from a set of three injection wells on the East Mesa. If so, injection wells would not be drilled on the West Mesa. Until the injection wells have been drilled and tested, the option of injecting on both mesas is being retained. Consequently, two model simulations were conducted. The first projects groundwater flow paths from injection of 21 gpm only on the East Mesa. The second projects groundwater flow paths with the 21 gpm injection flow split evenly between the two mesas. Results of these two simulations are shown on Figures 2 and 3, respectively.

In the study area, much of the aquifer consists of relatively low-permeability silty and clayey sands with relatively thin layers of more permeable clean sands and gravels. Groundwater will travel much more rapidly through the clean sand and gravel zones than through the silty and clayey sand zones. The groundwater model simulates the average bulk properties of the aquifer and does not include the small scale preferential flow pathways represented by the clean sand and gravel layers. The model projections may therefore tend to underestimate the groundwater transport velocities. To account for model uncertainties, the average effective porosity in the model was set at 3 percent. Typical values of effective porosity of sand and gravel would be 15 percent. Using a value of 3 percent provides equivalent transport velocities to a condition where four-fifths of the aquifer is lower-permeability silty and clayey sands and groundwater is preferentially flowing through the higher-permeability clean sands and gravels that make up about one fifth of the saturated thickness.

The model uses 4 vertical layers to simulate a total aquifer thickness of about 250 feet near the injection wells. The hydraulic conductivity in this area is estimated to be about 35 ft/day. This estimate is consistent with results of aquifer testing in both the TW-1 well near the compressor station and the TW-2 wells near the floodplain. The pathlines shown on Figures 2 and 3 represent particles starting in Layer 3 of the 4-layer model. The pathlines and travel times are similar for particles started in other model layers. The injection wells were simulated as fully penetrating wells screened through all four model layers. The rate of injection into each layer is proportional to that layer's contribution to total transmissivity.

To simplify the graphical presentation of model results, the model simulated injection through a single well on each mesa. Actually, there are three potential injection well locations on the East Mesa and two potential injection well locations on the West Mesa. If the model had simulated injection from multiple wells on each mesa, any resulting increases or decreases in travel times would not be expected to be significant.

Ranking of Potential Well Locations

The preferred compliance monitoring well locations were surveyed for cultural and biological resources by an archaeologist from Applied Earthworks and a wildlife biologist from CH2M HILL. These surveys indicated that, with proper mitigation measures in place, wells could be installed at all seven of the preferred locations without adverse impacts. A site-specific cultural resources survey also was conducted for Site I. This survey revealed that a well could not be installed at this location without adverse impact to cultural resources. Therefore, Site I is no longer considered to be a candidate site. Detailed cultural and biological surveys have not yet been completed on any other potential compliance well sites.

Table 1 provides a summary of the relative rankings of the potential well locations based on a set of criteria that include groundwater travel time from injection wells, ease of equipment access, and an initial screening for impacts to cultural and biological resources. The ranking criteria are somewhat subjective and meant only to provide insight into the process of selection of the preferred wells. An explanation of the ranking criteria is provided in Table 3.

Not included in Table 2 is the criterion of geographic location of the wells. It is desirable to have the compliance monitoring wells located in all four quadrants around each injection well field, rather than clustered together in one or two quadrants.

TABLE 2
Ranking of Potential Compliance Monitoring Well Locations

Well Location	Primary Monitoring Purpose	Ground-water Travel Time (yr.)	Equipment Access (ranking)	Cultural Resource Risk (ranking)	Biological Resource Risk (ranking)	Overall Score	Comments
A	Both Mesas	16	4	1	3	24	
B	East Mesa	31	4	1	4	40	Potential Willow Flycatcher habitat nearby
C	West Mesa	8	3	1	3	15	
D	**West Mesa**	**6**	**3**	**1**	**3**	**13**	
E	Both Mesas	13	3	1	3	20	
F	East Mesa	14	4	1	4	23	Potential Willow Flycatcher habitat nearby
G	West Mesa	6	3	1	3	13	
H	Both Mesas	10	3	1	3	17	
I	East Mesa	8	2	4	2	16	Site found to be inaccessible due to cultural resources
J	**East Mesa**	**6**	**2**	**2**	**2**	**12**	Travel time is 4 years if injection on East Mesa only
K	East Mesa	14	2	3	2	21	Use of Old Trails Highway needed for access
L	**West Mesa**	**3**	**3**	**1**	**3**	**10**	
M	**Both Mesas**	**9**	**3**	**1**	**3**	**16**	Travel time is 3 years if injection on East Mesa only
N	Both Mesas	12	3	1	3	19	
O	**West Mesa**	**3**	**2**	**2**	**2**	**9**	Travel time is 2 years if injection on East Mesa only
P	**East Mesa**	**2**	**1**	**1**	**1**	**5**	
Q	**East Mesa**	**3**	**1**	**1**	**1**	**6**	Travel time is 2 years if injection on East Mesa only
R	East Mesa	10	1	1	1	13	

Notes:
Travel time estimates based on injection of 21 gpm, divided between East and West Mesas as shown on Figure 3.
Bold text indicates preferred well locations.
Rankings are subjective with 1 being most desirable and higher numbers less desirable. Criteria used for rankings is explained in Table 3.

TABLE 3
Explanation of Ranking Criteria used in Table 2

Rank	Equipment Access	Cultural Resources	Biological Resources
1	Sites on or near established roads easily accessible to conventional truck-mounted drilling equipment	Sites in previously disturbed areas or in wash bottoms where significant cultural resources are unlikely to be present	Sites in previously disturbed upland areas where significant biological resources are unlikely to be present
2	Sites further from established roadways with some grading or filling needed to be accessible to truck-mounted drilling equipment	Sites on upland areas where significant cultural resources may exist but drilling likely can be conducted without adverse impact	Sites in undisturbed upland areas where there may be some sensitive species present
3	Sites in wash bottoms that will likely require all-terrain drilling equipment	Ranking given to Site K, indicating that blanketing of a section of Old Trails Highway likely would be required to allow access	Sites in wash bottoms, where sensitive species are known to be present but mitigation measures can prevent adverse impacts
4	Sites in wash bottoms far from established roads that will likely require all-terrain drilling equipment	Ranking given to Site I, indicating that site use would result in adverse impact to cultural resources	Sites near potential endangered species (Willow Flycatcher) habitat where mitigation to avoid adverse impacts may not be possible

Note – Ranking of 1 is considered to be most desirable and ranking of 4 least desirable

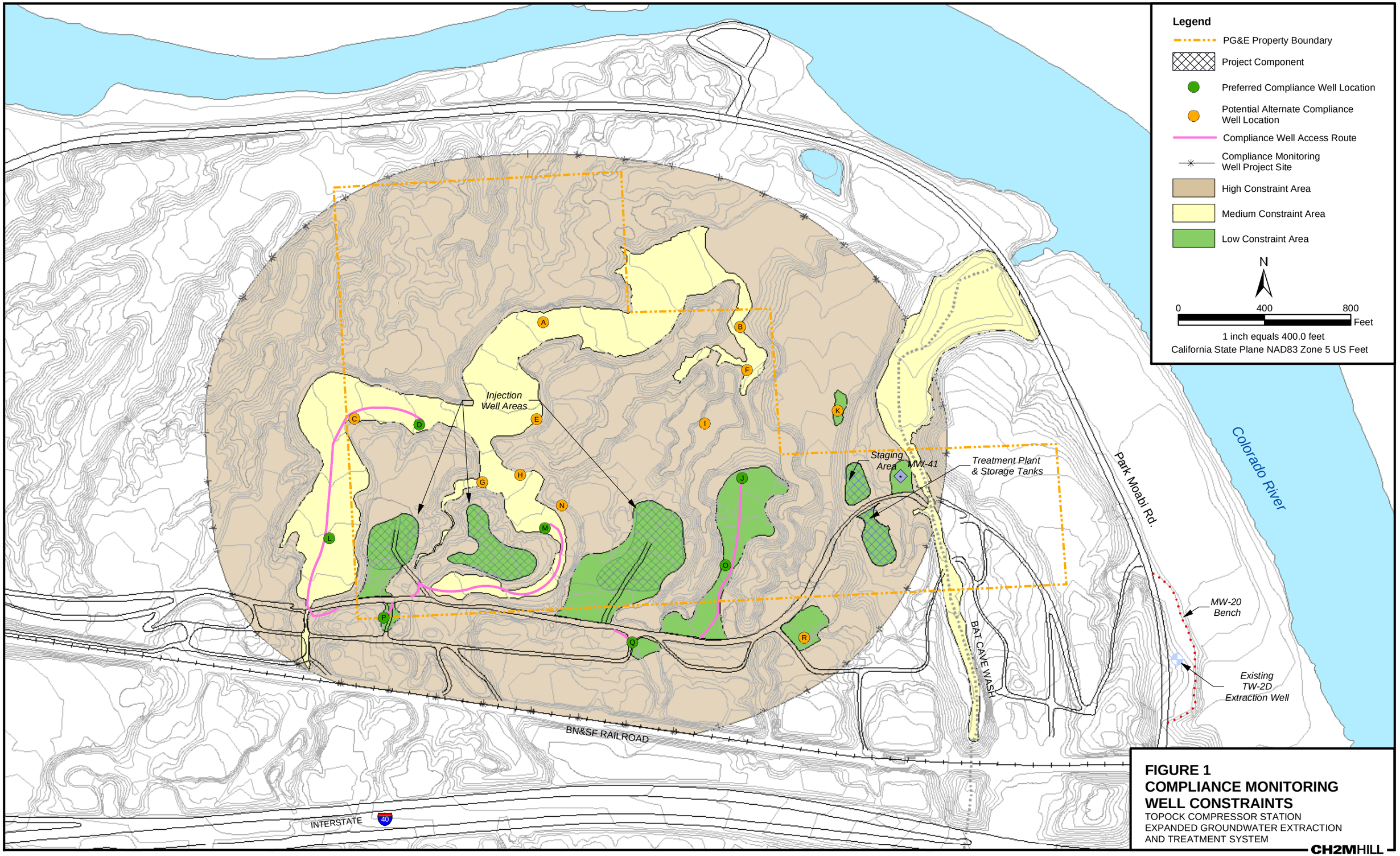

FIGURE 1
COMPLIANCE MONITORING WELL CONSTRAINTS
TOPOCK COMPRESSOR STATION
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

CH2MHILL

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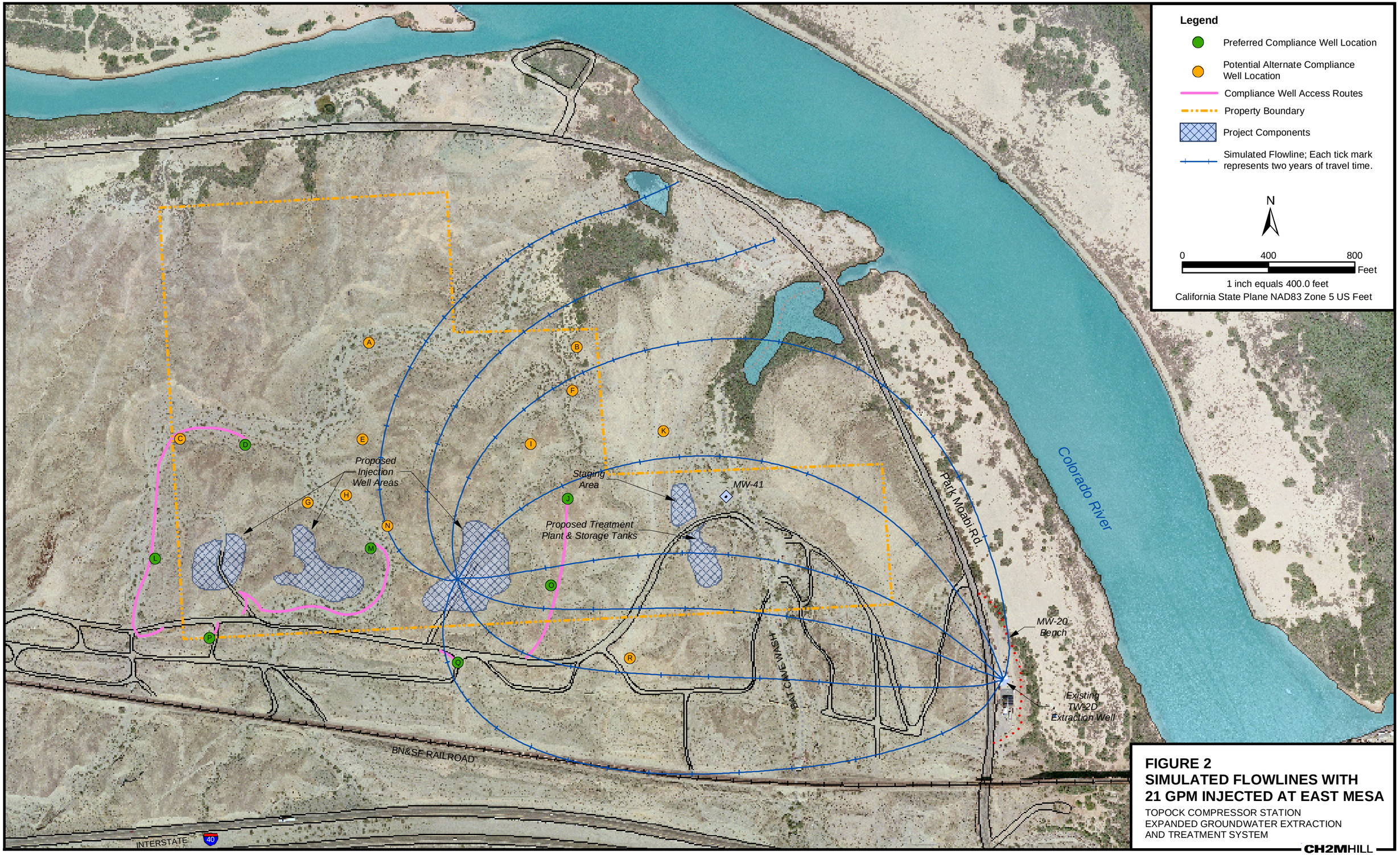

FIGURE 2
SIMULATED FLOWLINES WITH 21 GPM INJECTED AT EAST MESA

TOPOCK COMPRESSOR STATION
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

CH2MHILL

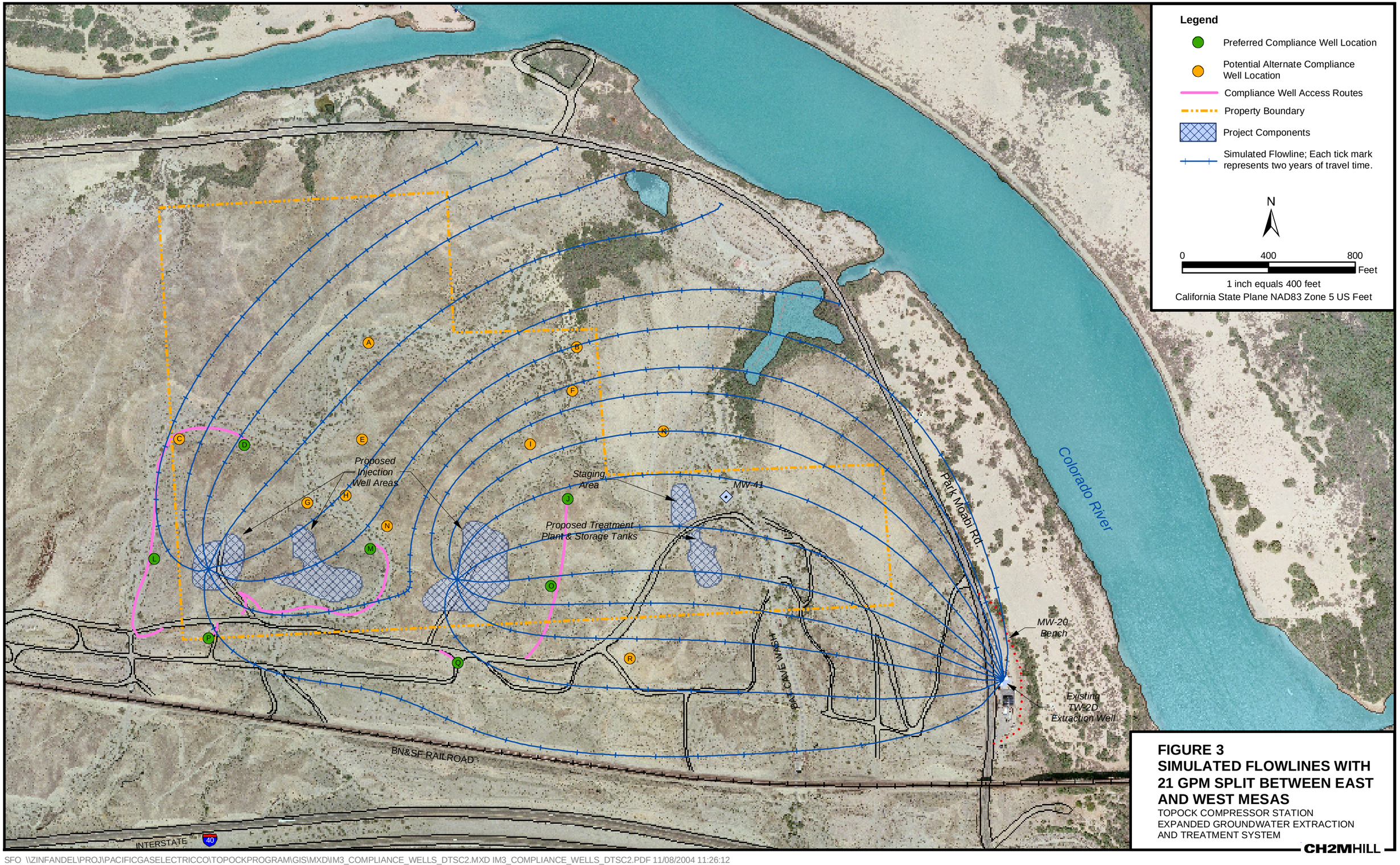

FIGURE 3
SIMULATED FLOWLINES WITH 21 GPM SPLIT BETWEEN EAST AND WEST MESAS
TOPOCK COMPRESSOR STATION
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

CH2MHILL

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Appendix D3:
Well PGE-6 Decommissioning Evaluation

Pacific Gas and Electric Company

Yvonne J. Meeks
Topock Project Manager
Chromium Remediation Project Office
Gas Transmission & Distribution

6588 Ontario Road
San Luis Obispo, CA 93405

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4325 South Higuera Street
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E-Mail: YJM1@pge.com

November 10, 2006

Mr. Aaron Yue
Project Manager
California Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630

Subject: Well PGE-6 Revised Decommissioning Work Plan
PG&E Topock Compressor Station, Needles, California

Dear Mr. Yue:

This letter transmits the *Well PGE-6 Revised Decommissioning Work Plan*. The revised work plan is submitted in conformance with DTSC's October 23, 2006 letter.

If you have any questions, please do not hesitate to contact me. I can be reached at (805) 234-2257.

Sincerely,

Julie Eakins for Yvonne Meeks

cc. Karen Baker/DTSC
Chris Guerre/ DTSC
John Earle/HNWR
Casey Padgett/DOI

Enclosure

Well PGE-6 Revised Decommissioning Work Plan

PG&E Topock Compressor Station
Needles, California

Prepared for

California Department of Toxic Substances Control

On Behalf of

Pacific Gas and Electric Company

November 10, 2006

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, CA 94612

Well PGE-6 Revised Decommissioning Work Plan

PG&E Topock Compressor Station
Needles, California

Prepared for
California Department of Toxic Substances Control

On behalf of
Pacific Gas and Electric Company

November 10, 2006

This work plan was prepared under supervision of a California Certified Engineering Geologist

Paul Bertucci, C.E.G.
Project Hydrogeologist

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2.2 Well Decommissioning Requirements and Scope 2-1
2.2.1 Backfill Materials 2-3
2.2.2 Surface Excavation and Casing Removal 2-4
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4.0 Schedule and Reporting **4-1**

5.0 Required Approvals and Authorizations **5-1**

6.0 References **6-1**

Tables

1 Duration of Major Tasks
2 Approvals for Well PGE-6 Decommissioning

Figures

1 Locations of PGE-6 and Proposed Well Decommissioning Access and Staging Areas
2 Schematic Diagram of PGE-6 Proposed Decommissioning

Attachment

A Driller's Log and Video Logging Report (1998)

Acronyms and Abbreviations

µg/L	micrograms per liter
bgs	below ground surface
BLM	U.S. Bureau of Land Management
Cr(VI)	hexavalent chromium
DTSC	California Department of Toxic Substances Control
DEHS	San Bernardino County Department of Environmental Health Services
DWR	California Department of Water Resources
ft bgs	feet below ground surface
HNWR	Havasu National Wildlife Refuge
IDW	investigation-derived waste
PG&E	Pacific Gas and Electric Company
USFWS	U.S. Fish and Wildlife Service

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station near Needles, California, under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). In a January 6, 2006 letter "Conditional Approval of the Draft Well Installation Work Plan for Interim Measures Performance Monitoring Program, PG&E Topock Compressor Station" (DTSC 2006a), DTSC requested a technical memorandum be submitted by February 28, 2006 with recommendations regarding whether the inactive water supply well PGE-6 should be decommissioned. If decommissioning was recommended, DTSC required that a work plan for decommissioning be submitted on the same date as the technical memorandum. PG&E submitted the *Well PGE-6 Decommissioning Work Plan* (Work Plan) to DTSC on February 28, 2006 (CH2M HILL 2006a).

Existing well construction, drilling logs, water level, and water quality data were reviewed for PGE-6 and nearby wells. Recommendations for the potential future use and decommissioning of PGE-6 were provided in the technical memorandum that accompanied the Work Plan entitled *Well PGE-6 Decommissioning Evaluation, PG&E Topock Compressor Station (*CH2M HILL 2006b). The technical memorandum recommended that PGE-6 could possibly be useful as an injection or extraction well in a pilot test of in-situ remediation. After the pilot test was complete, or once it is determined that PGE-6 wouldn't be needed for the pilot test, it was recommended that the well be decommissioned. This work plan describes the methods, materials, waste management, schedule, and authorizations pertinent to the decommissioning work.

In a letter dated October 23, 2006, DTSC provided comments on the February 2006 Work Plan for decommissioning well PGE-6 (DTSC 2006b). DTSC's comments required modified procedures for decommissioning well PGE-6 and requested that a revised Work Plan be submitted by November 10, 2006. The February 2006 Work Plan has been revised to incorporate DTSC's comments on decommissioning procedures and field work staging areas, as directed.

1.1 Well PGE-6 Construction Details and Present Condition

As shown on Figure 1, well PGE-6 is located approximately 400 feet northeast from the northern boundary of PG&E's Topock Compressor Station, in an area known as the MW-24 bench. PGE-6 was originally installed in 1964 as a standby industrial water supply well for the Topock Compressor Station. It has not been in service as a production well since at least 1971 and was reportedly rarely pumped prior to that time. It has been sampled periodically since 1997. Concentrations of hexavalent chromium [Cr(VI)] in samples from PGE-6 have ranged from non-detect (<10 micrograms per liter [µg/L]) to 3,100 µg/L.

Information on the drilling, construction, and current conditions of PGE-6 are included in Attachment A. The 1964 drillers log indicates that the well was constructed to a depth of 180 feet below ground surface (ft bgs) with 14-inch steel casing. A 20-inch diameter

conductor casing extends to a depth of 19 feet. The screened interval extends from 110 feet to 180 feet bgs with 3/32-inch by 1-inch long vertical cut slots. Based on available 1964 construction specifications in PG&E files, the 14-inch well casing is believed to have been installed directly (i.e., driven) in the 14-inch diameter borehole without an annular space, gravel pack, or bentonite seal. The construction records indicate that a drive shoe was installed on the bottom of the casing, which would imply that there is no end cap on the well.

A 1998 video log of PGE-6 shows the well to be filled with sediment or collapsed to a depth of 162 feet bgs. A well schematic diagram of the current condition of PGE-6 is provided in Attachment A. The PGE-6 video log (logging report included in Attachment A) shows the well casing to be in very poor condition. Numerous holes are visible in the casing between about 60 and 100 feet. The perforated well screen is heavily corroded and encrusted. The casing above the screen is in such poor condition that there is significant potential risk of collapse if attempts were made to clean out or rehabilitate this well.

2.0 PGE-6 Decommissioning

2.1 Site Access and Preparation

The MW-24 bench is on federal land owned by the Havasu National Wildlife Refuge (HNWR) and managed by the U.S. Fish and Wildlife Service (USFWS). Trucks and equipment needed to do the decommissioning work at PGE-6 will have to negotiate a steep, one-lane dirt road that leads from the Compressor Station down to the MW-24 bench. This road frequently becomes rutted after rains and may require some grading or filling of ruts to allow equipment access to the well site. Equipment needed for decommissioning may include a backhoe, dump truck, front loader, cement truck or trailer, and pump service truck. The decommissioning work could be accomplished in two to three days. Because of the short duration of the work and the relatively small amount of materials needed, there will be no need for an equipment or materials staging area. However, if a staging area becomes necessary, an area on the Compressor Station southeast of PGE-6 will be used for storing equipment and materials (Figure 1). It may be necessary to locate some pallets of cement at the work site during the decommissioning work. These would be stored in the areas outlined on Figure 1.

Buried gas pipelines cross PG&E and federal property just outside the north gate of the Compressor Station. An earthen berm will need to be placed over top of these pipelines to allow the safe passage of heavy vehicles across them. This berm would be removed at the completion of the decommissioning work.

Well PGE-6 is in an area that has been previously graded and is very sparsely vegetated. There are a few small creosote bushes located near the well that may be affected. It will not be necessary to trim or destroy any other vegetation during the course of this work.

2.2 Well Decommissioning Requirements and Scope

PGE-6 currently has a pump used for groundwater sampling that must be removed prior to the well decommissioning activities. It is unknown if a check valve is equipped on the pump. If one exists, the water column within the pump drop pipe will be discharged into 55-gallon drums or portable tanks and transported to the IM-3 treatment plant for processing. The pump will be removed and stored at the staging area until further disposition.

In accordance with DTSC's comments and requirements (DTSC 2006b), the PGE-6 decommissioning activity will involve an attempt to remove the collapsed formation or sediment fill at the bottom of the well, collection of a new well video log, complete sealing of the well using cement grout, and excavation and capping below grade of the well casings, as described below. Figure 2 presents a schematic diagram of the specifications and conditions proposed for decommissioning PGE-6.

Well decommissioning will be conducted in accordance with state and county regulations and guidelines. The San Bernardino County Department of Environmental Health Services (DEHS) is the lead agency the permitting and oversight of well decommissioning activities at the PG&E Topock site. Per San Bernardino County requirements, the area around the wellhead must be excavated and the casing removed from the uppermost 5 feet of the well. Except for this additional requirement, San Bernardino County follows the California Department of Water Resources (DWR) Standards which specify the techniques and types of materials suitable for well decommissioning.

Well decommissioning typically involves perforation of the casing in the upper portion of the well to allow the grout to penetrate and seal any annular space outside the casing. Based on the presence of a drive shoe on the bottom of the casing, it is likely that there was no annular space in the borehole when PGE-6 was installed. Due to the poor condition of the casing in PGE-6 it is likely that attempts to perforate the well might cause it to collapse. In preparing the February 2006 Work Plan, DEHS was contacted to discuss the proper means of decommissioning PGE-6. Because there is a significant risk of collapse if attempts were made to perforate the casing and considering that the casing is already perforated by corrosion in many places, the DEHS agreed that perforation of the casing in PGE-6 would not be required (personal communication between Martin Barackman/CH2M HILL and Marvyn Cerdenio/San Bernardino County DEHS, February 17, 2006).

DTSC's letter of October 23, 2006 directs that attempts be made to bail and perforate this well in order to assure a more thorough seal through this Cr(VI)-impacted aquifer. It is understood that there is some risk of well collapse associated with these activities. PG&E understands DTSC's direction to be that if the well collapses during the decommissioning process, it will be acceptable to DTSC to continue with the grouting operations outlined in this Work Plan and that DTSC will not require over-drilling of this well.

In their October 23 letter, DTSC required modified and additional procedures for decommissioning PGE-6 beyond the approach described in the February 2006 Work Plan. Per DTCS direction, and if conditions allow, the PGE-6 well decommissioning will include the following work activities:

1. Removal of sediment at the bottom of the well (162-180 ft bgs) will be attempted using a high-capacity suction bailer. If the sediment elevation does not decrease within a reasonable amount time (30-60 minutes), the bailing will be terminated. The sediment level will be measured during bailing. Sediment bailed from PGE-6 will be discharged into 55 gallon drums and stored at the staging area as IDW. The estimated sediment and liquid volume bailed from the well will be recorded.

2. To increase water clarity after using the high-capacity suction bailer, potable water will be added to the well through a garden hose until approximately 5-10 casing volumes of water are replaced. This will be necessary to increase visibility in the well prior to use of a downhole video camera.

3. After the water in the well has been cleared by flushing the well with potable water, a video camera survey will be conducted.

4. Tremied cement grout or poured bentonite chips will be emplaced in the bottom portion of the well screen (approximately 150 to 180 ft bgs). This procedure is intended to ensure

that the bottom of the well (assuming the well is open at the bottom) and that the final sediment fill interval in the bottom of the well casing is sealed.

5. If the video log indicates mostly closed or sealed screen perforations and no significant holes or breeches in the casing, a 10-foot interval above the bottom seal and below the historical static water level (106 ft bgs) will be perforated using a mechanical or hydraulic perforator (approximately 130-140 ft bgs). The perforating method used will be based upon the driller's recommendations but will not involve explosives. The intent of perforating the casing screen is to establish a grout seal if annular space is present between the outside of the well casing and the formation.
6. A packer will be utilized inside the 14-inch well casing to pressure cement grout the screened interval and any sections of blank casing where holes are visible in the video log. The packer will then be removed and grout placement will continue into the remainder of the well casing.
7. The concrete well pad will be removed and backfill/concrete around the 20-inch conductor casing will be excavated to approximately 6 ft bgs. It will be confirmed that concrete is securing the 20-inch conductor casing at that depth.
8. The 20-inch conductor casing and 14-inch well casing will be removed 5 ft bgs using a cutting torch.
9. If no grout seal is present around the outside of the 20-in conductor casing, the excavation will advance to the maximum depth practical to allow full surface seal around the outside of the 20-in conductor casing.
10. A concrete "mushroom cap" will be installed as a surface seal to a minimum depth of 3 ft bgs over the 14-inch well and 20-inch conductor casings. The remainder of the excavation will be backfilled with soil from the excavation and regulatory-approved backfill materials (see next section).

2.2.1 Backfill Materials

Section 23 of California Department of Water Resources Water Well Standards (DWR 1991) specifies the methods and materials to be used in decommissioning wells. For wells situated in unconsolidated material, such as the Alluvial Aquifer at the site, these standards specify that the lower portion of the well may be filled with clay, silt, sand, gravel, crushed stone, native soils, or mixtures of these materials so long as no organic matter is included. The uppermost 20 feet of the casing must be filled with impervious material with a coefficient of permeability less than 10 feet per year. San Bernardino County recommends a cement grout mixture for the impervious material in the upper portion of the well. Consistent with these regulations, the following backfill materials are proposed for decommissioning PGE-6:

- Bottom portion of well (depth greater than approximately 150 ft bgs): bentonite cement grout or bentonite
- Upper portion of well (depth less than 150 ft bgs): bentonite cement grout
- Surface excavation where casing was removed: native soil

Figure 2 provides a schematic diagram of the final decommissioned well.

2.2.2 Surface Excavation and Casing Removal

San Bernardino County requires removal of the top 5 feet of casing during decommissioning. This involves excavating a trench around the casing large enough and deep enough for personnel to enter and operate cutting tools. PGE-6 includes both a 20-inch diameter conductor casing and a 14-inch diameter production casing. The records do not indicate what material was used to fill the annular space between the conductor and surface casings. If concrete was used in this annular space, the size of the excavation might need to be as large as 10 feet in diameter and up to 7 feet deep to allow use of a jackhammer in the excavation. The excavation will be benched and sloped to allow workers to enter the excavation without the need for shoring. All excavation activities will meet applicable California OSHA regulations pertaining to excavation work.

The soil excavated from the hole will be placed back in the hole as backfill. Additional clean topsoil will be added as needed to re-establish the existing grade. Backfill materials will be compacted using the backhoe during emplacement. The surface will be restored to original grade and smoothed.

2.2.3 Grout Requirements

The grout requirements are as follows:

- The grout will be a bentonite cement mixture in the following proportions:
  - 94 pounds of neat Type V Portland or American Petroleum Institute Class A cement
  - Not more than 7 gallons of potable water and approximately 3 to 5 pounds of powdered bentonite per sack of cement
- All grout will be pumped into place using a tremie pipe beginning at the bottom of the borehole. The end of the tremie pipe will be kept at least 2 feet below the surface of the grout during emplacement.
- The cement grout will extend from a depth of approximately 150 feet below grade to the top of the cut-off casing at approximately 5 feet below grade.
- The expected volume of each ingredient in the grout mixture will be pre-calculated and documented.
- Grout will be poured in a single continuous lift and will completely fill the cut off well casing and flow out into the excavation around the casing.
- Grout will be allowed to cure for at least 30 minutes prior to placing any backfill in the surface excavation.

San Bernardino County will be notified at least 4 hours prior to grouting to provide them the opportunity to have a representative onsite during grouting.

3.0 Waste Management

Investigation derived waste (IDW) materials that will be generated during well decommissioning include incidental trash, the 5-foot sections of steel casing that will be cut off the top of the well, and possibly a small amount of Cr(VI)-bearing groundwater.

Incidental trash typically includes empty cement and sand bags, pallets, empty drink and food containers, plastic sheeting and other disposables associated with construction work. Incidental trash will be collected at the end of each shift and hauled off the site to an appropriate disposal facility.

The 5-foot sections of well casing will be pressure washed to remove any residual contamination and, depending on the condition of the steel, either recycled as scrap metal or disposed of as solid waste. The IDW will be placed on secondary containment at the MW-24 bench while the well decommissioning work is underway, then moved to staging areas on PG&E Compressor Station property.

As the top of the grout approaches the top of the casing, any groundwater found to be floating on top of the grout layer will be pumped off and placed in drums or a temporary tank near the well site. No groundwater will be allowed to spill out of the top of the well casing.

Any groundwater generated during the decommissioning operation will likely have a very high pH from being in contact with the grout. If the pH is greater than 12.5, this water would be classified as hazardous waste and managed accordingly. If the pH is less than 12.5, the water would be managed in the same way as other purge water at the Topock site.

4.0 Schedule and Reporting

The PGE-6 decommissioning activities are subject to obtaining approvals and authorizations as outlined in Section 5.0. Therefore, the schedule below is presented in terms of duration of work without a definite start date being identified. Per DTSC's letter of October 23, 2006, PG&E will work to complete the well decommissioning prior to the start of the uplands in-situ pilot study.

TABLE 1
Duration of Major Tasks
Well PGE-6 Decommissioning Work Plan,
PG&E Topock Compressor Station, Needles, California

Activity	Duration
Site Preparation Work (grading of road, berm over gas pipeline)	10 days
Mobilize Equipment to Site	7 days
Decommissioning Work	4 days
Reporting	60 days

Within 60 days of the completion of the decommissioning work, PG&E will submit a report documenting the decommissioning of the well. This report will include documentation of the decommissioning activities, quantities of materials used, photographs of the decommissioning work, and copies of the well destruction reports filed with the California Department of Water Resources and San Bernardino County.

5.0 Required Approvals and Authorizations

Table 2 provides a listing of approvals that have been identified as applicable to the decommissioning of well PGE-6 on the HNWR land near the PG&E Topock Compressor Station. Applicable approvals will be obtained prior to initiating any site preparation work or moving equipment to the site.

TABLE 2
Approvals for Well PGE-6 Decommissioning
Well PGE-6 Decommissioning Work Plan,
PG&E Topock Compressor Station, Needles, California

Agency	Approvals and Authorizations
DTSC	Approval of decommissioning work plan
U.S. Fish & Wildlife Service, and Havasu National Wildlife Refuge	Approval of decommissioning work plan
San Bernardino County	Well Destruction Permit

6.0 References

California Department of Toxic Substances Control (DTSC). 2006a. Letter to PG&E. "Conditional Approval of the Draft Well Installation Work Plan for Interim Measures Performance Monitoring Program, PG&E Topock Compressor Station." January 6.

_____. 2006b. Letter to PG&E. "Review of Workplan for Decommissioning Well PGE-6 at Pacific Gas and Electric Company, Topock Compressor Station, Needles, California." October 23.

California Department of Water Resources (DWR). 1991. California Well Standards. Bulletin 74-90, Part III Destruction of Wells. June.

CH2M HILL. 2006a. *Well PGE-6 Decommissioning Work Plan, PG&E Topock Compressor Station*. February 28.

_____. 2006b. *Well PGE-6 Decommissioning Evaluation, PG&E Topock Compressor Station*. February 28.

Figures

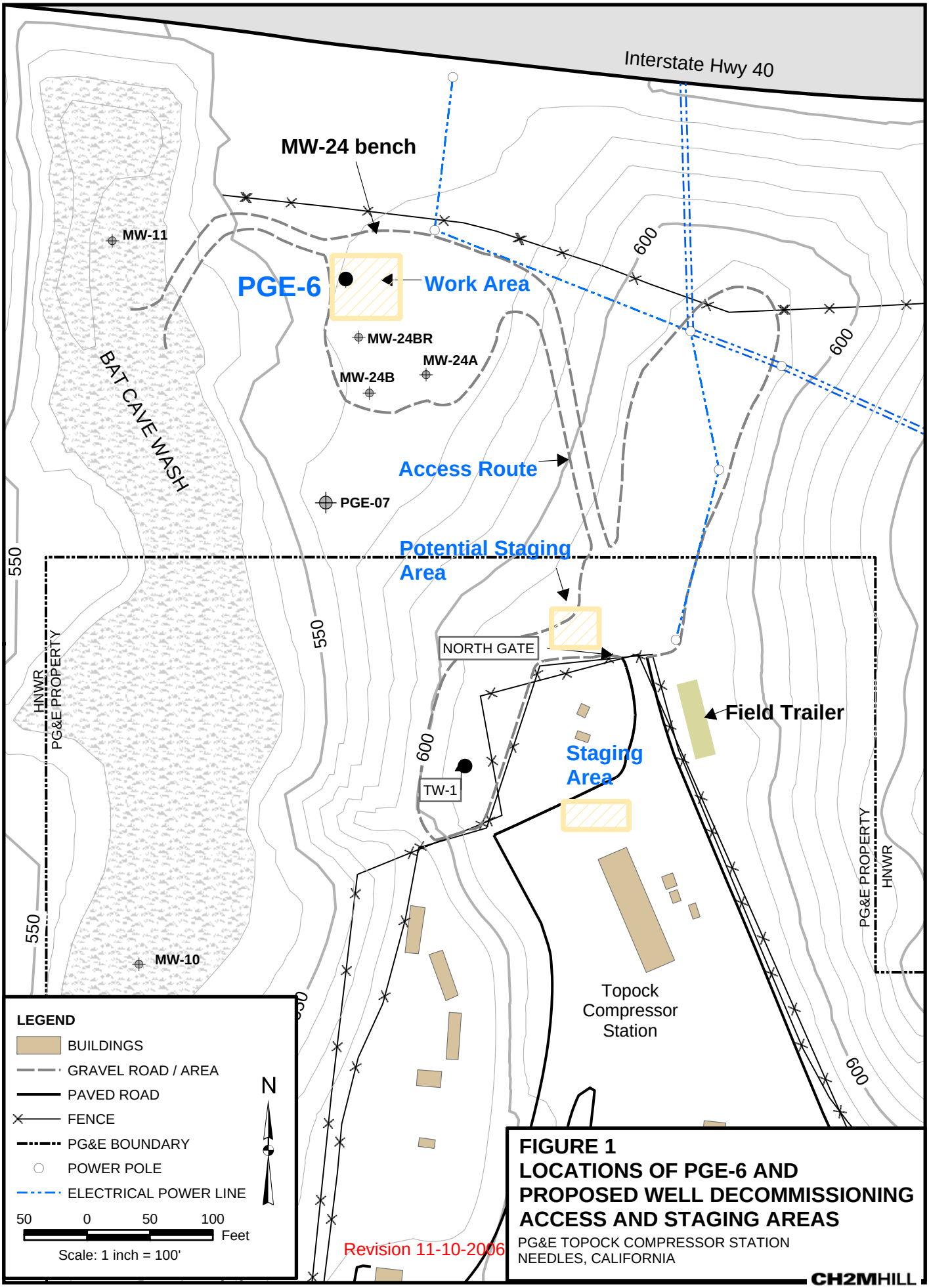

FIGURE 1
LOCATIONS OF PGE-6 AND PROPOSED WELL DECOMMISSIONING ACCESS AND STAGING AREAS
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

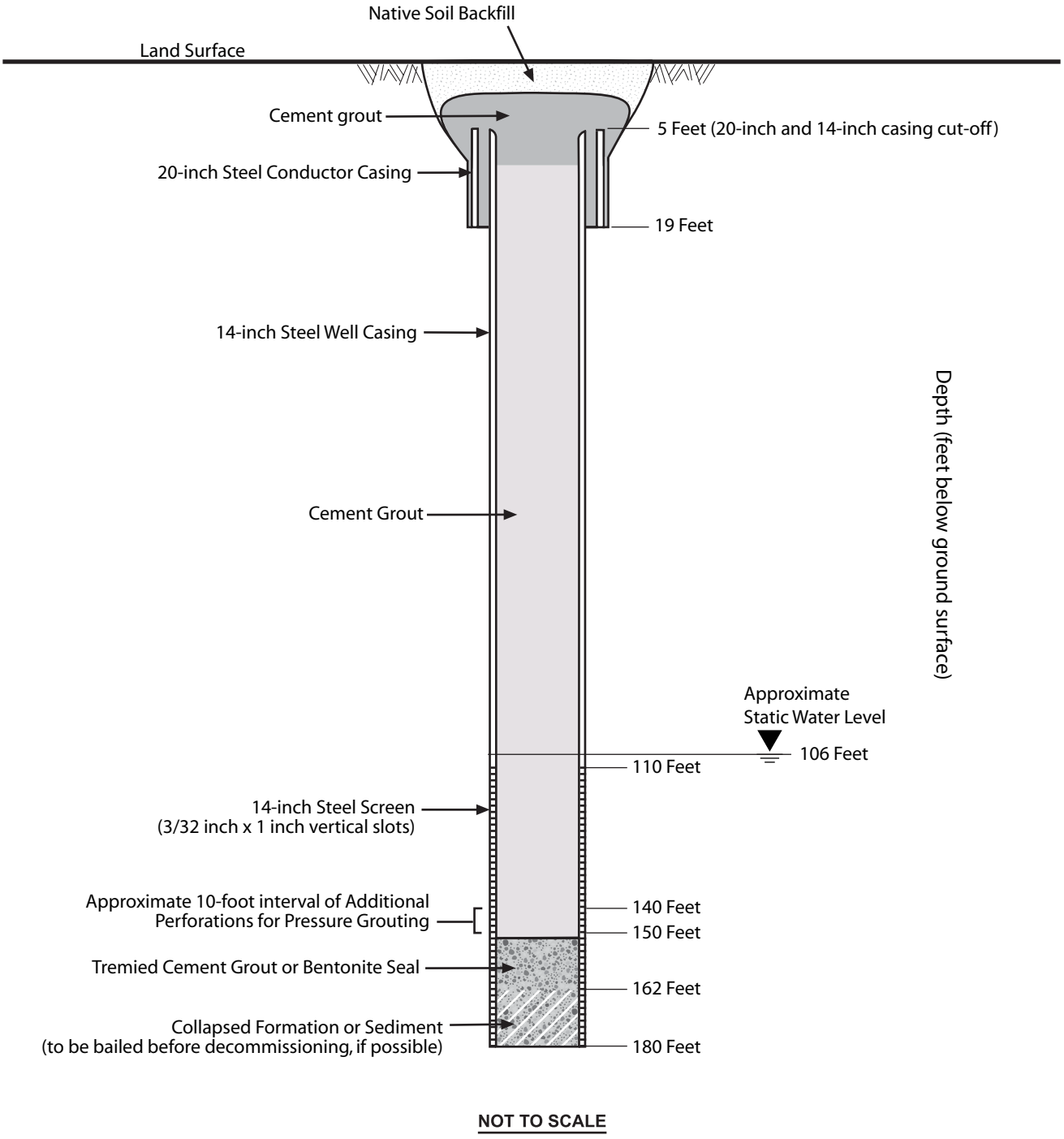

FIGURE 2
SCHEMATIC DIAGRAM OF PGE-6
PROPOSED DECOMMISSIONING
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Revised 11-8-06

CH2MHILL

ES112006001BAO PGE_6_figure2.ai 11-08-06 dash

Attachment A
Driller's Log and Video Logging Report (1998)

PAUL R. PEAKER

WATER WELL REPAIRING AND DRILLING

ROUTE 6, BOX 522-T • TELEPHONE TH ornwall 5-0823

BAKERSFIELD, CALIFORNIA

WATER WELL LOG June 17, 1964

for No. 6-WELL

Pacfic Gas and Electric Co., Box 488, Barstow, California
14", 180', at Topock Compressor Station.

DEPTH	FORMATION
0 - 19'	Boulders and gravel
19 - 30'	Coblestone and gravel
30 - 60'	Some boulders and gravel
60 - 180'	Sand, gravel, and rocks

CASING LOG

0 - 110'	Blank #8 gage Kai-weld
110 - 180'	Perf. 3/32 x 1", with a 3/4 x 12 x 14" shoe on bottom

There is 19' of 20" conductor pipe on top, and the water level is 106'.

PGS434692

Refer to G.M. 159114
Contract # 11-10-64
Contract # 11-29-64

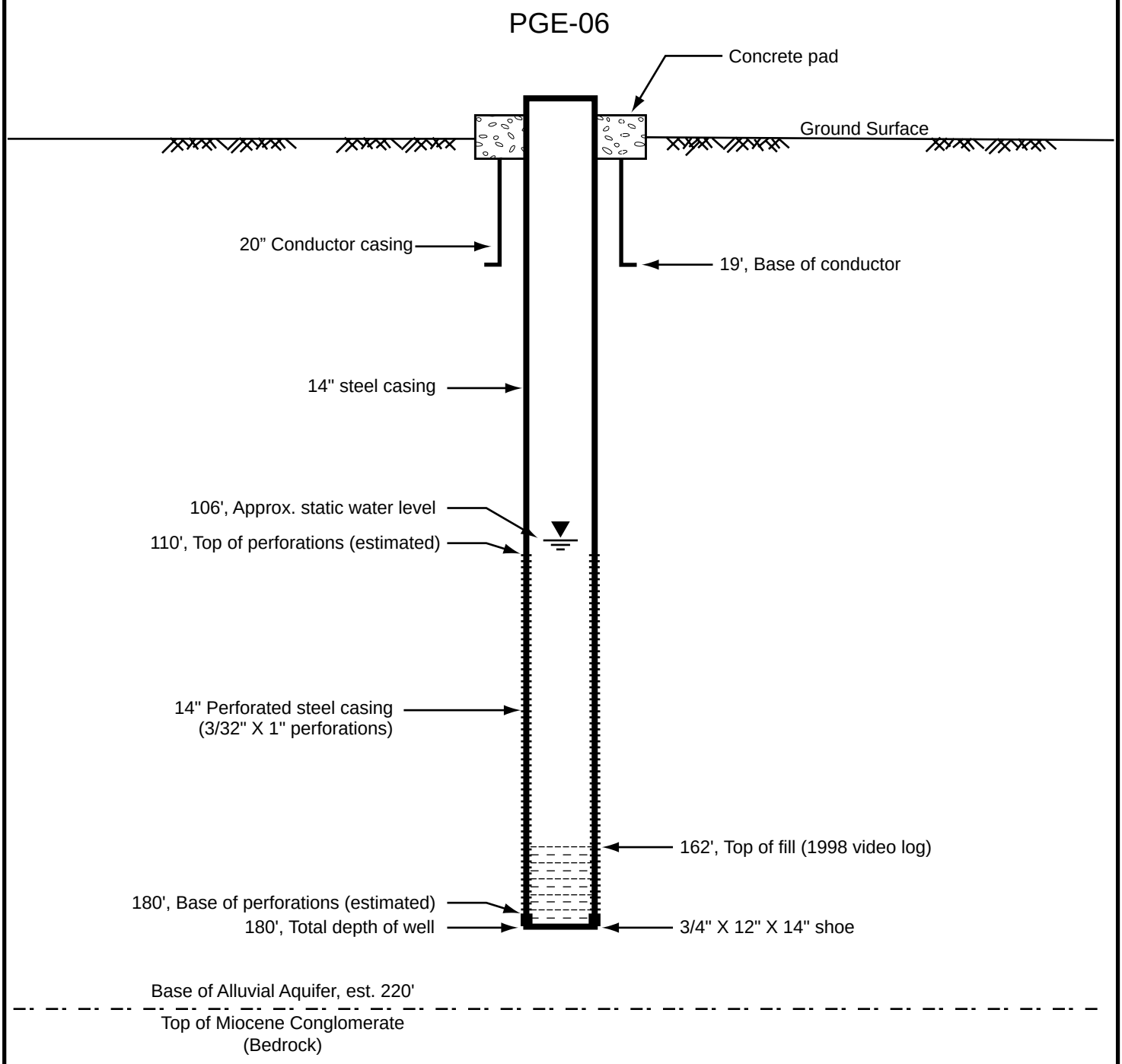

DIAGRAM NOT TO SCALE

All depths in feet below ground surface (bgs)

PGE-6 is an inactive water supply well that was installed in 1964. Well contains Grundfos submersible pump for periodic sampling.

FIGURE A-1
SCHEMATIC DIAGRAM OF INACTIVE SUPPLY WELL PGE-6
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

welenco
VIDEO SURVEY REPORT

Fax (805) 834-2550 • (800) 445-9914 • (805) 834-8100

Customer ECOLOGY + ENVIRONMENT
Address 350 SANSOM ST Ste 300
City SAN FRANCISCO State CA Zip 94104
Request By RALPH LAMBERT Cust. P.O. _____
Copy To _____
Reason for Survey GENERAL INSPECTION

Job No. 29098 Run No. ONE
Well No. PG+E # 6 Date 3-25-98
Location TOPOCK - PG+E COMPRESSOR STATION - NEEDLES AREA
Zero Datum TOP OF CASING
Survey By DAN THOS Truck No. L-17

DEPTH	REMARKS
0 FT	RECORDING STARTS
39	MARK ON CASING
50	MARK ON CASING BEHIND PIPE
58	HEAVY SCALE
63	LARGE HOLE
64	LARGE HOLES TO 65'
71	HOLES
74	HOLES
78	HOLES
98	HOLES
106	STATIC WATER LEVEL - FAIR TO POOR VISIBILITY
123	BOTTOM OF PUMP
162	FILL - BOTTOM OF WELL
110	POSSIBLE TOP OF VERTICAL SLOTS

NOTE: PUMP IN WELL - PERFORATIONS REPORTED 110' - 180'

CASING CONDITION:

ID at Surface 14" Reduces to _____ at _____ : _____ at _____ : _____ at _____

Diameter Reference: ☐ Caliper Survey ☐ Estimate from TV/Photo Survey ☐ Well Records

Corrosion/Incrustation Build-up ☐ Light ☐ Moderate ☒ Heavy ☒ Increases with Depth

Appendix D4:
In-situ Upland Pilot Study Work Plan

Pacific Gas and Electric Company

Yvonne Meeks
Senior
Environmental Geologist
Environmental Services

Mailing Address
4325 South Higuera Sreet
San Luis Obispo, CA 93401
Location
6588 Ontario Road
San Luis Obispo, CA 93405
Tel: (805) 546-5243
Email: yjm1@pge.com

29 September 2006

Mr. Christopher Guerre
Project Manager
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630

Subject: PG&E Topock Compressor Station, Needles, California
In Situ Hexavalent Chromium Reduction Pilot Test Work Plan
Upland Plume Treatment

Dear Mr. Guerre:

Enclosed is the revised In Situ Hexavalent Chromium Reduction Pilot Test Work Plan – Upland Plume Treatment (Work Plan) for the Topock Compressor Station. This Work Plan provides details on a proposed pilot test to be carried out at the Topock site to support the evaluation of technologies for remediation of hexavalent chromium in groundwater under the Resource Conservation and Recovery Act Corrective Measures Study and CERCLA Feasibility Study.

The enclosed document includes revisions made in response to verbal comments provided and discussed with DTSC staff during a meeting on September 8 and a telecon on September 26 regarding DTSC's review of the previous versions of the work plan dated August 4, 2006 and September 15, 2006. If you have any questions regarding this report, please call me at (805) 234-2257.

Sincerely,

Yvonne Meeks
Topock Project Manager

Enclosure:
In Situ Hexavalent Chromium Reduction Pilot Test Work Plan – Upland Plume Treatment

cc: John Earle, US Fish and Wildlife
Aaron Yue, DTSC

ARCADIS
Infrastructure, environment, facilities

Imagine the result

In Situ Hexavalent Chromium Reduction Pilot Test Work Plan – Upland Plume Treatment

Pacific Gas & Electric Company
Topock Compressor Station
Needles, California

29 September 2006

ARCADIS

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Alison Jones, PhD
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In Situ Hexavalent Chromium Reduction Pilot Test Work Plan – Upland Plume Treatment

Pacific Gas & Electric Company
Topock Compressor Station
Needles, California

Pacific Gas & Electric

Prepared by:

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Tel 510 233 3200
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Our Ref.:
RC000698.0001.00009

Date:
29 September 2006

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ARCADIS

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Appendices

A ARCADIS Experience Matrix

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing the presence of hexavalent chromium (Cr[VI]) in groundwater at the Topock Compressor Station (Compressor Station, Figure 1), under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC).To support the Resource Conservation and Recovery Act (RCRA) Corrective Measures Study and CERCLA Feasibility Study (CMS/FS) for the Topock site, PG&E is evaluating technologies for remediation of Cr(VI) in groundwater. Treatability studies, including pilot studies, are required when it is determined that insufficient data are available to evaluate or screen a remedial alternative. In addition, data produced from pilot studies are used to optimize the performance of a remedy and represent good engineering practice (United States Environmental Protection Agency [USEPA], 1989). This work plan presents the proposed approach and description of field activities for an in situ Cr(VI) reduction pilot test to be completed at the upland plume area of the Topock site.

The remainder of Section 1.0 of this work plan briefly describes the purpose of the pilot test and provides background information and a description of the Topock site. Section 2.0 presents an overview of the in situ Cr(VI) reduction technology and the reagent introduction and distribution system that will be tested during this pilot test. Section 3.0 describes the location evaluation criteria and introduces the proposed pilot test approach, while Section 4.0 presents the activities to be performed prior to implementation of the pilot test. The implementation plan and schedule for conducting the pilot test are discussed in Sections 5.0 and 7.0, respectively. Section 6.0 presents procedures for waste management and equipment decontamination to be followed during drilling, development and sampling of the proposed pilot test wells. References cited in this document have been listed in Section 8.0.

1.1 Purpose

The purpose of the pilot test is to evaluate how well recirculation wells can distribute reductant throughout the aquifer to achieve treatment across a transect (a line across the direction of groundwater flow) within, or at the edge of, the plume (creating an in situ barrier), and/or to treat zones within the source area. The specific aquifer characteristics at the Topock site indicate that the use of groundwater recirculation wells has the potential to maximize the volume of aquifer treated per injection well. Modeling of this injection approach, and experience at other sites, indicates that this approach should be effective at the Topock site; however, a pilot test should provide confirmatory data for the site-specific design evaluation.

1.1.1 Site Remedial Objectives that Guide the Pilot Test Approach

The Topock site remedial objective for groundwater is to treat Cr(VI) so that Cr(VI) is no longer present in the groundwater above a yet to be established site cleanup standard. In situ remediation of Cr(VI) by reduction and precipitation is one technology that is being evaluated prior to completion of the CMS/FS for inclusion into potential corrective measures. Currently, in situ Cr(VI) bioremediation treatment technology is being evaluated in the floodplain, adjacent to the Colorado River, at the Topock site. The upland pilot study proposed herein will evaluate other important aspects of the in situ treatment of Cr(VI), including the effective distribution of the reducing agents in the subsurface. The results of the upland pilot test will provide information to evaluate an in situ remedy which will:

- Minimize the overall impacts of a full-scale remedial system to the Topock site by:
  - Providing information to determine the minimum number of wells that are required to meet the remedial objective.
  - Limiting the installation of remedial components to the historically disturbed areas (e.g., freeway and road alignments), where possible.
  - Minimizing the operational time and frequency of site visits required to operate and maintain the remedial systems.
  - Minimizing the footprint of site support facilities.
  - Coordinating and consulting with stakeholders to assure potentially affected environmental, archaeological, and spiritual resources are best preserved.
- Achieve site cleanup in a reasonable time
  - By using a recirculation system, remediation of a larger area in a shorter time can be achieved reducing the duration of cleanup activities.
  - The upland pilot test will help determine if a reactive zone can be used to prevent Cr(VI) migration under either ambient or enhanced groundwater gradients. Enhanced groundwater gradients (which can be created by extraction or injection of water) may accelerate groundwater movement through the in situ reactive zone(s) and reduce the overall cleanup time.
- Create robust remedial systems
  - The remedy should be capable of maintaining effectiveness in widely variable aquifer conditions and, as feasible, enhancing the effectiveness of other components of the remedy. If in situ reduction is selected for the overall site groundwater remedy, it will likely be used in combination with other technologies; for instance, the combined effect of groundwater extraction and treatment and in situ Cr(VI) reduction is an example of a combined remedy. Even after the active treatment is ended, the previously created in situ reductive zones (IRZs) can continue to operate as a reactive barrier to treat

chromium-contaminated groundwater that flows across the zone. The reactive zones can also enhance the performance of monitored natural attenuation, by providing source area treatment and by creating a shrinking plume.

1.1.2 Technical Objectives

The overall technical objective of this pilot test is to determine if organic carbon reductant can be delivered into the subsurface in a sustainable manner via recirculation wells. The goal is to minimize the number of injection wells that will be needed to achieve treatment of a groundwater transect across the plume in a timely manner with the intent to minimize environmental, archaeological and spiritual impacts.

More specific technical objectives of this pilot study are to:

- Determine the maximum spacing between injection wells that still results in adequate chromium-precipitating conditions within the aquifer.

- Determine the loading rate of organic carbon required to transform naturally occurring iron in the aquifer to its reactive, reduced (ferrous) form between injection wells.

- Determine how often and for how long injection wells must be operated to maintain reduced iron in the aquifer. Reduced iron formed during the operational period will continue to precipitate Cr(VI) even when the organic carbon treatment reagent is not being injected.

1.2 Project Background

PG&E's Topock Compressor Station is located in San Bernardino County, approximately 15 miles southeast of Needles, California (Figure 1). The Topock site and adjacent lands are contained within a larger geographic area that is sacred to the Fort Mojave Indian people. In addition, the area includes the Topock Maze and historic Route 66, which are listed on the National Register of Historic Places. In February 1996, PG&E and DTSC entered into a Corrective Action Consent Agreement (CACA) pursuant to Section 25187 of the California Health and Safety Code. Under the terms of the CACA, PG&E was directed to conduct a RCRA Facility Investigation (RFI) and to implement corrective measures to address Cr(VI) released in the Bat Cave Wash Area near the PG&E Topock Compressor Station. The source was chromium salt historically used as a corrosion inhibitor in the station's cooling towers. DTSC is the lead administering agency for the project.

PG&E is proceeding with the corrective measures process to select and implement a long-term remedy for the Topock site. PG&E submitted the CMS work plan in December 2002, pursuant to the RCRA corrective action process, and in accordance with the CACA. The DTSC approved the CMS work plan in June 2003.

Concurrently with the CMS, and in compliance with DTSC's directive, PG&E commenced implementation of Interim Measures (IM) in March 2004. The objective of the IM is to provide hydraulic control of the Cr(VI) plume in the floodplain by maintaining a net landward groundwater gradient. The elements of the IM currently include the following: groundwater extraction from the pumping centers at wells TW-2D and TW-3D, and PE-1; groundwater treatment; and management of the treated groundwater. Evaluation of additional potential remedies and remediation strategies identified in the CMS Work Plan is ongoing.

1.3 Site Description

The following sections discuss the geology, hydrogeology, groundwater quality and the environmental, archaeological, and spiritual resources at the site.

1.3.1 Geology and Hydrogeology

The site is characterized by arid conditions with precipitation averaging less than 5 inches per year and high temperatures. Vegetation at the Topock site is very sparse, except in the southern part of the Colorado River floodplain where stands of tamarisk and occasional mesquite trees occur. Topography near the Topock site is abrupt, rising from around 450 feet above mean sea level (msl) at the Colorado River to over 1,200 feet msl within a mile to the south and southwest.

Groundwater occurs under unconfined to semi-confined conditions within the alluvial fan and fluvial sediments beneath most of the Topock site. The saturated portion of the alluvial fan and fluvial sediments are collectively referred as the Alluvial Aquifer. In the floodplain area adjacent to the Colorado River the fluvial deposits interfinger with, and are hydraulically connected to, the alluvial fan deposits. The unconsolidated alluvial and fluvial deposits are underlain by the Miocene conglomerate and pre-Tertiary metamorphic and igneous bedrock.

Groundwater monitoring well clusters, such as those at MW-20, MW-24, MW-34, MW-36, and MW-39 also include wells screened at deeper levels of the alluvial aquifer. The measured saturated thickness of the alluvial aquifer in the pilot study area range

from as little as 30 feet in the southern floodplain area (at MW-32) to 260 feet in the IM-3 injection area and 340 feet in the northern floodplain area (MW-49). In the vicinity of the proposed pilot test, the subsurface shallow aquifer zone consists of alluvial deposits. These unconsolidated deposits are 150 to 200 feet thick. Approximately 100 feet of the unit is saturated. Lithologic logs and hydraulic testing suggest that the alluvial materials undergo facies changes across the Topock site such that the lower portion of the aquifer unit (lower 35 feet) is generally of lower conductivity in a portion of the pilot test area (Figure 2). Additionally, some interfingering of coarser material is observed throughout the sediments (CH2M Hill, 2005a).

The pilot test area is located in an upland area, near the Topock Compressor Station, where the topography is generally steep. There is an abrupt decline in elevation towards the Colorado River floodplain. Hydraulic gradients across the pilot test area are between 0.0001 to 0.001 feet per foot (ft/ft). Groundwater flow is generally towards the northeast towards the extraction wells located in the Colorado River floodplain (Figure 8).

1.3.2 Groundwater Quality

Groundwater in the Topock site area exhibits variable total dissolved solids (TDS) concentrations. In general, TDS concentrations increase with depth in the area of the proposed pilot test. Samples collected from most of the shallow monitoring wells exhibit TDS concentrations in the range of 1,000 to 3,000 milligrams per liter (mg/L). However, groundwater sampled in bedrock wells and the deeper alluvium wells contains higher TDS concentrations (8,000 to 14,000 mg/L). Water samples from the Colorado River exhibit TDS concentrations ranging from 400 to 800 mg/L.

Major ions are dominated by sodium and chloride, with sulfate also significant in some wells. Oxidation-reduction potential (ORP) measurements in wells in the upland portion of the alluvial aquifer generally reflect non-reducing conditions in which Cr(VI) is stable. Dissolved oxygen concentrations generally range from 3.0 to 7.0 mg/L. Nitrate concentrations up to 77 mg/L have been measured, but in the area of the proposed pilot test are approximately 5 to 20 mg/L. Table 1 includes the recent historical water quality data in the nearby monitoring.

Site characterization has been performed to quantify the distribution of Cr(VI) in groundwater at the Topock site. Monitoring wells have been installed throughout the Topock site including: near and along Bat Cave Wash, to the east of Bat Cave Wash, and in the Colorado River floodplain. Analytical results indicate that most of the

chromium found in affected groundwater is in the hexavalent form. The areal extent of the Cr(VI) plume (Figure 3) is approximated by the green contour representing 0.05 mg/L, which is the California drinking water maximum contaminant level for total chromium (CH2M Hill 2006).

1.3.3 Environmental, Cultural and Spiritual Resources

The Topock site has a diverse ecological community. Five types of plant communities are in the vicinity of the project area. The terrestrial wildlife diversity and abundance is considered low at the site; however, the plant life does provide habitat for various wildlife species. Several threatened or endangered species of plants and animals (state and federally listed) could occur in or near the Topock site (CH2M Hill, 2005a).

The site has archaeological and spiritual resources of significance to the Fort Mojave Indian Tribe (FMIT) and other neighboring tribal peoples along the Colorado River corridor. These resources include the Topock Maze, which is listed on the National Register of Historic Places, and numerous other archeological sites. In addition, transportation developments such as Old Trails Highway, Route 66, Burlington Northern Santa Fe Railroad and Interstate-40 all represent historic transportation resources (CH2M Hill, 2005a).

The site has spiritual resources as well. As discussed in Section 1.2, the Topock site and adjacent lands are contained within a larger geographic area that is sacred to the Fort Mojave Indian people.

PG&E and their consultants are committed to preserving all of the resources of the Topock site.

2.0 Overview of Technology

The following subsections describe various aspects of in situ biological Cr(VI) reduction technology that will be evaluated in the proposed pilot test. Appendix A presents selected ARCADIS and other remediation industry in situ Cr(VI) reduction projects that have been performed throughout the country. As evidenced by both experience tables the state of knowledge of situ remediation for Cr(VI) reduction is fairly extensive. Successful chromium reduction and removal has been achieved across the country in various hydrogeologic settings. In some cases, the use of in situ remedies has reduced the time to closure by over 10 years, and one case cited has a reduction in closure time of 25 years.

2.1 In Situ Bioremediation Technology Description

Bioremediation of chromium-contaminated groundwater is a widely practiced approach that involves the injection of organic carbon substrates into chromium-containing groundwater to stimulate microbes that use the organic carbon as a nutrient and energy source. These microbes then use oxygen, nitrate, ferric iron, and other oxidized materials in the aquifer as electron acceptors.

$$\text{organic carbon + electron acceptor } (O_2, NO_3, Fe^{3+}, Cr_2O_7^{2-}, SO_4) \rightarrow$$

$$CO_2 + \text{water} + (N_2, Fe^{2+}, Cr^{3+}, HS^-)$$

When sufficient organic carbon is supplied, anaerobic conditions result, and a reduced zone is created in the aquifer. The term “reduced” refers to the oxidation state of the iron, manganese, and other oxidation/reduction (redox)-active elements present in the aquifer media.

Cr(VI) can be reduced by microbes while consuming organic carbon by the reaction:

$$2Cr_2O_7^{-2} + 3C + 16H^+ \rightarrow 4Cr^{+3} + 3CO_2 + 8H_2O$$

The Cr(III) forms chromium hydroxide, which binds to the aquifer matrix.

Cr(VI) can also be reduced to Cr(III) indirectly by the formation of reactive reduced (ferrous) iron compounds in the aquifer, and also, less importantly, by sulfide compounds.

A zone with available organic carbon and reduced iron is a type of IRZ that is effective in treating Cr(VI) in groundwater. The amount of naturally occurring iron in an aquifer varies due to parent mineral types, but some amount of iron is nearly universally present in aquifer matrices. At the Topock site, previous investigations showed approximately 0.3 percent ferric iron that could be reduced by citrate-bicarbonate-dithionite extractant (CH2M Hill, 2005c). It is expected that a significant fraction of this iron will be reduced under iron- and sulfate-reducing conditions. The ferric iron in the aquifer is generally transformed from the iron oxide coatings and structural minerals to become soluble ferrous iron and reduced iron aquifer minerals including ferrous iron bound on clay minerals and mixed valance iron oxides and hydroxides such as magnetite (Fe_3O_4) and green rust, $Fe_6(OH)_{12}(\{CO_3^{2-}$ or $SO_4^{2-}\}mH_2O)$. All of these reduced iron minerals are effective for reaction with hexavalent chromium, leading to precipitation of Cr(III) hydroxides and mixed iron-chromium hydroxides.

The ferrous ions in solution and on solid surfaces react with Cr(VI) according to:

$$\mathbf{HCrO_4^- + 3Fe^{+2} + 7H^+ \rightarrow Cr^{+3} + 3Fe^{+3} + 4H_20}$$

With the addition of organic carbon, some percent of the sulfate available in the aquifer will also be reduced to sulfide in succession after iron reduction. Sulfides formed will react with dissolved iron and form iron sulfide precipitates. Iron sulfides will also reduce Cr(VI) to Cr(III).

There are two important components of an in situ treatment that are required for the treatment to be both technically successful and efficient in remediating the full plume.

- Reagents must be delivered into the subsurface to achieve contact with the entire plume, and

- A reduced zone must be sustained in the subsurface without continuous injections.

This requirement for widespread and uniform distribution limits the potential use of insoluble substrates such as vegetable oils because these substrates often cannot easily be transported useful distances from the injection locations and may distribute non-uniformly. These substrates will not generally create sufficiently uniform reductive conditions across the plume to ensure a reliable reactive zone. For delivery between widely spaced wells, the optimal substrate would be a fully soluble one with viscosity less than or equal to water such as a short-chain carbon compound like alcohol, an organic acid, or a sugar. The amount of substrate delivered should be sufficient to de-

oxygenate and denitrify the aquifer and reduce the Cr(VI) and some fraction of the iron oxides in the aquifer.

The creation of a sustained reductive condition within the aquifer by adding these simple organic carbon molecules requires multiple steps. First, microbial growth must occur leading to enhanced rates of carbon consumption. Then sequential consumption of oxygen, chromium, nitrate, ferric iron, and sulfate must occur. As sufficient organic carbon is delivered, iron and sulfate that naturally occur in the subsurface will become reduced, leading to zones within the plume that have reduced iron and smaller zones with reduced iron and reduced sulfur (principally iron sulfide); once formed, these zones sustain chromium-reducing conditions for some time. The length of time the reduced zone can sustain chromium-reducing conditions is a factor of the rate at which oxidants (oxygen, nitrate, and Cr(VI)) re-enter the reduced zone. In areas where higher pumping rates lead to faster groundwater (and dissolved oxidant) movement, these reduced zones will become depleted and will require replenishment more frequently.

In summary, ferric iron oxide minerals naturally occur in the Topock aquifer (CH2M Hill, 2005c). The microbial and chemical reduction of naturally occurring iron oxides occurs with the addition of reductants (organic carbon) forming reduced (ferrous) iron minerals such as ferrous iron oxides and ferrous iron sulfides. Reduced iron minerals are reactive with Cr(VI) and precipitate chromium as Cr(III) hydroxides and mixed iron-chromium hydroxides. By creating a reduction zone (reducing and storing iron that is available in the aquifer), the reduction activity within an injection area can be maintained for long periods of time. These zones can continue to precipitate chrome between widely spaced injection events even after injection ceases and can form the basis for natural attenuation of the chromium plume.

2.2 Reagent Delivery System

In situ remediation systems are designed so chemically-affected groundwater comes into contact with a treatment medium or reagent within the aquifer or within the well. The treatment media can be a nutrient to stimulate chemical biodegradation by indigenous or introduced microorganisms, an oxidizing or reducing agent to chemically destroy the chemical, or a solid catalyst or sorbent. Groundwater recirculation wells have recently been demonstrated to be an effective method of achieving in situ contact between chemically-affected groundwater and a treatment medium (Huang and Goltz, 2005).

Generally, recirculation wells are installed in a line to allow spatial coverage of the plume perpendicular to groundwater flow. Recirculation wells are multiple screen wells that pump water in through one of the screens and release it back into the formation through the other. The screen intervals are located within the same aquifer but are hydraulically isolated from each other using packers. Treatment reagents are added to the groundwater in the well casing between the packers, or in a vault at the well head, so that the water being forced back into the aquifer through the well screen contains treatment reagents.

The recirculation system is designed to create a three dimensional circulation pattern in the aquifer. Groundwater is drawn into the well, pumped through the well casing and reintroduced into the aquifer at a different elevation.

Applying the same concept, a second well can be placed adjacent to a well designed as previously described, but operated in a reverse pumping pattern, such that alternating wells are pumping upward and downward. This technique, known as horizontal flow treatment wells (HFTWs), involves a pair, or series of pairs, of dual-screened treatment wells. The upflow well operates by capturing the chemically-affected water in the lower well screen, pumping it upward through a mixer, and then forcing the water out into the aquifer through the upper well screen. With both contaminant and treatment medium pumped into the aquifer, the second well draws water in through the upper well screen where it is then pumped downward, mixed with a treatment medium, and pumped out into the aquifer through the lower screen. In both cases the circulation pattern that results (termed a “conveyer belt” pattern because the circulation occurs between wells) is effective in delivering and mixing the chemically-affected groundwater with the treatment reagents. The recirculating water allows for one or multiple passes through the treatment zone created by the reagent injection as required to achieve efficient overall remediation of the groundwater (Huang and Goltz, 2005).

Any soluble carbon source can be used to create a reactive zone through recirculation wells, including reagents such as molasses, corn syrup, lactate, methanol or ethanol.

2.3 Groundwater Modeling of Recirculation Zone

A preliminary groundwater model was developed to aid in the design the groundwater recirculation well system at the selected pilot test area. The existing MODFLOW model for the site was refined to focus on the zone immediately surrounding the potential pilot test area to simulate groundwater flow under recirculation conditions. The resulting

model covers an area of approximately 0.6 mile in the east-west dimension by 0.5 mile in the north-south dimension, or 0.3 of a square mile. The localized model was used to estimate the spacing of injection wells, the appropriate location of pilot test monitoring wells, and to help calculate the loading rate of reagents.

To develop the localized flow model, the known lithology from the MW-24 wells and PGE-6 was used to define 13 layers within the model with varying hydraulic conductivity, with a 10:1 horizontal to vertical anisotropy at each layer. The predicted water table generated by the localized groundwater model agreed with known water levels in the wells in the area.

To evaluate the potential distribution of the organic carbon substrate that would be injected during this pilot test, MODPATH was used in conjunction with the MODFLOW model to evaluate the reagent distribution and the effects of mixing, dilution, dispersion, and degradation. The MT3D99 computer code was used for this solute transport modeling. The purpose of this aspect of the modeling was to help define the potential breakthrough time for reagent, to calibrate the potential distances between circulation wells that would still have reagent coverage between the circulation wells, and to aid the decisions about monitoring wells location and frequency of monitoring.

Figure 4 presents the results of the flow model simulation for one set of coupled recirculation wells. Model results suggest that the desirable coverage will be achieved in a six-month period and show that 10 to 20 percent of the organic carbon injected will reach the opposing screens during this period. Figure 5 shows the modeled extent of reagent that is of sufficient concentration to achieve chromium treatment and iron reduction (10 percent of the injected alcohol concentration). For each well, the estimated radius of influence is approximately 150 feet. This concentration is sufficient to achieve the ferrous iron reduction required for chromium treatment. The conclusion of the groundwater model simulation is that recirculation wells could be successfully used at the selected pilot test area and coverage across the entire aquifer thickness can be achieved.

By comparison, radius of influence calculations indicate that if an injection well system was to be used without circulation with wells spaced every 20 feet, approximately 30,000 gallons of injectant would be required per injection per well. In addition, an injection well screened across the entire aquifer would require active management during injection to achieve uniform delivery and adequate coverage. Heterogeneity and anisotropy, in both vertical and horizontal directions, could limit coverage between

injection points. Induced flow (horizontal and vertical) overcomes these injection difficulties.

The model results indicate that coverage can be achieved either by circulation between fully screened wells (Figure 6) or by two screened recirculation wells operating in reverse circulation patterns (Figure 4). The pilot test proposed, however, will most likely utilize the recirculation pattern in order to induce vertical flow. It is anticipated that this approach will more reliably increase the vertical coverage even in aquifer conditions with varying degrees of anisotropy.

2.4 Potential Full Scale Treatment Configuration

For effective pilot testing, a potential full scale configuration should be conceptualized to ensure that the configuration tested has relevance to potential full scale application at the Topock site. The general approach of a recirculation well system would be to install a series of wells on approximately 100 foot (or greater) intervals along Park Moabi Road or other locations (Figure 7). Other areas for potential application at the Topock site could include the source area in Bat Cave Wash and down the Bat Cave Wash to the east, along Interstate 40, along the railroad area (Figure 7). The conceptual approach involves operation of the recirculation wells for a period of several months at a time to reduce the ferrous iron in the aquifer and create reduced iron minerals such as iron oxides and iron sulfides. These iron minerals would continue to react with the chromium (and other oxidized compounds in the aquifer) for some period of time and, when a significant fraction of the reduced iron and organic carbon is depleted, the recirculation wells would be turned on again to regenerate the reductive capacity of the iron in the aquifer.

Currently, in situ Cr(VI) reduction technology is being evaluated in the floodplain, adjacent to the Colorado River, at the Topock site. Both pilot test results will be evaluated to assess a full scale site remedy. While remedy assessment is in its initial stages for the Topock site, it is not expected that any in situ treatment approach, if selected, would operate as a stand-alone remedy for the site – rather, it would be an enhancement to groundwater extraction or injection approaches (to enhance contact of the chromium with the reactive zone). In situ bioremediation would likely be used in combination with other technologies; for instance, the combined effect of groundwater extraction and treatment and in situ Cr(VI) reduction is an example of a combined remedy. Even after the active treatment is ended, the previously created in situ reductive zones (IRZs) can continue to operate as a reactive barrier to treat chromium-contaminated groundwater that flows across the zone. The reactive zones can also

enhance the performance of monitored natural attenuation, by providing source area treatment and by creating a shrinking plume.

3.0 Pilot Test Design

The following sections discuss the pilot test location evaluation, the proposed pilot test layout location, aquifer testing and the pilot test approach.

3.1 Pilot Test Location Evaluation

Five potential pilot test areas (PTA) within the upland portion of the site were previously evaluated to compare their suitability as locations for the upland pilot test. Based on changes to the proposed approach to pilot test, three additional pilot test areas were identified and some of the original PTAs were eliminated or shifted somewhat to account for pilot test constraints. Three PTAs were still considered potentially acceptable based on current site understanding and objectives of the test. These PTA locations are shown on Figure 3. The assessment of PTAs involved evaluation of several characteristics that will allow results from the pilot test to be broadly applied across the site.

Potential PTAs were evaluated based upon the following criteria:

Representative of the Plume in Upland (Alluvial) Area

The PTA had to be representative of the groundwater plume in the upland (alluvial) area so that the effect of site hydrogeology on the remediation of the plume could be evaluated.

Availability of Existing Hydrology and Geochemistry Data

Detailed knowledge of the stratigraphy and groundwater chemistry within the pilot test area is essential in planning and executing a successful in situ pilot test. Therefore, a PTA located closer to monitoring wells with extensive historical data showing suitable in situ pilot test conditions is considered a good pilot test location. The available information from previous investigations in this area (CH2M Hill, 2003) indicates that hydraulic conductivities in the area of MW-24 are conducive to groundwater circulation.

Access

Due to the steep natural terrain at the Topock site, there are certain areas that are not readily accessible for a drill rig. Many of these locations would require extensive ground reconfiguration in order to be accessed. Figure 3 shows accessibility and

topographic constraints at the Topock site. When evaluating a PTA the four items that should be considered in terms of access to the test area are:

- Road
- Power
- Minimize new disturbance
- Safety

Potential Impact on Cultural Resources

As mentioned above, the project area lies within a larger area of significant cultural value and within an area that is sacred to the Fort Mojave Indian people. In recognition of this, all activities are planned in a manner to minimize impact to this area. The work will be conducted in a manner that recognizes and respects these resources and site spiritual values. In addition, the Colorado River itself is of spiritual and cultural importance to local tribes.

Potential Impact on Biological Resources

There are minimal expected impacts to species and biological resources within the upland area containing the PTAs. Care will be taken to avoid animals and plants. No live, or recent signs of the, desert tortoise have been found in the proposed areas. Beavertail cacti, palo verde, and cat claw exist in the vicinity. Biological resource surveys will be conducted prior and post construction and if avoidance is not possible, these plant species will be transplanted. If transplanting is unsuccessful, the vegetation will be replaced.

Proximity to Existing Extraction Wells

The selected PTA has to be far enough from the current injection/extraction flow field in order to evaluate the recirculation well performance separate from the effect of the extraction wells. All of the PTAs are within the zone that may eventually be extracted by TW-2D and TW-3D, which ensures that any reagents injected through the recirculation wells may eventually be extracted in these wells.

3.2 Proposed Pilot Test Location Layout

At this time, PTA-8, located in the vicinity of monitoring well MW-24 (Figure 3) is favored because more geology and groundwater chemistry information is available than for other considered areas. PTA-8 is located immediately northwest of the Compressor Station and south of Interstate-40. It is also within the southern portion of the plume source area. It has easy access from the Compressor Station. The stratigraphy and the groundwater chemistry in the vicinity is relatively well-understood due to the presence of historical data obtained from wells MW-24 A/B, MW-11, PGE-6, PGE-7, MW-38 S/D, and TW-1, which are all within a 250-foot radius of PTA-8. PTA-8 is sufficiently far from the current extraction wells that the operation of the extraction well will not complicate the pilot test. Pump tests at TW-1 (near PTA-8) provided hydraulic information of the area.

It is recognized, after discussion with the FMIT, that all of the areas where a pilot test could potentially be performed are within a sacred area. This fact impacted a number of pilot test design factors.

- Where possible, existing wells will be utilized to provide groundwater monitoring information. For example at PTA-8, MW-24 (A, B, and BR), MW-11, and MW-38 (S and D) may provide significant groundwater monitoring information, thereby minimizing the need for new monitoring wells and the additional disturbance associated with well drilling.

- The total number of monitoring wells will be limited to the bare minimum to achieve the critical objective of the pilot test. At a site without sacred significance, additional monitoring wells would have been proposed that would have provided beneficial information, but not information critical to the core objectives of the pilot test. Thus, a streamlined test will be performed.

- All additional wells will be located in an area with prior disturbance associated with gas pipelines previously installed. Access to the PTA-8 site will utilize existing roads and infrastructure where possible.

- It is believed that injection wells proposed at PTA-8 could become part of the overall site remedy, if in situ is selected.

PG&E has met with the FMIT to discuss the pilot testing approach to solicit input about performing the pilot test in a manner that respects the cultural and spiritual significance

of the area. PG&E has considered, and will continue to consider, the input of the FMIT and of others in the design and implementation of this pilot test.

PTA-8 is proposed as the location for the pilot test (Figure 3). Other locations are potential locations that could alternatively be considered (PTA-3 and PTA-4); however, geology, hydrology, and chemistry data equivalent to that available for PTA-8 are unavailable for these other potential pilot study locations. At these locations, additional disturbance would be necessary to obtain equivalent information equal to that which is currently known about PTA-8. For this reason, PTA-8 is the proposed location for this pilot test.

Well construction details are presented in a following section.

3.3 Aquifer Testing

The pilot test reagent delivery approach being tested is the use of groundwater recirculation wells. A pair of injection-extraction wells screened at high and low elevations in the aquifer will be installed within a 150 feet distance from each other providing between-well circulation. Twenty five foot screen intervals (near the top of the saturated portion of the aquifer) separated by 30 feet of well casing followed by 30 feet of screen will be used to create circulation between the injection and extraction well screens. The top screen interval will be located within 10 feet of the top of the aquifer, and the bottom screen interval will end next to the bedrock layer at the bottom of the relatively permeable aquifer unit. The remedial reagent will be added to each well between the two screened intervals through an in-well mixer.

The aquifer-testing program will include completing a circulation pump test in both recirculation wells for approximately 8 hours, collecting drawdown data, and analyzing the data. The objective of the circulation pump test is to determine final injection and recirculation rates and to obtain additional hydrogeologic information. The circulation pump tests will consist of four approximately 2-hour step tests to determine well yield. After the recirculation well is installed and developed, a 4-inch diameter submersible pump, appropriate packer and piping will be installed in the well and tested for reliable operation. The circulation pump tests will be performed to evaluate the potential maximum yield of the well and to approximate the sustainable yield for the well. The first step will have a pumping rate constant of approximately 5 gallons per minute (gpm) for approximately 120 minutes, the second step at approximately 10 gpm for approximately 120 minutes, the third step at approximately 20 gpm for approximately 120 minutes and the final step at approximately 30 gpm for approximately 120 minutes.

Should field conditions suggest that this procedure should be modified, PG&E will discuss with DTSC and obtain verbal approval prior to making any significant adjustments. The water yield from one well screen during the circulation pump test will be re-injected simultaneously in the other well screen within the same well.

Pressure transducers, connected to a data logger, will be placed in the recirculation well and the monitoring wells as practical. The data logger will be programmed to collect drawdown measurements. Two pressure transducers will be needed to monitor both the extraction and the injection. Throughout the circulation pump test, water-level displacement will be measured in the monitoring wells (PT-7 S/M/D, PT-8 S/M/D, PT-9 S/M/D, MW-24 A/B, and MW-11, Figure 8). Data from the closest monitoring well PT-7 and MW-24A will be collected on a high frequency (e.g. every 15 seconds). Data from wells further from the pumped well (PT-8, PT-9 and MW-11) will be collected less frequently (e.g. every minute) since the influence on these wells should be less. Manual measurements will be collected periodically from the wells equipped with the transducers to confirm the accuracy of the pressure transducers. Manual measurements will be made using either a chalked steel tape or a water level meter.

Baseline water level measurements will be collected from one monitoring well (PT-7 S/M/D) using a pressure transducer and data logger for one week prior to conducting the test. Immediately prior to starting the test, a comprehensive, synoptic round of water-level measurements will be collected to obtain baseline groundwater elevation data. The baseline water-level data, as well as barometric pressure and precipitation data, will be used to evaluate non-pumping conditions and identify potential interference or trends affecting groundwater levels during the test.

Recovery data will be collected to confirm the results of the circulation pump test by measuring water levels in selected monitoring wells with pressure transducers until water levels are within approximately 10 percent of the pre-test levels, or for a maximum of 24 hours after shutdown, whichever occurs first. The recovery rate may vary based on the actual materials screened and the availability of groundwater to recharge the system.

Data obtained during the circulation pump test will help determine the circulation rate of water. After the pumping rate is determined, both of the recirculation wells will be run at the same rate to balance the circulation flow rates between the two recirculation wells. Water levels will be monitored in the selected monitoring wells (PT-7 S/M/D, PT-8 S/M/D, PT-9 S/M/D, MW-24 A/B, and MW-11), as previously defined.

The results of both the circulation step test and the recirculation hydraulic connectivity test will be analyzed prior to the start of the pilot test injections. If necessary, modifications to the pilot test plan will be made.

3.4 Pilot Test Approach

The proposed test area is just to the northeast of the Topock Compressor Station, near monitoring well MW-24. This area was selected (as summarized in Section 3.1) for its location near the center of the Cr(VI) plume, as shown in Figure 2. Access to the area is along Park Moabi Road through the Compressor Station. The area also has power access from the Compressor Station on the access road or from close by existing power poles. There are four possible equipment staging areas for the well installation activities and other pilot test related activities: outside the north Compressor Station gate, the MW-24 bench next to pilot test area, within the fenced area of the Compressor Station, and adjacent to the Transwestern valve site on Compressor Station property (two of these locations are shown on Figure 8).

The proposed pilot test will be conducted by introducing a food-grade carbon source to be used by indigenous microbes coupled with the available electron acceptors in the aquifer to provide a reducing environment in the aquifer. By creating a reducing environment, chromium reduction will be achieved by two different methods. First, microbes will directly reduce Cr(VI) to Cr(III) while consuming organic carbon, and also indirectly by formation of reactive reduced iron compounds and to a lesser extent, sulfide compounds in the aquifer.

Ethanol (denatured by methanol) is the preferred carbon substrate due to its solubility, low viscosity, and minimized well biofouling. The introduction of a carbon source (denatured ethanol) promotes microbial activity contributing to the creation of a reducing environment; Section 5.2 discusses the proposed reagent dosage to be used during the pilot test. These dosages have been based on available Topock site data and experience with the use of in situ bioremediation at similar Cr(VI)-impacted sites.

Since only tracer and reductant solution (and no injection water) is added to the site, surface disturbance by running water lines between the injection wells is avoided. In a full scale application of the recirculation approach, the injection direction will be alternated between the recirculation wells to create the desired “conveyer belt” flow field between the series of recirculation wells.

Three additional monitoring well nests will also be installed to monitor multiple depth intervals and assess coverage and the propagation of the reduced zone on the downgradient side of the circulation zone. One well (PT-7 S/M/D) will be located near the injection well (approximately 30 feet away from the injection well); this well, and MW-24A, will provide rapid assessment of the circulation efficiency, and will be used to modify reagent concentrations and injection rate, and circulation pumping rate. Another well nest (PT-8 S/M/D) will be located equidistant between the circulation wells to monitor how well treatment is being achieved between the two recirculation wells. The third well nest (PT-9 S/M/D) will be located downgradient of the pilot test area to monitor the remediation effects observed downgradient of the area. The other existing monitoring wells in the area will be used to monitor the performance of the pilot study. MW-24 A/B will also be used to monitor the coverage between recirculation wells, MW-11 will be used to monitor the circulation extent to the north and MW-38 S/D will be used to monitor the upgradient water quality flowing into the circulation zone.

The recirculation wells will be operated until hydraulic steady state flow conditions are achieved and iron present in the aquifer is reduced and stored to maintain reduction activity within the injection area. Modeling suggests that hydraulic steady-state flow conditions will be achieved within a six-month period. Vertical and horizontal coverage will be documented by monitoring tracer concentrations and chromium treatment data. Each recirculation well will have reagent injected with a tracer, with fluorescein in pilot test recirculation well PTR-1, and rhodamine in PTR-2 (Figure 8).

Formation of reduced iron stored in the aquifer will be assessed to confirm that it can continue to precipitate chromium between widely spaced injection events and even after the injection ceases. This reduced iron can form the basis for natural attenuation of the chromium plume. A soil core will be removed from the circulation zone after the circulation phase is complete and the amount of reduced ferrous iron will be assessed, and compared with pre-test conditions. The monitoring wells will be used to assess the dissolved ferrous iron. Together these data will show all of the iron reduced during the circulation phase. Sulfate and sulfide will be similarly monitored to provide data on the sulfur-based stored reductive capacity in the aquifer.

As described further in Section 5.4, groundwater chemistry monitoring will be conducted to evaluate the effectiveness of the reagent introduction to the aquifer. It is anticipated that this monitoring information will yield useful information whether or not complete Cr(VI) removal is achieved. The suitability of injecting reagents into the groundwater using circulation wells, the effects of the remediation process on secondary water chemistry characteristics, and additional aquifer characterization in

this area are examples of information that this pilot test will yield in addition to the Cr(VI) precipitation. All data will be used to evaluate the pilot test, which will be informative to selecting the overall site remedy options at the Topock site.

4.0 Pre-Implementation Considerations

The following sections describe activities that will be conducted prior to implementation of the pilot test.

4.1 Access Agreements

Permission for access and placement of components of the pilot test will be obtained from the Havasu National Wildlife Refuge.

4.2 Permitting and Approvals

It is anticipated that the injection of reductant and tracer solutions as proposed for the pilot test will require the issuance of Waste Discharge Requirements (WDR) by the Regional Water Quality Control Board (RWQCB). The WDR will specify how the test will be conducted and the monitoring and reporting that will be required by the RWQCB. This work plan, in addition to the completed Report of Waste Discharge (ROWD) Form 200, provides the information needed for the RWQCB staff to prepare the WDR. The WDR will be considered for approval by the RWQCB at a regular board meeting. Generally, at least three months is required from submittal of the ROWD until the WDR is approved.

Well construction permits will be obtained from the San Bernardino County Department of Public Health, Environmental Health Services Safe Drinking Water Permit Section for the additional wells that will be installed.

PG&E will work with the DTSC and federal agencies to determine and obtain those permits or approvals that are actually required prior to implementation of the pilot study.

4.3 Well Installation

Two recirculation wells (PTR-1 and PTR-2) with pumps and well-head vaults with pump controls and three new nested monitoring wells (PT-7 S/M/D, PT-8 S/M/D, and PT-9 S/M/D) will be installed in the locations shown on Figure 8. All drilling and field activities will be performed in accordance with the applicable procedures contained within the Sampling and Analysis Field Procedures, PG&E Topock Program (SAFPM) (CH2M Hill, 2006c) with modifications as necessary for the recirculation wells to enhance injectability.

The wells will be drilled using rotosonic techniques. The rotosonic drill rig will be equipped with drilling casing with an outside diameter of approximately 10 inches for the recirculation and monitoring well boreholes. Rotosonic drilling provides continuous highly representative, core samples that can be recovered in all formations without the use of air, water or additives, thus minimizing the waste produced. Soil samples will be continuously recovered and logged, and from this information the exact location of the screen intervals will be selected. The post-test soil sample for ferrous iron analysis will also be recovered using rotosonic techniques.

Recirculation wells will be 6-inches in diameter with two separate screened intervals. The upper screen interval will be approximately 25 feet long and the lower screen interval will be approximately 30 feet long, with approximately 30 feet of spacing between screens. The two injection wells will be spaced approximately 150 feet apart. The screen material used will be at least 0.02-inch V-shaped continuous stainless steel wire-wrapped screen (Figure 9). The stainless steel wire-wrapped screen will provide a stable, more permeable section to which the organic carbon substrate is less likely to clog during injection activities. The recirculation wells will be constructed with the upper screened interval from approximately 445 to 420 feet above msl and the lower screened interval from approximately 390 to 360 feet above msl.

The monitoring well nests are specified in the pilot treatment zone around the recirculation wells. Monitoring well PT-7 S/M/D and PT-8 S/M/D will be located between recirculation wells to monitor coverage of the injected reagents and the circulation between the wells, and PT-9 S/M/D will be located downgradient of the circulation zone to monitor the propagation of the reduced zone.

Construction of a single boring at each nest with three separate two-inch well completions was considered. However, this approach was rejected since it would likely require overdrilling upon removal, resulting in additional site disturbance. It is also more difficult with a ‘triplet’ to ensure proper placement of the well sand pack and bentonite seal. Therefore, two separate borings for each monitoring well nest (the PT-7, PT-8 and PT-9 series) will be advanced. One boring will contain two separate 2-inch well completions (shallow and deep) while the second boring will contain a single completion in the middle layer. It is anticipated that these wells will be abandoned using pressure grouting techniques. The wells will be constructed with Schedule 40 PVC casing and 0.02-inch slotted PVC screen (Figure 9). The suggested elevations for the screen intervals are the following approximate elevations: shallow interval from 440 to 430 feet above msl; intermediate interval from 410 to 400 feet above msl; and lower interval from 380 to 370 feet above msl.

Reagent storage tanks and reagent injection pumps, as well as in-well packer and in-line reagent mixer, will be used. No night work will be conducted during the pilot test implementation.

5.0 Implementation Plan

Following well installation, aquifer testing and baseline sampling (discussed below), the pilot test will commence with the introduction of ethanol and tracers. This section discusses the calculated required dosage and methodology for reagent injection.

5.1 Tracer Test

Concurrent with the pilot test injection, a tracer test will also be initiated to better understand the flow conditions in the pilot test area. Due to the substrate distribution system selected and the circulation mixing between the wells, the tracer study will be conducted with each injection well receiving its own tracer. PTR-1 will receive fluorescein and PTR-2 will receive rhodamine as tracers. The resulting information will be used to track groundwater movement at different depth intervals and also the distribution of substrate between the wells. The dyes will be introduced at a target concentration of 1 mg/L in the injection water and will be continuously injected for the first month of circulation. The monitoring wells will be sampled for both tracers at the same frequency as all other parameters for the full eight months to determine relative mixing of the dyes (and the associated groundwater) during the circulation test. Approximately 12 pounds of each dye will be injected in their respective wells during the one month dye injection period.

5.2 Reagent Dosage

The proposed reagent dosages are calculated based upon the pilot test area and experience with the use of carbon source addition at other sites.

Based on the desired IRZ zone for this pilot test of approximately 375 feet long by 375 feet wide across a fully saturated thickness (approximately 100 feet), with an estimated porosity of 20 percent, the volume of impacted groundwater within the test area is approximately 21 million gallons. Therefore, the amount of ethanol needed to reduce oxygen, nitrate and iron in the aquifer to create a reducing zone and result in chromium reduction by either microbes that couple the organic carbon oxidation with chromium reduction or by reduced iron is calculated as approximately 12,000 gallons. However, to avoid flammable reagent storage issues at the site, a diluted 40 percent ethanol solution will be used. A total of 38,000 gallons of 40 percent ethanol solution will be injected in two recirculation wells in six months. This amount is calculated based on the stoichiometric amount of organic carbon needed to reduce the oxygen, nitrate and iron content of the subsurface and an additional 20 percent as a safety factor (to account

for some biomass inefficiency in carbon usage). Because it is not likely that the full 375 feet by 375 feet zone will be fully mixed initially, and the 20 percent safety factor is conservative, this reagent dosage is expected to be in excess of what is required for the reduction of just the oxygen, nitrate, chromium, and iron. Consequently it is expected that some sulfate reduction will also occur, which also may increase the beneficial storage of iron in the reduced zone. Sulfate and sulfide will therefore be monitored to document in situ reaction efficiency. Figure 4 presents the estimated total organic carbon coverage area over six months.

5.3 Reagent Introduction

The ethanol solution will be pumped into each of the two recirculation wells (PTR-1 and PTR-2). Data from monitoring wells will be used to adjust ethanol injection rate if needed, with required agency notification and concurrence. No permanent aboveground equipment will be employed during the pilot test. The proposed approach will minimize the duration and nature of site disruptions by placing temporary reagent tanks at well heads and using in-well packer and in-line reagent mixers. Diluted ethanol (and for the first month, a dye tracer) will be kept in double contained reagent tanks located at each well head. The reagent tanks (sized 3,000 gallons or less) will be re-filled approximately once a month. Reagent handling, transferring and delivery will follow existing site policies and procedures in compliance with the previously approved SAFPM (CH2M Hill, 2005b).

To minimize biofouling of the recirculation wells, the reagent will be injected multiple times daily at a high rate for a short period of time. For example, approximately 100 gallons of reagent will be injected each day in each well. Twenty-five gallons will be injected four times per day at a rate of 5 gallons per minute to rapidly inject the reagent into the aquifer. An automated reagent dosing system will be located within the well head vault to accomplish the reagent injection at regular intervals during each day of the pilot test.

5.4 Pilot Test Monitoring

Monitoring of reagent flow (rate and volume) into the injection well and water levels in nearby monitoring wells will be conducted daily throughout the first week of injection until the injection system is operating routinely. Thereafter, weekly monitoring visits will record volumes of reagent injected.

Groundwater chemistry monitoring will be conducted to evaluate the effectiveness of the reagent introduction to the aquifer. It is anticipated that the chemical nature of groundwater near the injection well will change soon after the introduction of the reagent. However, it may take some time for the effect to reach the monitoring wells. Monitoring wells will be sampled twice prior to the initial injection event (two baseline events) and on a phased schedule post-injection (weekly for the first month, bi-weekly for next three months, and monthly for the next five months), for a total of 17 monitoring events, plus any additional monitoring events required by the RWQCB WDRs. Monitoring will continue for a minimum of nine months (during the six months of injection and an addition three months to monitor the performance of the established reductive zone). Depending on the results obtained, post-test monitoring may continue beyond the nine-month timeframe.

Groundwater sampling, handling and analyses will be performed according to the methods in the SAFPM, including the Quality Assurance Project Plan (QAPP) presented in the SAFPM (CH2M Hill, 2005b). Monitoring will include field analysis of pH, temperature, and specific conductance (all events) and dissolved oxygen (only in the baseline sampling event), and any additional monitoring parameters required by the RWQCB WDRs. The groundwater samples will also be submitted for analyses for various specified parameters mentioned below. Water levels in each well will also be measured and recorded during each sampling event.

The baseline sampling events will include sampling and analyses of Cr(VI), total chromium, total and dissolved iron, total and dissolved manganese, dissolved arsenic, bicarbonate alkalinity, nitrate, total organic carbon (TOC), sulfide, and sulfate. Sampling and analyses during the pilot test will include: dissolved Cr(VI), total chromium, TOC, total iron and dissolved iron, sulfide and sulfate, rhodamine, and fluorescein plus any additional monitoring parameters required by the RWQCB WDRs. A more detailed sampling and analyses of all the parameters listed for the baseline sampling event will be conducted once every two months.

5.5 Reporting

It is anticipated that frequent communications between the PG&E project team and DTSC will occur during the course of the pilot test. Reporting will be coordinated, and where possible, combined with RWQCB WDR requirements. It is anticipated that quarterly update reports will be prepared and submitted beginning immediately after the introduction of reagents and continuing for the duration of the test period. All data will be used to evaluate the pilot test, which will be informative in selecting the overall

site remedy options at the Topock site. These reports will contain all data obtained during the test. A final written summary report of findings, including a complete data set, will be submitted within approximately one month after completion of the pilot test. This report will include a discussion of treatment efficiencies, recommendations, and considerations for development of a possible full-scale in situ remedial plan.

6.0 Waste Management and Equipment Decontamination

Several waste materials will be generated during the drilling, development, and sampling of the proposed pilot test wells. These investigation-derived waste (IDW) materials will include groundwater, drill cuttings, decontamination rinsate, and incidental trash. PG&E and their consultants are committed to preserving the site's archaeological and spiritual resources, and all IDW will be handling according to policies and procedures in compliance with the SAFPM (CH2M Hill, 2005b).

6.1 IDW Management

Drill cuttings generated during drilling of the pilot test wells will be contained in lined roll-off bins temporarily staged at an approved staging area at or near the drilling sites. After sampling and characterization of the drill cuttings are completed, the cuttings bins will be removed from the drilling sites for disposal by PG&E. The drill cuttings will be screened for chromium. If the drill cuttings are characterized as a hazardous waste, they will be transported off site for disposal at a permitted hazardous waste treatment, storage, or disposal facility. Cuttings bins could be temporarily staged for up to 90 days

Water generated during drilling, well development, and sampling activities may be collected in drums or portable storage tanks temporarily located at each drilling site and transferred to a truck mounted storage tank over secondary containment and transported to storage tanks in a staging area for characterization. Elevated chromium concentrations are expected in the groundwater that will be removed from the pilot test wells. Therefore, secondary containment will be provided for the storage tanks in the staging area. This water will be analyzed in accordance with the procedures in the SAFPM (CH2M Hill 2005b) to confirm that treatment of this water will be performed at the IM-3 treatment system.

Incidental trash will be collected from the work area at the conclusion of each workday and placed in a trash collection bin.

All IDW management will be performed in accordance with the procedures specified in the SAFPM (CH2M Hill, 2005b). Section 3.4 discusses possible staging areas. These areas include: outside the north Compressor Station gate, the MW-24 bench next to pilot test area, within the Compressor Station fenced area, and adjacent to the Transwestern valve site on Compressor Station property (Figure 8).

6.2 Equipment Decontamination

Down-hole drilling and development equipment and the back end of the drill rig will be steam cleaned prior to starting work at each new drilling site. Steam cleaning will be performed on a decontamination pad such that all rinsate can be contained and collected. Rinsate from the decontamination of drilling equipment will be transferred to the cuttings bin or water storage tank that contains material from the borehole last drilled.

All equipment decontamination will be performed in accordance with the methods specified in the SAFPM (CH2M Hill, 2005b). Water used for sampling equipment decontamination will be transferred at the end of each workday into the water storage tank that contains water from the wells sampled that day. Section 3.4 discusses possible staging areas for the decontamination water. These areas include: outside the north Compressor Station gate, the MW-24 bench next to pilot test area, within the Compressor Station fenced area, and adjacent to the Transwestern valve site on Compressor Station property (Figure 8).

7.0 Schedule

The following preliminary schedule has been developed to clarify the sequencing and approximate duration of tasks. It does not include time required for permitting and work plan approval. The results of the pilot test will be used to develop alternatives in the CMS. Figure 10 presents the upland in situ pilot test project schedule.

- Drilling and installation of two recirculation wells and three monitoring well nests (approximately one month).

- Installation of pilot test equipment (reagent storage tanks, injection pumps, pump controls, flow meters) (approximately one week).

- Injection/recirculation of the organic substrate (approximately six months).

- Monitoring activities including water levels and water chemistry at the following frequency: two baseline events, Day 1 post-injection, Weeks 1, 2, 3, 4, 6, 8, 10, 12, 14, and 16, and Months 5 through 9. The post-injection monitoring will commence with the start of injections and will continue for approximately 3 months after injection/recirculation activities are anticipated to have been completed. Depending on the data collected, monitoring activities may extend beyond nine months.

During this project, PG&E is committed to the protection of environmental, archaeological and spiritual resources, and to ensuring that all impacts to those resources are minimized. The pilot test area impacts will be kept to a minimum; and site restoration will occur upon completion of the applicable phases of the site remedy.

8.0 References

CH2M Hill, February 28, 2005a. RCRA Facility Investigation/Remedial Investigation Report, PG&E Topock Compressor Station, Needles, California.

CH2M Hill, March 31, 2005b. Sampling, Analysis, and Field Procedures Manual, PG&E Topock Compressor Station, Needles, California.

CH2M Hill, May 20, 2005c. Summary of Results—Aerobic Zone Hexavalent Chromium Core Testing, PG&E Topock Compressor Station, Needles, California.

CH2M Hill, June 1, 2006. Groundwater Surface Water Monitoring Report First Quarter 2006, PG&E Topock Compressor Station, Needles, California.

Huang and Goltz. 2005. A three-dimensional analytical model to simulate groundwater flow during operation of recirculation wells. Journal of Hydrology 314 (2005) 67 – 77.

USEPA, December, 1989. Treatability Studies Under CERCLA: An Overview USEPA Office of Soil Waste and Emergency Response, United States Environmental Protection Agency, Publication No. 9380.3-02FS.

Table 1
Historical Groundwater Data Near Proposed Pilot Test
Pacific Gas & Electric
Topock Compressor Station
Needles, California
DRAFT In Situ Hexavalent Chromium Reduction Pilot Test Work Plan - Upland Plume Treatment

Location Name	Date	Screen Interval (ft bgs)	Mearsuring Point Eleveation (ft amsl)	Alkalinity as CaCO3 (mg/L)	Chloride (mg/L)	Hexavalent Chromium (mg/L)	Total Dissolved Chromium (mg/L)	Total Ferrous Iron (mg/L)	Manganese (mg/L)	Nitrate (mg/L)	pH	SC (µS/cm)	Sulfate (mg/L)	TDS (mg/L)	TOC (mg/L)	DO (mg/L)
MW-11	1-Jul-97	62.5-82.5	522.61	141	590	0.02	0.07	14.8	0.5	7.2	7.02	2,790	415	1,910	11	2.10
	1-Sep-97			---	---	0.466	0.45	---	---	---	7.52	2,750	---	---	---	---
	18-Feb-98			---	---	1.01	0.96	---	---	---	7.85	2,820	---	---	---	---
	15-Jun-98			---	---	1.71	1.7	---	---	---	7.43	2,680	---	---	---	---
	15-Jun-99			---	---	0.822	0.82	---	---	---	7.55	2,840	---	---	---	---
	14-Sep-99			---	---	1.39	1.4	---	---	---	7.33	3,090	---	---	---	---
	1-Dec-99			---	---	1.31	1.3	---	---	---	7.35	2,680	---	---	---	---
	25-Mar-00			---	---	0.959	0.82	---	---	---	7.29	9,150	---	---	---	---
	14-Jun-00			---	---	0.491	0.56	---	---	---	7.62	2,760	---	---	---	---
	1-Sep-00			108	592	0.747	0.72	0.11	0.0033	8.8	7.47	3,320	490	1,880	4.9	7.46
	1-Dec-00			---	---	0.914	0.89	---	---	---	7.47	2,810	---	---	---	---
	28-Mar-01			---	---	0.71	0.68	---	---	---	7.35	2,740	---	---	---	---
	6-Jun-01			---	---	0.468	0.46	---	---	---	7.57	2,570	---	---	---	---
	22-Aug-01			---	---	---	---	---	---	---	7.06	2,410	---	---	---	---
	12-Sep-01			---	---	0.46	0.46	---	---	---	7.46	2,530	---	---	---	---
	28-Nov-01			121	530	0.73	0.54	0.16	0.0035	2.3	7.45	2,570	425	1,590	2.3	6.80
	6-Mar-02			---	---	0.613	0.512	---	---	---	7.2	2,440	---	---	---	---
	12-Jun-02			---	---	0.459	0.371	---	---	---	7.36	2,450	---	---	---	8.65
	17-Sep-02			---	---	0.408	0.483	---	---	---	8.14	2,640	---	---	---	6.09
	10-Dec-02			---	---	0.584	0.696	---	---	---	8.24	4,020	---	---	---	4.62
	18-Mar-03			---	---	0.463	0.452	---	---	---	8.04	2,430	---	---	---	8.30
	12-Jun-03			126	418	0.429	0.453	0.73	0.5	8.6	8.1	2,520	344	1,540	0.5	6.48
	11-Sep-03			---	---	0.412	0.376	---	---	---	7.44	2,560	---	---	---	5.90
	12-Dec-03			---	---	0.566	0.772	---	---	---	7.37	2,350	---	---	---	4.50
	16-Mar-04			---	---	0.432	0.358	---	---	---	7.42	2,830	---	---	---	5.90
	10-Jun-04			100	460	0.424	1.4	0.5	0.01	---	7.17	2,510	320	---	---	7.04
	21-Sep-04			---	---	0.431	---	---	---	---	---	---	---	---	---	---
	17-Dec-04			---	---	0.393	0.392	---	---	---	---	---	---	---	---	---
	8-Mar-05			---	---	0.396	0.334	---	---	---	7.89	2,310	---	---	---	7.02
	16-Jun-05			---	---	0.362	0.617 FF	---	---	---	8.02	2,200	---	---	---	5.60
	3-Oct-05			---	---	0.649	0.306 FF	---	---	---	7.33	2,330	---	---	---	5.91
	12-Dec-05			---	---	0.323	---	---	---	---	7.47	2,360	---	---	---	8.10
	6-Mar-06			---	---	0.306	---	---	---	---	---	---	---	---	---	6.98

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MW-24A	15-Jun-98	104-124	567.16	146	740	2.8	2.9	0.01	0.071	28	7.5	3,310	405	2,060	4.3	5.17
	15-Jun-99			---	---	2.93	3.7	---	---	---	7.85	4,140	---	---	---	---
	14-Sep-99			---	---	3.77	---	---	---	---	7.61	3,860	---	---	---	---
	3-Dec-99			---	---	3.67	3.9	---	---	---	7.49	3,470	---	---	---	---
	25-Mar-00			---	---	3.67	3.2	---	---	---	7.12	11,500	---	---	---	---
	13-Jun-00			---	---	3.42	3.4	---	---	---	7.68	2,990	---	---	---	---
	1-Sep-00			150	806	3.87	4	0.017	0.00079	18	7.55	4,350	355	2,020	2	6.31
	1-Dec-00			---	---	3.75	3.6	---	---	---	7.71	3,390	---	---	---	---
	8-Mar-01			---	---	3.22	3	---	---	---	7.6	4,130	---	---	---	---
	6-Jun-01			---	---	3.24	2.9	---	---	---	7.68	3,160	---	---	---	---
	22-Aug-01			---	---	---	---	---	---	---	7.85	3,500	---	---	---	---
	12-Sep-01			---	---	3.5	3.2	---	---	---	7.63	2,990	---	---	---	---
	29-Nov-01			158	880	3.4	2.9	0.016	0.0007	15.4	7.78	3,150	409	2,010	1	4.20
	8-Mar-02			---	---	3.03	2.99	---	---	---	8.53	3,210	---	---	---	---
	13-Jun-02			---	---	2.87	3.02	---	---	---	8.54	3,700	---	---	---	3.77
	17-Sep-02			---	---	3.29	3.49	---	---	---	8.35	4,290	---	---	---	5.71
	11-Dec-02			---	---	3.43	4.16	---	---	---	7.27	3,046	---	---	---	3.41
	18-Mar-03			---	---	2.77	2.61	---	---	---	8.5	3,650	---	---	---	3.31
	12-Jun-03			202	754	2.64	2.51	0.5	0.5	15.1	7.85	4,030	310	2,040	1.2	3.52
	11-Sep-03			---	---	2.97	2.62	---	---	---	7.66	3,430	---	---	---	2.90
	10-Dec-03			---	---	2.99	3.32	---	---	---	7.86	3,620	---	---	---	4.70
	17-Mar-04			---	---	2.6	2.27	---	---	---	7.96	3,350	---	---	---	6.53
	8-Jun-04			180	770	2.66	2.39	0.5	0.01	15	7.85	3,450	300	2,000	3	9.68
	20-Sep-04			---	---	---	---	---	---	---	7.39	3,530	---	---	---	4.24
	7-Mar-05			---	---	3.39	3.18	---	---	---	7.88	3,330	---	---	---	3.09
	16-Jun-05			---	---	3.28	2.64	---	---	---	8.09	3,180	---	---	---	2.70
	3-Oct-05			---	---	3.12	2.93 FF	---	---	---	7.63	3,200	---	---	---	3.26
	6-Mar-06			---	---	3.49	3.98 FF	---	---	---	7.62	3,100	---	---	---	5.17

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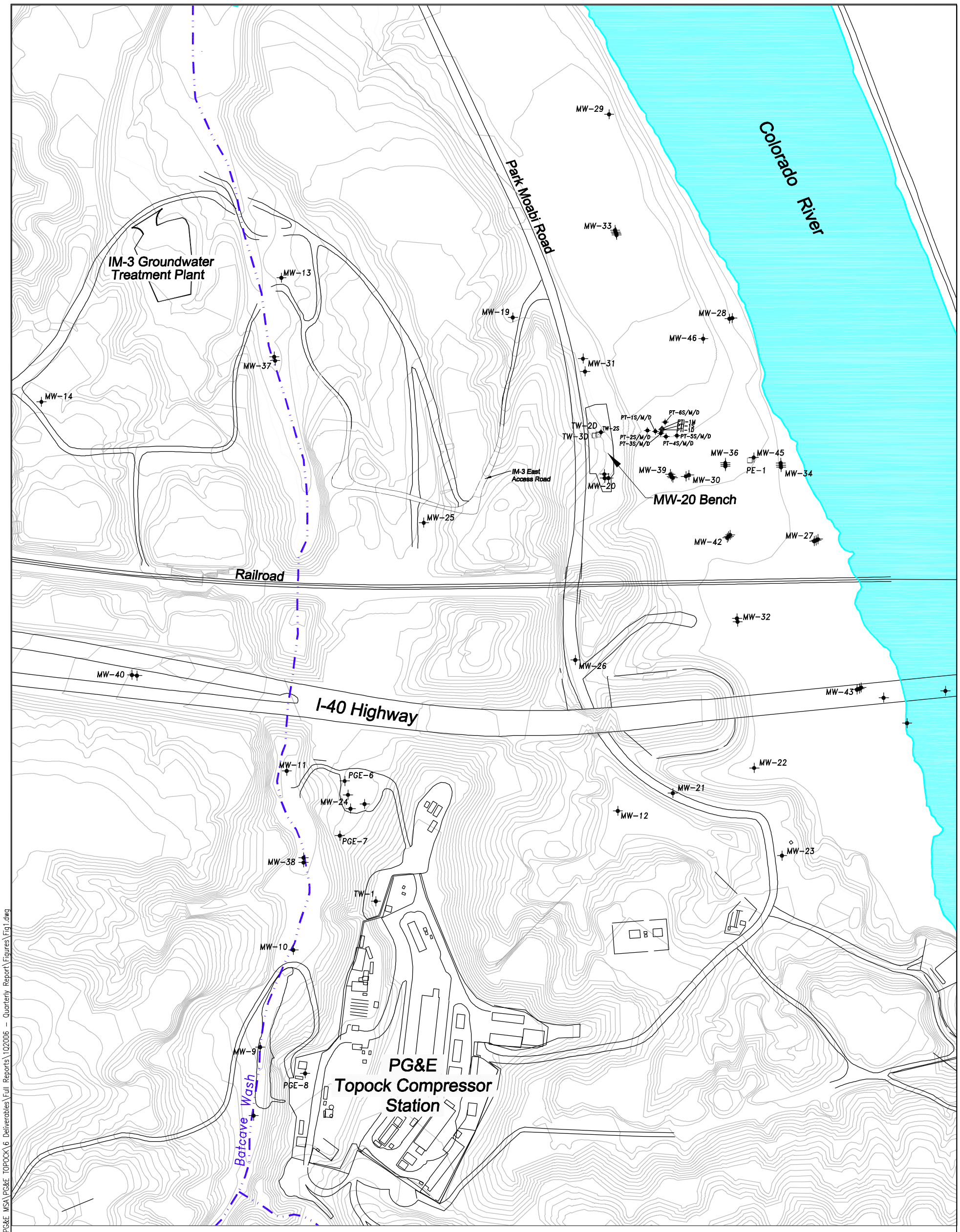
MW-24B	15-Jun-98	193-213	564.76	62	3830	3.41	3.71	0.05	0.24	14	7.97	13,800	1350	8,050	2.6	3.50
	15-Jun-99			---	---	3.12	3.5	---	---	---	8.17	6,550	---	---	---	---
	14-Sep-99			---	---	3.67	3.8	---	---	---	7.96	14,400	---	---	---	---
	3-Dec-99			---	---	3.05	2.8	---	---	---	7.87	12,400	---	---	---	---
	25-Mar-00			---	---	3.73	3.4	---	---	---	8.84	13,000	---	---	---	---
	15-Jun-00			---	---	3.9	3.8	---	---	---	7.96	11,200	---	---	---	---
	1-Sep-00			53	3830	3.97	4.4	0.05	0.11	39	8.07	13,100	1450	8,110	1	7.55
	1-Dec-00			---	---	0.741	0.68	---	---	---	7.79	11,200	---	---	---	---
	28-Mar-01			---	---	3.96	3.4	---	---	---	7.79	12,700	---	---	---	---
	6-Jun-01			---	---	4.15	3.5	---	---	---	7.75	12,400	---	---	---	---
	22-Aug-01			---	---	4.54	4	---	---	---	7.41	13,000	---	---	---	---
	12-Sep-01			---	---	4.7	3.9	---	---	---	7.57	11,700	---	---	---	---
	29-Nov-01			55.4	3700	4.4	4.4	0.39	0.07	30.8	7.97	12,500	1310	7,760	1	4.90
	8-Mar-02			---	---	4.92	4.6	---	---	---	8	13,200	---	---	---	---
	13-Jun-02			---	---	4.83	5.12	---	---	---	8.07	12,500	---	---	---	1.12
	10-Dec-02			---	---	4.62	5.38	---	---	---	8.83	12,400	---	---	---	1.31
	18-Mar-03			---	---	4.9	4.65	---	---	---	8.71	13,700	---	---	---	1.47
	12-Jun-03			63.4	3350	4.79	5.57	0.5	0.5	15.7	7.94	14,500	1270	8,130	1.1	1.87
	11-Sep-03			---	---	4.6	4.32	---	---	---	8.28	14,700	---	---	---	2.70
	10-Dec-03			---	---	4.84	6.05	---	---	---	7.99	12,700	---	---	---	2.90
	17-Mar-04			---	---	4.86	3.9	---	---	---	8.35	13,100	---	---	---	2.03
	8-Jun-04			51	3600	5.19	4.91	0.5	0.05	16	7.78	13,250	1300	9,200	3	---
	21-Sep-04			---	---	---	---	---	---	---	7.67	10,800	---	---	---	4.30
	7-Mar-05			---	---	5.32	4.95	---	---	---	8.13	13,400	---	---	---	1.70
	16-Jun-05			---	---	5.64	5.66	---	---	---	8.29	12,700	---	---	---	2.20
	3-Oct-05			---	---	5.24	4.93 FF	---	---	---	7.84	14,900	---	---	---	3.19
	7-Mar-06			---	---	5.65	5.97 FF	---	---	---	7.92	15,400	---	---	---	2.59
MW-38S	14-May-04	75-95	525.51	---	---	0.332	0.373	---	---	---	7.61	3,500	---	2,310	---	3.50
	11-Jun-04			210	770	0.509	0.493	0.5	0.12	9.7	7.22	4,430	500	2,400	3	---
	17-Jun-04			---	---	---	---	---	---	---	7.48	4,560	---	---	---	0.20
	24-Sep-04			---	---	---	---	---	---	---	6.94	394	---	---	---	4.88
	11-Mar-05			---	---	0.919	0.938	---	---	---	7.8	3,840	---	---	---	5.36
	17-Jun-05			---	---	0.807	0.73	---	---	---	7.72	3,790	---	---	---	2.87
	7-Oct-05			---	---	0.776	0.825 FF	---	---	---	7.47	3,430	---	---	---	2.17
	10-Mar-06			---	---	0.824	0.788 FF	---	---	---	7.53	3,700	---	---	---	3.44

Table 1
Historical Groundwater Data Near Proposed Pilot Test
Pacific Gas & Electric
Topock Compressor Station
Needles, California
DRAFT In Situ Hexavalent Chromium Reduction Pilot Test Work Plan - Upland Plume Treatment

Location Name	Date	Screen Interval (ft bgs)	Mearsuring Point Eleveation (ft amsl)	Alkalinity as CaCO3 (mg/L)	Chloride (mg/L)	Hexavalent Chromium (mg/L)	Total Dissolved Chromium (mg/L)	Total Ferrous Iron (mg/L)	Manganese (mg/L)	Nitrate (mg/L)	pH	SC (µS/cm)	Sulfate (mg/L)	TDS (mg/L)	TOC (mg/L)	DO (mg/L)
MW-38D	5-May-04	163-183	525.31	---	---	0.0331	0.0296	---	---	---	7.96	17,900	---	14,000	---	2.20
	10-Jun-04			33	6500	0.0769	0.0835	0.5	0.09	1.3	7.75	21,900	750	13,000	3	0.48
	23-Sep-04			---	---	---	---	---	---	---	7.76	1,740	---	---	---	4.51
	11-Mar-05			---	---	0.328	0.323	---	---	---	8.01	20,000	---	---	---	3.95
	17-Jun-05			---	---	0.202	0.175	---	---	---	8.5	4,980	---	---	---	1.66
	7-Oct-05			---	---	0.227	0.227 FF	---	---	---	7.95	21,500	---	---	---	1.07
	10-Mar-06			---	---	0.111	0.106 FF	---	---	---	7.85	23,500	---	---	---	2.09

Notes:

ft amsl	feet mean sea level
mg/L	milligrams per liter
µS/cm	microSiemens per centimeter
ft bgs	feet below ground surface
TDS	total dissolved solids
TOC	total organic carbon
DO	dissolved oxygen
CaCO3	hardness
FF	field filtered
---	not available



Source: MWH Draft In-Situ Hexavalent Chromium Reduction Pilot Test Work Plan, Upland Plume Treatment, 2006.

Legend

- *Monitoring Well Locations*
- *Extraction Well Locations*
- *Injection Well Locations*

N

0 FEET 300

SCALE

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Task Manager: H. VOSCOTT	Technical Review:
Drawing Date: 05 APR 06	Drawn By: M. CHIU

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SITE PLAN
PG&E TOPOCK FACILITY
NEEDLES, CALIFORNIA

Project Number: RC000689.0001

Figure: 1

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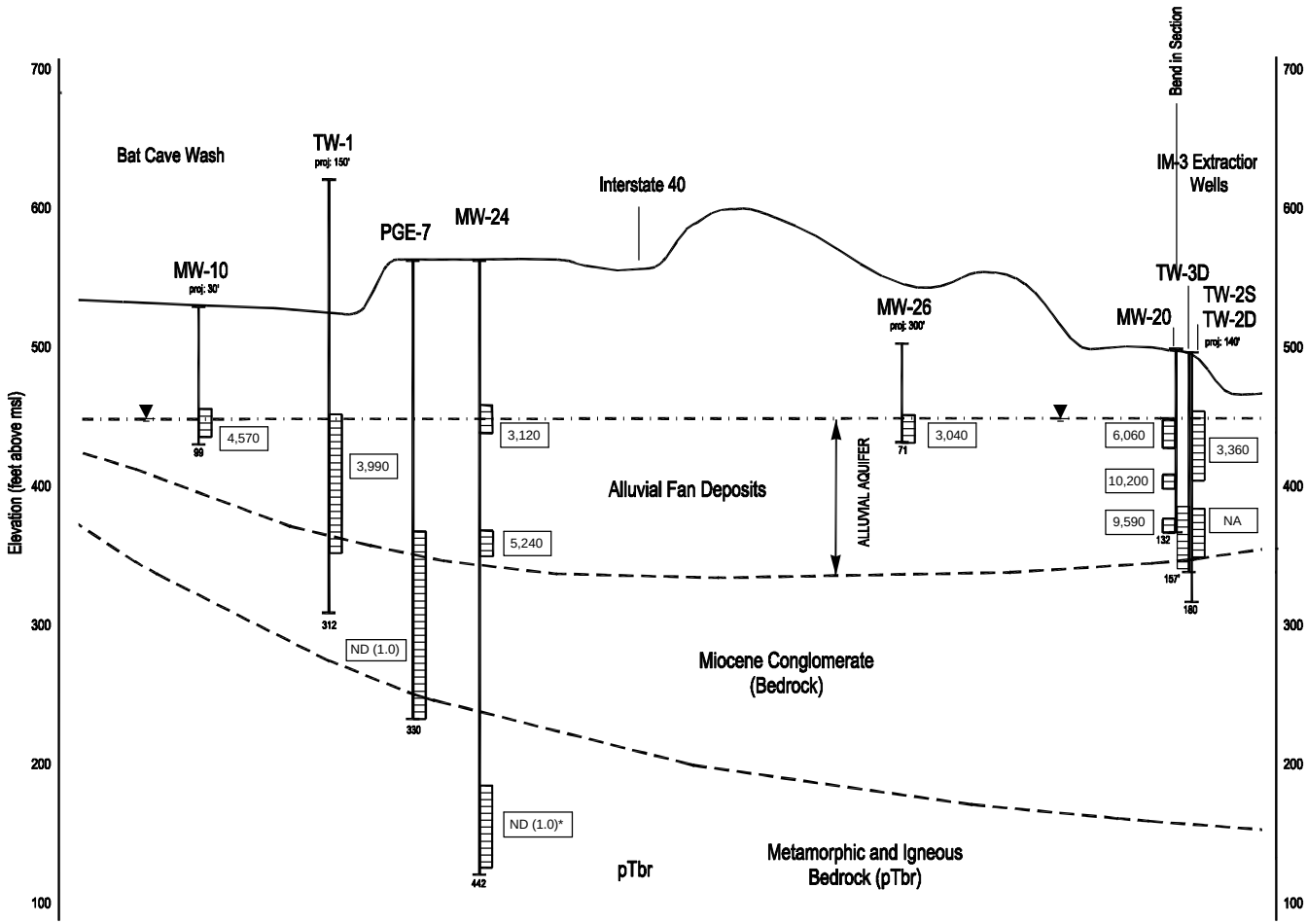
SOUTHWEST
A

EAST
A'



well ID MW-26
water level
well screen 3,040
total depth of boring 71

Hexavalent Chromium [Cr(VI)] Sampling Results, October 2005
Groundwater concentrations in micrograms per liter (ug/L)

Maximum Cr(VI) concentrations detected in October 2005 primary and duplicate samples
NA = Data not available
ND = Not detected at listed reporting limit
* = December 2005 sampling result presented when October 2005 data not available

NOTES:
Cross section prepared at approximate 3 times vertical exaggeration.

The contacts for primary hydrostratigraphic units (HS generalized for this cross-section.

Source: CH2MHILL Groundwater Monitoring Program, PG&E Topock Compressor Station, 2005 Annual Report.

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N. MORGAN-BUTCHER	J. PETERS
Task Manager	**Technical Review**
N. MORGAN-BUTCHER	J. ELY
Drawing Date	**Drawn By**
28 JUL 06	M. CHIU

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VERTICAL CROSS SECTION
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Project Number
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Figure
2

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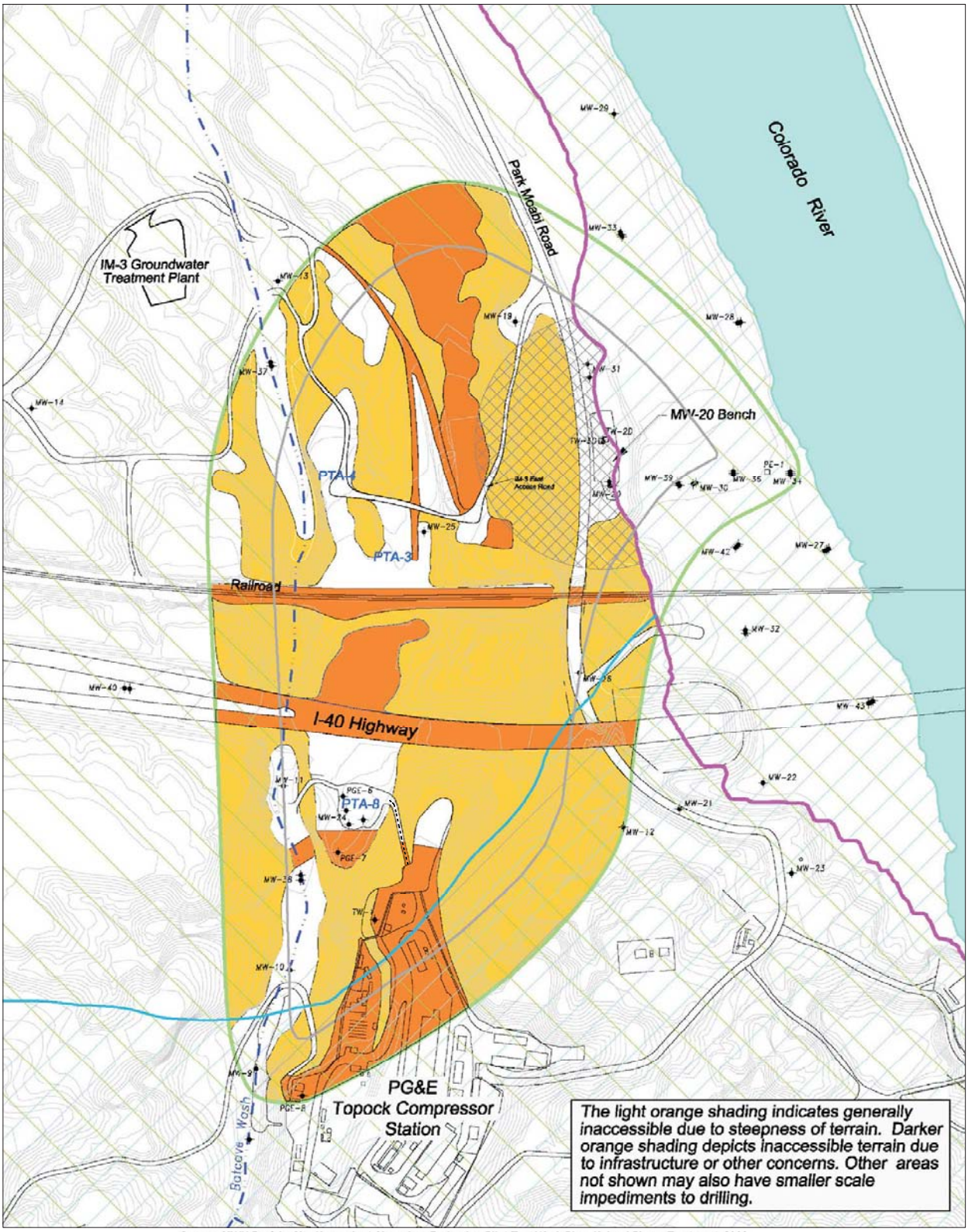

Source: MWH Draft In-Situ Hexavalent Chromium Reduction Pilot Test Work Plan, Upland Plume Treatment, 2006.

Contours based on March 2005 data

Legend

- Monitoring Well Locations
- Extraction Well Locations
- Interpreted Limit of Groundwater with a Concentration of Hexavalent Chromium that Exceeds 50 ppb
- Estimated Boundary Where Fluvial Deposits are Observed
- Estimated Boundary Where the Alluvial Aquifer Contains Less than 50 Feet of Saturated Thickness
- PTA — Potential Pilot Test Area
- Area within 400 Feet of Extraction Well TW-3D
- Area within 200 Feet of Interpreted Limit of Groundwater with a Concentration of Hexavalent Chromium that Exceeds 50 ppb
- Area with Less than 50 Feet of Saturated Thickness of the Alluvial Aquifer or in Area of Fluvial Deposits
- Access route to pilot test area

N

0 FEET 300

SCALE

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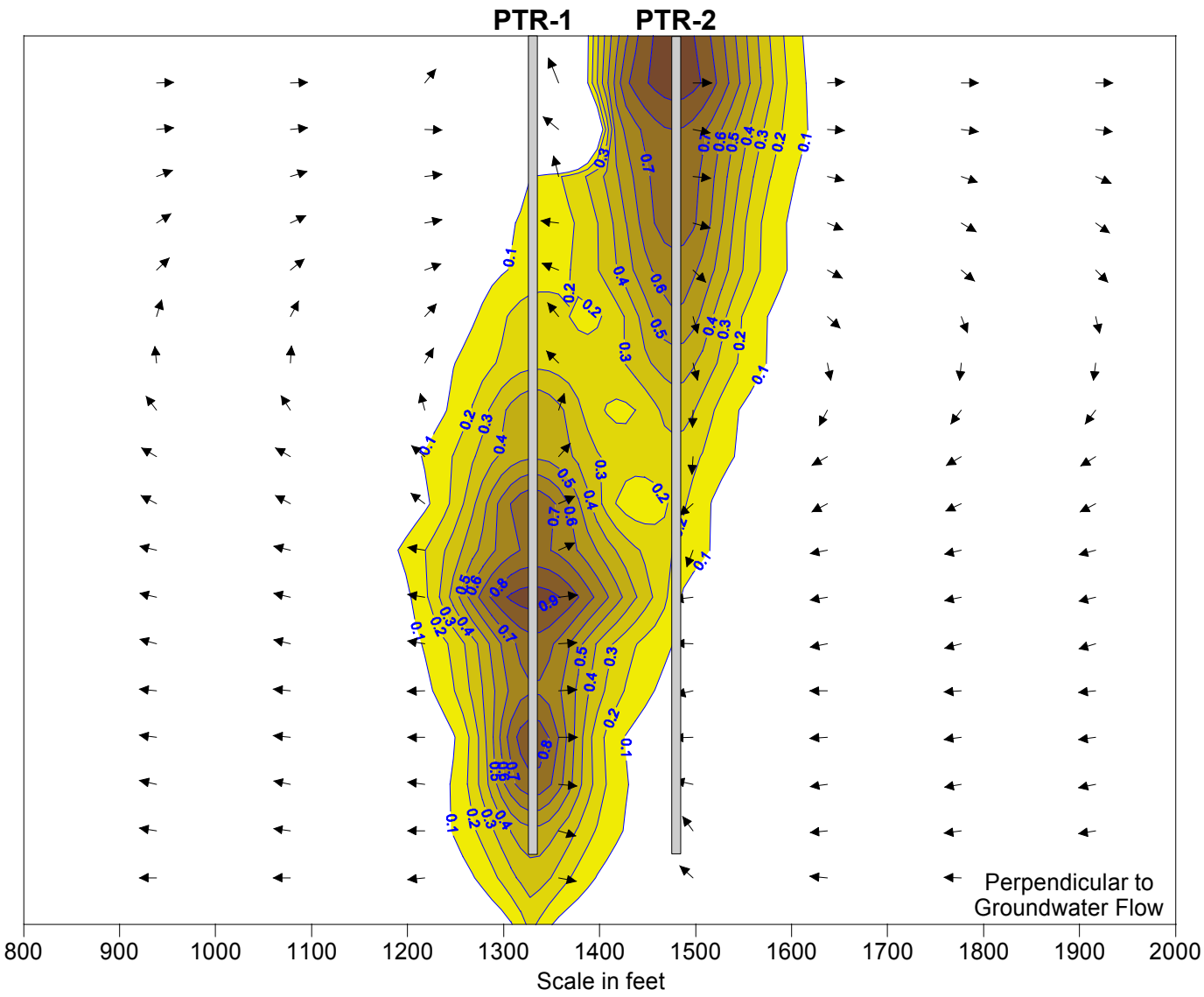
PROPOSED PILOT TEST AREAS
UPLAND AREA

PG&E TOPOCK FACILITY
NEEDLES, CALIFORNIA

PROJECT MANAGER	DEPARTMENT MANAGER
DRAFTER	CHECKED
PROJECT NUMBER: RC000689.0001	DRAWING NUMBER: 3



LEGEND

0.1 Simulated Substrate Percent Fraction

Groundwater Flow Direction

Coverage in wells over a six month time period

Simulated Substrate Percent Fraction Color Scale

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

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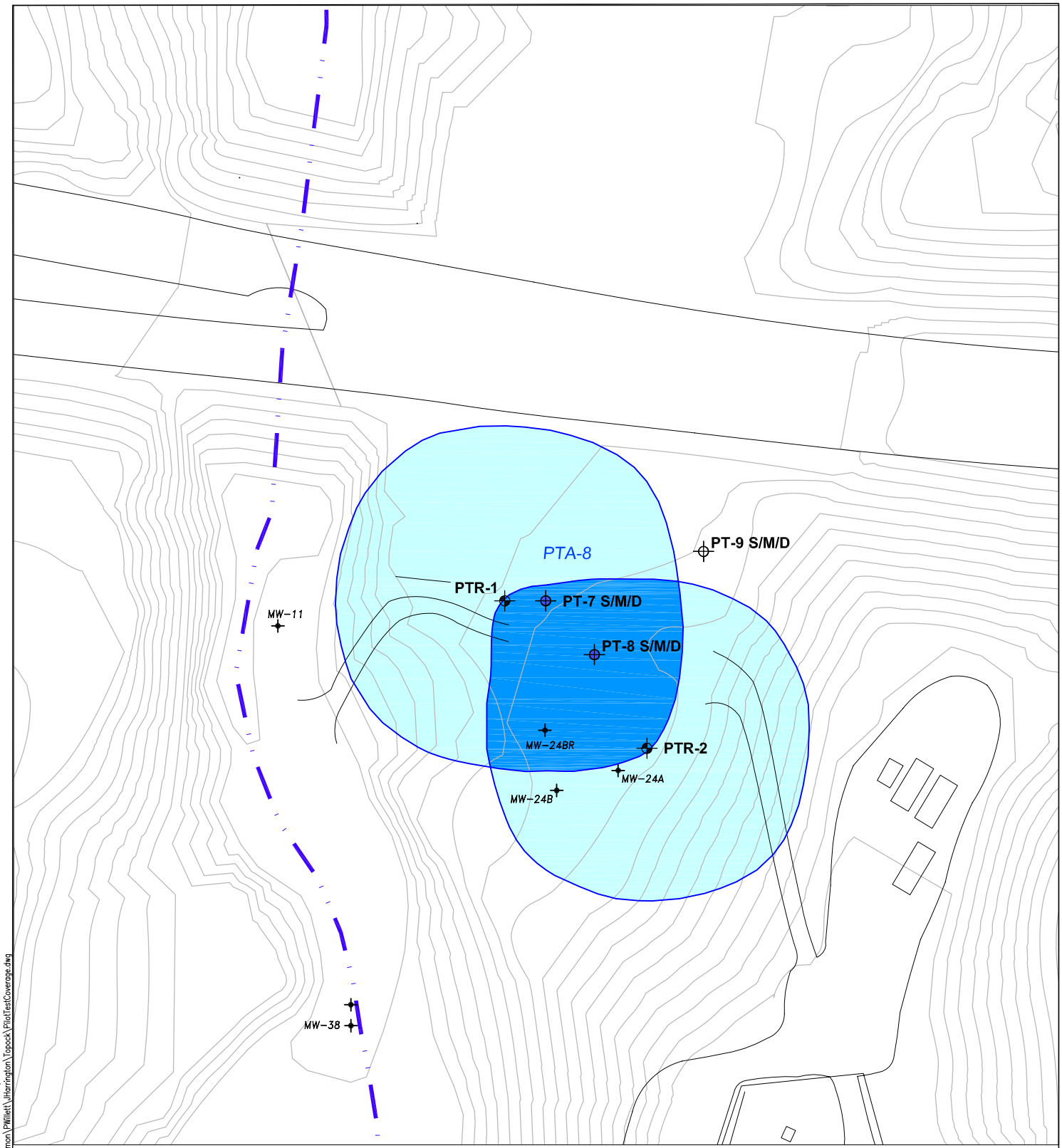
MODEL SIMULATION OF COVERAGE BY TWO RECIRCULATION WELLS OPERATING IN REVERSE CIRCULATION PATTERNS
UPLAND AREA

PG&E TOPOCK FACILITY
NEEDLES, CALIFORNIA

PROJECT MANAGER	DEPARTMENT MANAGER
AJ	MPK
DRAFTER	CHECKED
JWR	JE
PROJECT NUMBER	DRAWING NUMBER
RC000689.0001	4



Source: MWH Draft In-Situ Hexavalent Chromium Reduction Pilot Test Work Plan, Upland Plume Treatment, 2006.

Legend

- Existing Monitoring Well Locations
- Pilot Test Monitoring Well Locations
- Pilot Test Recirculation Well Locations
- Total Organic Carbon Coverage Area Over Six Months

0 FEET 100
SCALE

N

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Task Manager: H. VOSCOTT	Technical Review:
Drawing Date: 03 JUL 06	Drawn By: M. CHIU

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MODEL SIMULATION OF PILOT TEST LAYOUT COVERAGE OF TOTAL ORGANIC CARBON BETWEEN TWO RECIRCULATION WELLS UPLAND AREA

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Project Number: RC000689.0001

Figure: 5

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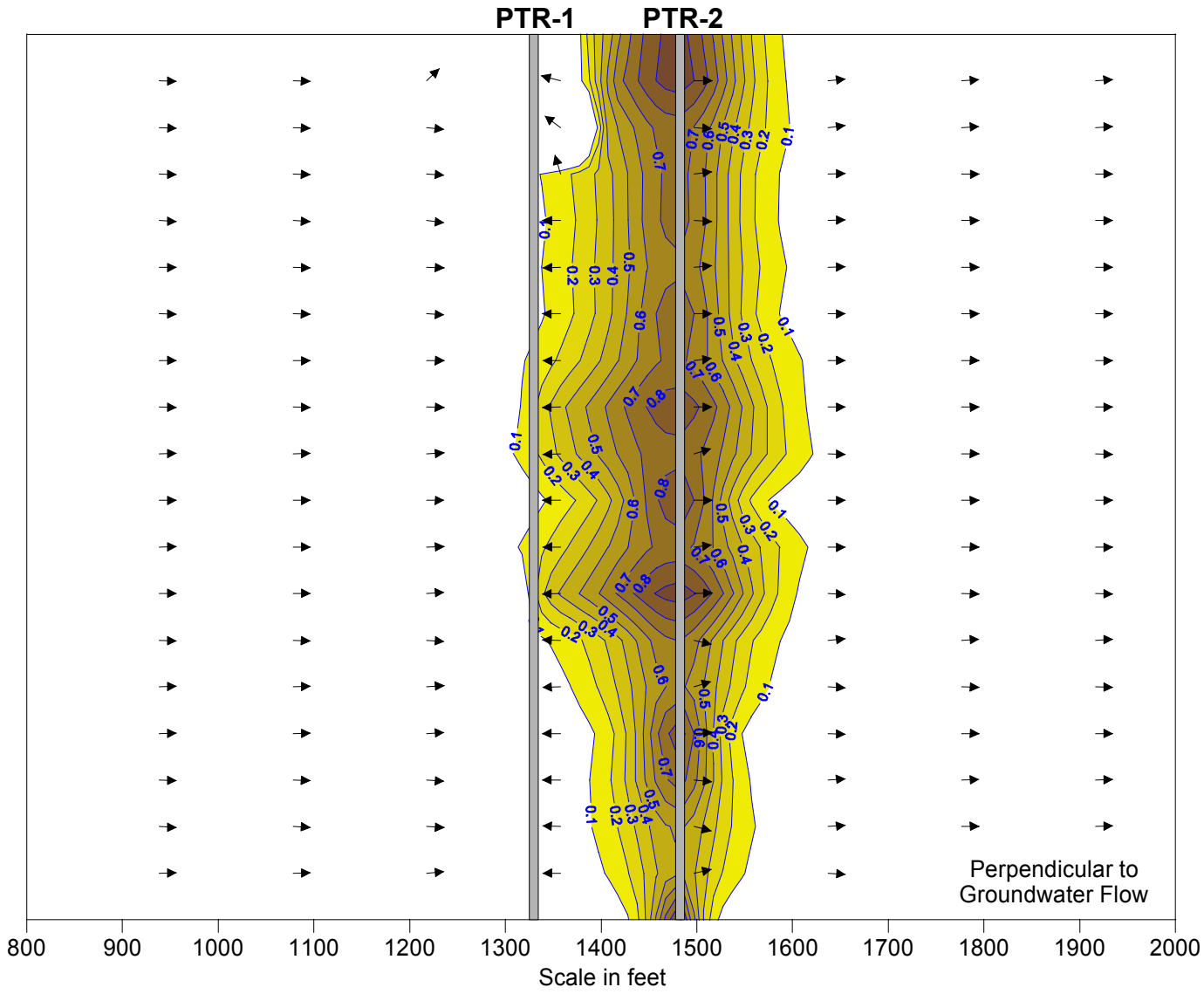

LEGEND

0.1 Simulated Substrate Percent Fraction

Groundwater Flow Direction

Coverage in wells over a six month time period

Simulated Substrate Percent Fraction Color Scale

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

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MODEL SIMULATION OF COVERAGE BY CIRCULATION BETWEEN TWO FULLY SCREENED WELLS
UPLAND AREA
PG&E TOPOCK FACILITY
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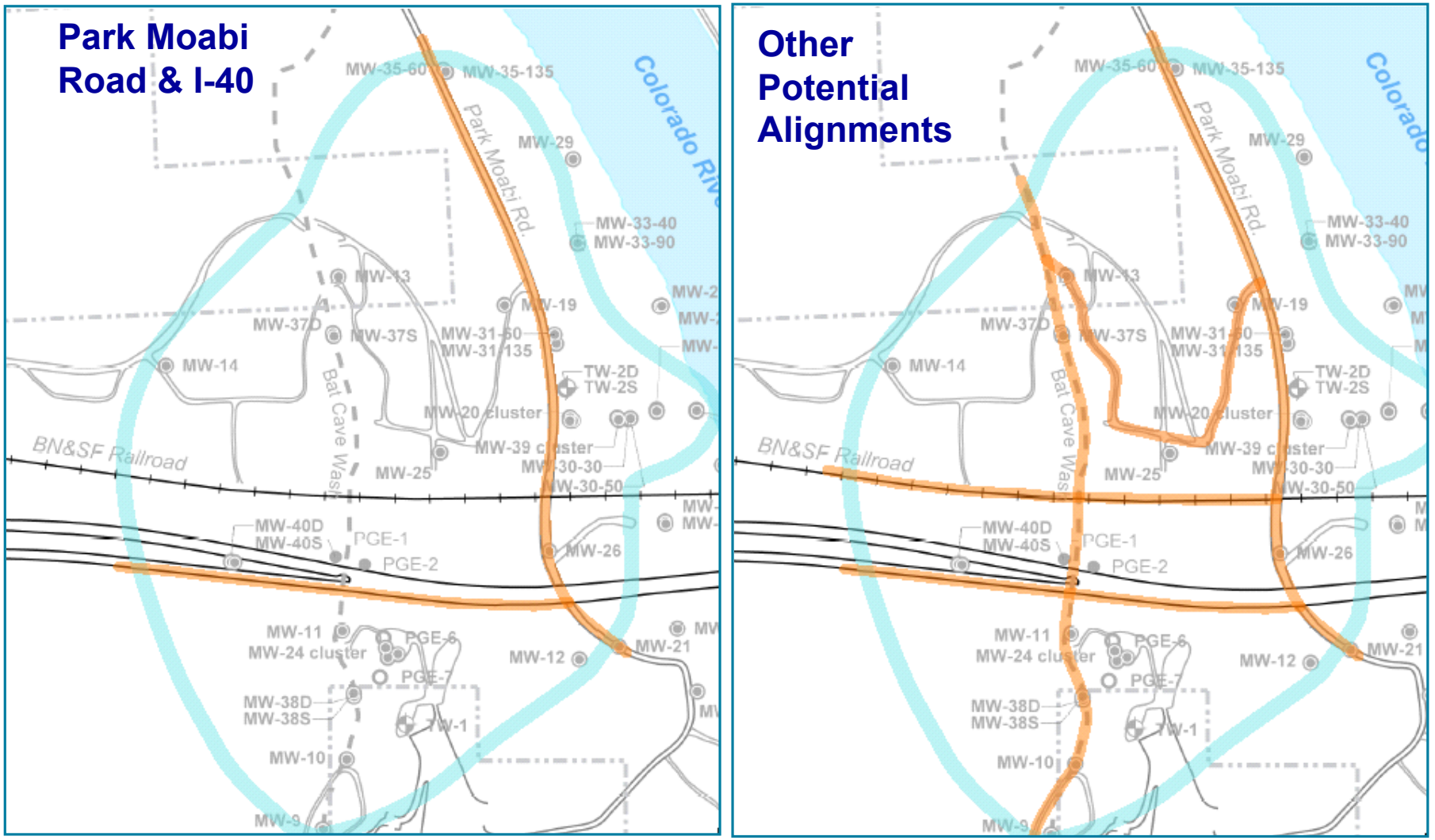
PROJECT MANAGER	DEPARTMENT MANAGER
AJ	MPK
DRAFTER	CHECKED
JWR	JE
PROJECT NUMBER	DRAWING NUMBER
RC000689.0001	6



LEGEND

- Monitoring Well
- Extraction Well
- Potential Alignments
- Approximate Hexavalent Chromium Groundwater Plume

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POTENTIAL FULL SCALE IN-SITU BARRIER ALIGNMENTS

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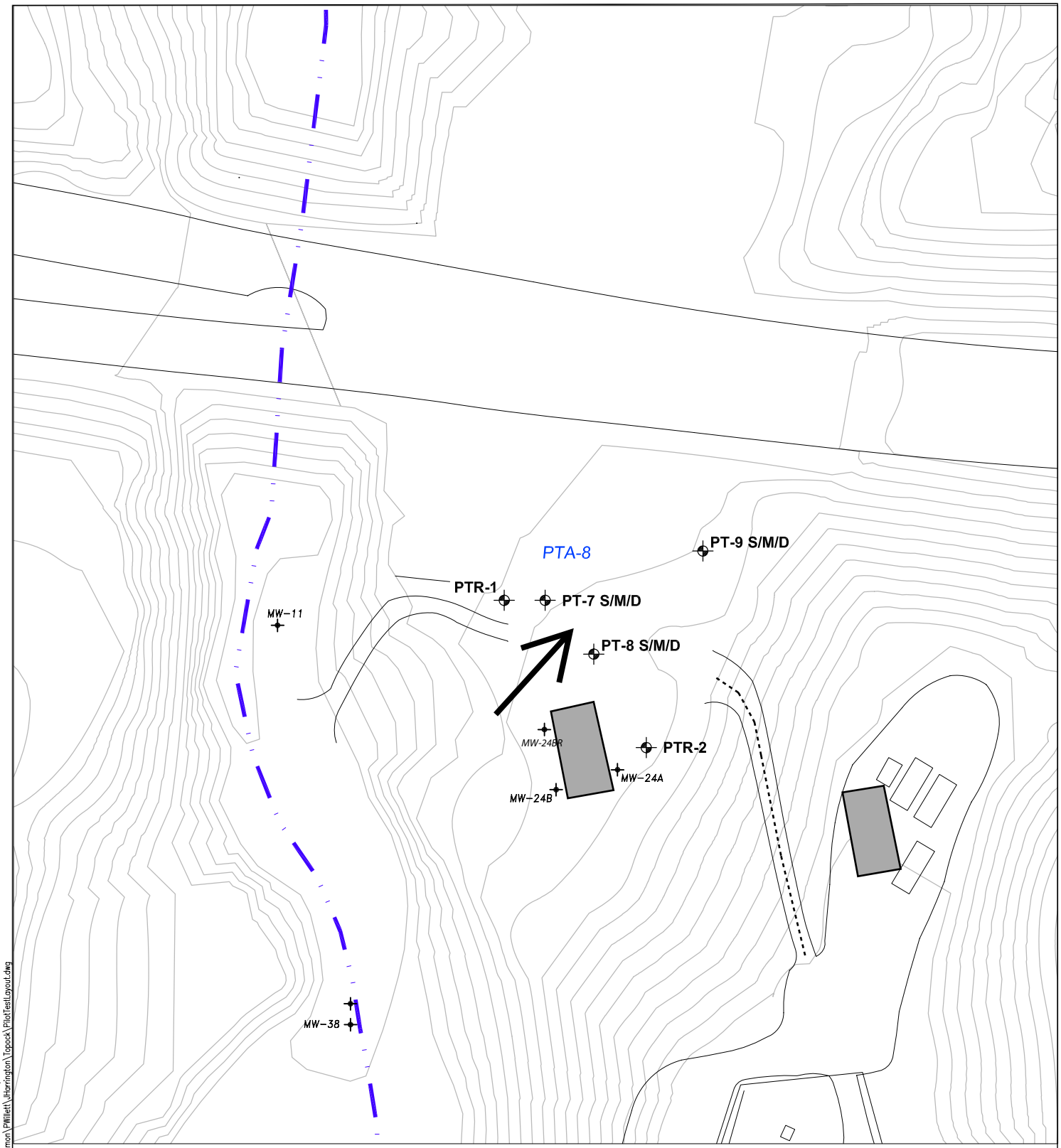
NEEDLES, CALIFORNIA

PROJECT MANAGER	DEPARTMENT MANAGER
AJ	MPK
DRAWN	CHECKED
JWR	JE
PROJECT NUMBER	DRAWING NUMBER
RC000689.0001	7



Source: MWH Draft In-Situ Hexavalent Chromium Reduction Pilot Test Work Plan, Upland Plume Treatment, 2006.

Legend

- Monitoring Well Locations
- Extraction Well Locations
- Recirculation Well Locations
- Groundwater Flow Direction
- Access Route to Pilot Test Area
- Potential Staging Areas

0 FEET 100
SCALE

N

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User Name : PWillett

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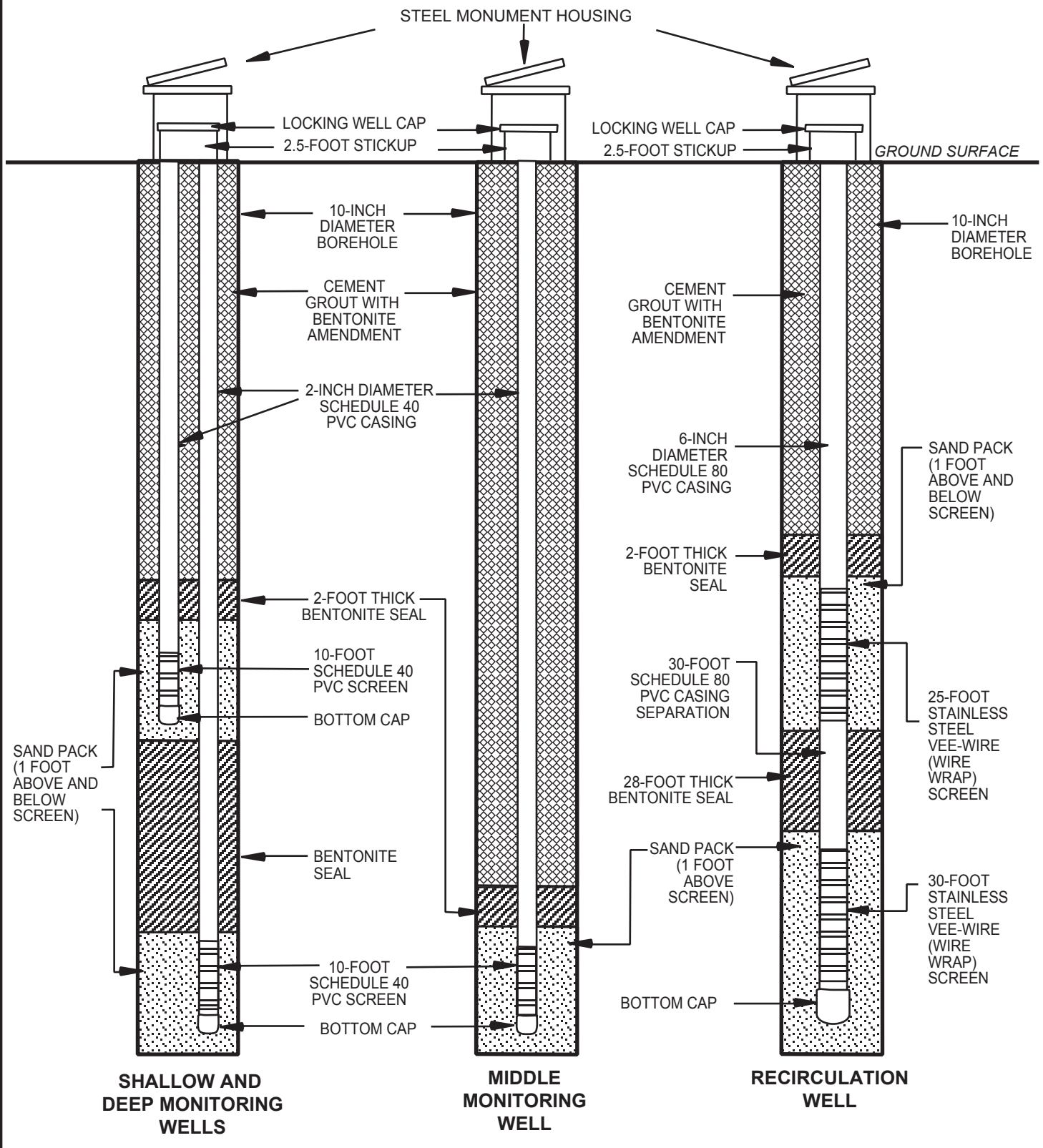
PILOT TEST LAYOUT
PLAN VIEW
UPLAND AREA

PG&E TOPOCK FACILITY
NEEDLES, CALIFORNIA

Project Number: RC000689.0001

Figure: 8



(DIAGRAMS NOT TO SCALE)

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Drawing Date: 28 SEP 06	Drawn By: M. CHIU

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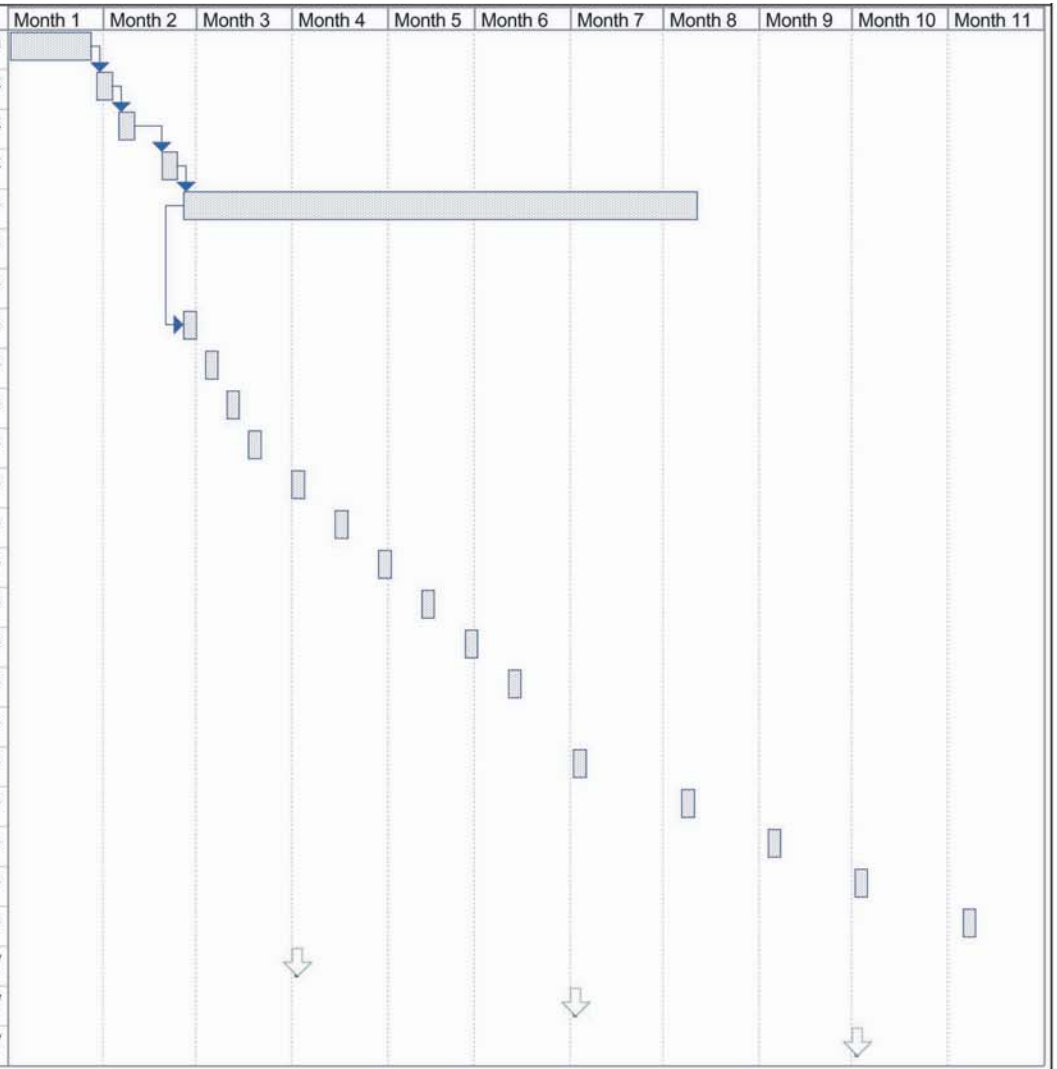
TYPICAL WELL CONSTRUCTION DIAGRAM
PG&E TOPOCK FACILITY
NEEDLES, CALIFORNIA

Project Number: RC000689.0001

Figure: 9

Path\Name : G: Projects-Active\PG&E MSA\Topock\Draft Reports\Upland Work Plan\Fig 9.ai

ID	Task Name	Duration
1	Well Installation	1 mon
2	Installation of pilot test equipment	1 wk
3	Baseline Sampling Event 1	1 wk
4	Baseline Sampling Event 2	1 wk
5	Injection/recirculation of the organic substrate	6 mons
6	**Groundwater Monitoring - Post Injection**	**184 days**
7	**Weekly Monitoring**	**79 days**
8	Weekly Monitoring Week 1	4 days
9	Weekly Monitoring Week 2	4 days
10	Weekly Monitoring Week 3	4 days
11	Weekly Monitoring Week 4	4 days
12	Weekly Monitoring Week 6	4 days
13	Weekly Monitoring Week 8	4 days
14	Weekly Monitoring Week 10	4 days
15	Weekly Monitoring Week 12	4 days
16	Weekly Monitoring Week 14	4 days
17	Weekly Monitoring Week 16	4 days
18	**Monthly Monitoring**	**94 days**
19	Monthly Monitoring Month 5	4 days
20	Monthly Monitoring Month 6	4 days
21	Monthly Monitoring Month 7	4 days
22	Monthly Monitoring Month 8	4 days
23	Monthly Monitoring Month 9	4 days
24	Quarterly Report Month 3	1 day
25	Quarterly Report Month 6	1 day
26	Quarterly Report Month 9	1 day



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Date\Time : Fri, 28 Jul 2006 – 1:25pm
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Drawing Date	**Drawn By**
28 JUL 06	M. CHIU

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UPLAND IN SITU PILOT TEST SCHEDULE
PG&E TOPOCK FACILITY
NEEDLES, CALIFORNIA

Project Number
RC000689.0001

Figure
10

Appendix A

ARCADIS Experience Matrix

Appendix E
Biological Data and Reports

USE OR DISCLOSURE OF DATA CONTAINED ON THIS SHEET IS SUBJECT TO
THE RESTRICTION ON THE TITLE PAGE OF THIS PROPOSAL.

Pacific Gas and Electric Company®

Yvonne J. Meeks
Site Remediation - Portfolio Manager
Environmental Affairs

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805.546.5243
Internal: 664.5243
Fax: 805.546.5232
Internet: YJM1@pge.com

October 12, 2005

Cathy Wolff-White
United States Bureau of Land Management
Program Director
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406

Subject: Biological Resources Survey Report for the Area of Potential Effect
Pacific Gas and Electric Company - Topock Project

Dear Ms. Wolff-White:

This letter transmits the *Biological Resources Survey Report for the Area of Potential Effect, Expanded Groundwater Extraction and Treatment System* at the Pacific Gas and Electric Company (PG&E) Topock site. This report was prepared in conformance with the BLM Action Memo signed September 17, 2004.

Future project related activities may occur within a larger footprint than the current Interim Measures; this area is identified as the Area of Potential Effect (APE). In consultation with the DTSC and Bureau of Land Management (BLM), approximately 1,800 acres is the proposed maximum APE. This report documents the biological resources survey that was conducted to identify federally listed species and potential project constraints within the APE. The survey results will be used as a planning tool for future project related activities to avoid, reduce, and mitigate potential impacts to sensitive biological resources and identify appropriate regulatory permits.

Please do not hesitate to call if you have any questions. I can be reached at (805) 546-5243.

Sincerely,

Teri Henson
for Yvonne Meeks

cc: John Earle, USFWS
Doug Adams, BLM
Arturo Delgado, CDFG
Yvonne Meeks, PG&E
Bob Doss, PG&E
Curt Russell, PG&E
Robert Knutson, PG&E

Biological Resources Survey Report For the Area of Potential Effect (APE) Topock Compressor Station Expanded Groundwater Extraction and Treatment System Needles, California

Prepared for

United States Bureau of Land Management

United States Fish and Wildlife Service

California Department of Fish and Game

on behalf of

Pacific Gas and Electric Company

October 2005

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, California 94612

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2 USACE Jurisdictional Waters and Wetlands
3 Special Status Wildlife Survey Boundary

Appendices

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B Photographs: Waters of the U.S.
C Photographs: Wetlands
D Wetlands Delineations Forms
E Southwestern Willow Flycatcher Report
F USFWS Clapper Rail Data
G Desert Tortoise Report

Acronyms and Abbreviations

AGFD	Arizona Game and Fish Department
APE	Area of Potential Effect
BLM	United States Bureau of Land Management
BNSF	Burlington Northern Santa Fe
CDFG	California Department of Fish and Game
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
DTSC	California Department of Toxic Substances Control
EPA	Environmental Protection Agency
FESA	Federal Endangered Species Act
GIS	Geographic Information System
GPS	Global Positioning System
HNWR	Havasu National Wildlife Refuge
MBTA	Migratory Bird Treaty Act
OHWM	Ordinary High Water Mark
PG&E	Pacific Gas and Electric Company
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SCS	Soils Conservation Service
SP	Soil Test Pits
SUP	Special Use Permit
SWCA	Steven W. Carothers and Associates
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USC	United States Code
USFWS	United States Fish and Wildlife Service
WDM	Wetland Delineation Manual
WTI	Wetland Training Institute

1.0 Introduction

1.1 Project Description

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). In a letter dated June 30, 2004, DTSC directed PG&E to implement Interim Measures for hydraulic control of the plume boundaries in the Colorado River floodplain and management of extracted groundwater. Future project related activities may occur within a larger footprint identified as the Area of Potential Effect (APE). In consultation with the DTSC and Bureau of Land Management (BLM), approximately 1,800 acres is the proposed maximum APE.

1.2 Project Location

The APE is located near Needles, California. Agriculture and public lands dominate the area. The APE includes the 100-acre property owned by PG&E (San Bernardino County Assessor's Parcel No. 650-151-06). Surrounding land is also owned and managed by a number of federal and regional agencies including the BLM, United States Fish and Wildlife Service (USFWS), United States Bureau of Reclamation (USBR), and San Bernardino County. Access to the APE is via I-40 that links Barstow, California and Topock, Arizona. The APE is bordered to the east by the Havasu National Wildlife Refuge (HNWR), to the north by Park Moabi Regional Park, to the south by the railroad and I-40, and to the west by the Chemehuevi Mountains. The general vicinity of the APE is depicted in Figure 1.

1.3 Purpose

The purpose of this report is to document the biological resources survey that was performed to identify federally listed species and potential project constraints within the APE. The survey results will be used as a planning tool for future project related activities to avoid, reduce, and mitigate potential impacts to sensitive biological resources and identify appropriate regulatory permits.

2.0 Federal and State Regulations

2.1 Federal Regulations

The following are the various federal and state regulations, provided here for general information purposes.

- Federal Endangered Species Act (FESA), including the coordination requirement of Section 7 (16 USC §§1531 *et seq.*; 50 Code of Federal Regulations [CFR] Part 402). Section 9 of FESA prohibits the "take" of species federally listed as threatened or endangered. "Take" is further defined to include any harm or harassment, including significant habitat modification or degradation that could potentially kill or injure wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Take" incidental to otherwise lawful activities can be authorized under Section 7 of FESA, where a federal agency is involved.

- Migratory Bird Treaty Act (MBTA) (16 USC 703-712; 50 CFR 10). "Take", as defined by 50 CFR 10.12 under the MBTA, means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound kill, trap, capture, or collect migratory birds or parts thereof.

- The U.S. Army Corps of Engineers (USACE) has jurisdictional authority under the Clean Water Act over "waters of the United States." 33 CFR Section 328.3 defines waters of the United States as waters having current or historic use for interstate or foreign commerce; all interstate waters including interstate wetlands; all other intrastate waters such as lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds; tributaries to any of the aforementioned waters; territorial seas; and wetlands adjacent to waters (other than waters that are themselves wetlands) named above. Waters of the United States are generally described as the area of streambed located below the ordinary high water mark (OHWM) and adjacent or isolated wetlands as defined in the 1987 *Corps of Engineers Wetland Delineation Manual* (WDM) (Environmental Laboratory 1987). Wetlands are defined as:

  > "Those areas that are inundated or saturated by surface or groundwater [*wetland hydrology*] at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation [*hydrophytic vegetation*] typically adapted for life in saturated soil conditions [*hydric soils*]. Wetlands generally include swamps, marshes, bogs, and similar areas." *40 CFR 230.3 and 33 CFR 328*.

  The WDM requires an examination for the presence of indicators of three mandatory diagnostic environmental characteristics. These characteristics, or wetland parameters, are hydrophytic vegetation, hydric soils, and wetland hydrology.

Except in limited instances, the WDM requires that evidence of a minimum of one positive indicator from each of the three mandatory wetland parameters be present for an area to be called a wetland under Section 404 jurisdiction.

- Section 10 of the Rivers and Harbors Appropriations Act of 1899 relate to the protection of navigable water in the U.S. and regulates any construction affecting navigable waters and any obstruction, excavation, or filling. Section 10 requires permits for all structures, such as riprap, and activities, such as dredging, in navigable waters of the U.S. Navigable waters are defined as those subject to the ebb and flow of the tide and susceptible to use in their natural condition or by reasonable improvements as means to transport interstate or foreign commerce. USACE grants or denies permits based on the effects on navigation. Most activities covered under this act are also covered under Section 404 of the CWA. All activities involving navigable waters of the U.S. require a Section 10 permit. Projects must obtain approval of plans for construction, dumping, and dredging permits (Section 10). Agencies involved in the coordination of the Rivers and Harbors Appropriations Act include the U.S. Coast Guard, USACE, the Environmental Protection Agency (EPA), as well as local and state agencies. Section 10 of the Rivers and Harbors Appropriations Act is administered by USACE.

2.2 State Regulations

- California Endangered Species Act (CESA) (California Fish and Game Code §§2050 *et seq.*). Section 2050 of the California Fish and Game Code prohibits any activities that would jeopardize or "take" a species listed as threatened or endangered within the state. CDFG Code §86 'Take' is defined as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill. Projects that have the potential to impact species listed as threatened or endangered by the state may require an Incidental Take Permit from the California Department of Fish and Game (CDFG) under Section 2081 of the Fish and Game code.

- CDFG Code 1600 – Streambed Alteration Agreements (California Fish and Game Code §1600). Section 1600 of the Fish and Game Code regulates the alteration of the bed, bank, or channel of a stream, river, or lake, including dry washes. Generally, CDFG asserts jurisdiction up to the top of significant bank cuts or to the outside of any riparian vegetation associated with a water course. Activities that have the potential to affect jurisdictional areas can be authorized through issuance of a Streambed Alteration Agreement (SAA).

- State Clean Water Act (CWA) – Section 401 of the CWA. Projects requiring a Section 404 permit also require a CWA Section 401 Water Quality Certification issued by the appropriate Regional Water Quality Control Board (RWQCB). Section 401 of the CWA, governed by 33 USC 1341 and 40 CFR 121, requires a water quality certification from the State Board or Regional Board when a project: (1) requires a federal license or permit and (2) will result in a discharge to waters of the United States.

- California Fully-protected Wildlife Species Provisions (California Fish and Game Code§§3511, 4700, 5050, and 5515). These provisions prohibit the taking of fully-protected birds, mammals, amphibians, and fish.
- Birds of Prey Protection Provision (California Fish and Game Code § 3503.5). This provision prohibits the taking of birds of prey, including any birds of the order Falconiformes or Strigiformes, and including nests or eggs of such birds.

3.0 Methodology

3.1 Background Research

Background research of databases, literature, and technical reports was performed and the following agencies/firms were consulted regarding federally listed species in the area: BLM, USBR, USFWS, California Department of Fish and Game (CDFG), Arizona Game and Fish Department (AGFD), and Steven W. Carothers and Associates (SWCA). Several sensitive biological resources were identified including wetlands, waters of the U.S., and federally listed wildlife species. No federally listed plant species were identified during the background search. The federally listed wildlife species potentially occurring within the APE are identified in Table 1. A work plan identifying the APE survey approach was submitted to BLM, USFWS, and CDFG (Appendix A).

Table 1

Federally Listed Wildlife Species Potentially Occurring within APE

Common Name	Scientific Name	Status
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered
Yuma clapper rail	*Rallus longirostris yumanensis*	Endangered
Desert tortoise	*Gopherus agassizii*	Threatened
Colorado pikeminnow	*Ptychocheilus lucius*	Endangered
Bonytail chub	*Gila elegans*	Endangered
Razorback sucker	*Xyrauchen texanus*	Endangered

3.2 Reconnaissance Survey

Upon completion of the background search, a reconnaissance survey was performed to identify areas within the 1,800 acre APE that were: 1) in need of wetlands and waters of U.S. delineation, 2) suitable habitat for the aforementioned listed species, and 3) in need of USFWS protocol surveys. The necessary approvals including a Special Use Permit (SUP) were obtained from the BLM and USFWS to perform the reconnaissance survey on lands managed by these agencies (Appendix A).

3.3 Waters of the United States

Jurisdictional limits of the USACE were delineated in the field using a combination of GPS technology and aerial photographs based on the criteria outlined above in section 2.1. Waters located within the APE were delineated using a Trimble Geo XT Global Positioning System (GPS) unit and photo documented with a digital camera. The GPS data was downloaded into the Geographic Information System (GIS) to plot the delineations on an aerial map. The site was initially surveyed by foot in order to define the potential areas of jurisdiction. Then a more detailed evaluation was undertaken to record channel widths, adjacent vegetation types, hydrology characteristics and soil characteristics.

Drainages including ephemeral washes were mapped in the field. The limit of waters of the U.S. is generally identified as the limits of the OHWM of a stream or drainage as extended by any adjacent wetlands. The Corps also have jurisdiction over isolated wetlands. The OHWM is generally considered to be the highest level to which water flows at least every other year (50 out of 100 years) the OHWM was identified by observing a distinct or subtle bed or bank, or shelving. When more than one level of channel shelving occurred, professional judgment and experience were used to distinguish the OHWM from the low flow channel or the extreme high water mark.

3.4 Wetlands

The wetland delineations were conducted in accordance with the USACE and Wetland Training Institute (WTI) guidelines. Wetlands located within the APE were delineated using a Trimble Geo XT GPS unit and photo documented with a digital camera. The GPS data was downloaded into the GIS to plot the delineations on an aerial map.

A total of 53 wetland sampling points were located within the APE study area. At each sampling point, information on vegetation, soils and hydrology were recorded on data forms. Dominant plant species in each strata that occurred within 20 feet of the sampling point were recorded. Soil pits (SP) were dug to a depth of approximately 13 inches below ground surface. Soils were identified based on criteria established by the Soils Conservation Service (SCS) and described in the WDM. Soils colors were determined using Munsel Soil Color Chart descriptions. Observed ground water levels in the pit, observations of inundation and saturation, observations of drainage patterns and the sample point's landscape position (elevation) were used to determine the presence or absence of wetland hydrology for the sample point.

3.5 Southwestern Willow Flycatcher

The southwestern willow flycatcher presence/absence surveys were conducted in accordance with protocols established by Sogge et al. (1997) and revised by the USFWS (2000). The surveys were performed within approximately 80 acres of potential flycatcher suitable habitat located in the APE. Those areas containing a relatively consistent salt cedar thicket stand were identified as potential suitable habitat. As several *Empidonax* flycatchers look very similar and may pass through the Topock Marsh and Gorge areas of the Colorado River, positive identification of a southwestern willow flycatcher constituted hearing the "fitz-bew" song. All flycatcher detections and non-detections were recorded on standardized data sheets from the USFWS protocol. Call point locations were documented with a GPS unit and mapped using GIS technology.

3.6 Yuma Clapper Rail

Each year, the USFWS and USBR conduct presence/absence surveys for the Yuma clapper rail along the Colorado River and within the Topock Marsh. Yuma clapper rail habitat has been surveyed on the HNWR each year since 1969. All suitable habitat is surveyed, including habitat within the APE. The USFWS plans to continue these monitoring activities. Because Yuma clapper rail surveys will continue to be conducted within suitable habitat of the APE by the USFWS, it was determined that PG&E should not duplicate these efforts. Additional surveys would only increase the disturbance to the Yuma clapper rails within

the APE. The USFWS specifically requested that additional surveys not be conducted for this reason. A letter from the HNWR manager, John Earle, stating this request is provided in Appendix A.

3.7 Desert Tortoise

The desert tortoise presence/absence surveys were conducted in accordance with the USFWS survey protocol (USFWS, 1990b). The surveys were performed within approximately 650 acres of potential desert tortoise suitable habitat located in the APE. The area bound by Park Moabi Road and the Burlington Northern Santa Fe (BNSF) railroad has been previously surveyed (CH2M HILL 2004). Additionally, those areas that are previously disturbed and no longer considered suitable habitat were not included in the survey area (e.g.; PG&E compressor station and holding ponds, Moabi Regional Park, I-40 freeway, and BNSF railroad). Zone of Influence transects were not performed due to natural and man-made barriers to the desert tortoise outside the full coverage survey area. All tortoise sign (live tortoises, carcasses, scats, burrows, etc.) detected within the APE were documented using the standardized field forms. Locations of live tortoises, carcasses, and burrows were documented with a GPS unit and mapped using GIS technology.

3.8 Colorado Pikeminnow, Bonytail Chub, and Razorback Sucker

Due to very low abundance within the lower Colorado River, presence/absence surveys were not performed for these listed fish species. Similar to the other listed species, a literature review was performed. Presence/absence of these fish species within the APE was based solely on the literature review.

4.0 Results

4.1 Waters of the United States

Several intermittent drainages were documented as occurring within the APE. Figure 2 depicts the delineations within the APE. Photographs of the waters of U.S. are located in Appendix B. The drainages are primarily precipitation-driven systems that appear to flow only in response to rainfall events, and are tributaries to the Colorado River. The upper reaches of the drainages are primarily dominated by upland vegetation including creosote bush (*Larrea tridentata*), beavertail cactus (*Opuntia basilaris*), palo verde (*Cercidium* sp.), and allscale saltbush (*Atriplex polycarpa*). Salt cedar (*Tamarix* sp), cat-claw acacia (*Acacia greggii*), honey mesquite (*Prosopis glandulosa*), and screwbean mesquite (*Prosopis pubescens*) occur near their confluence with the Colorado River. These drainages have bed and bank connection to jurisdictional waters of the U.S.; therefore, the intermittent drainages fall under the jurisdiction of USACE.

Table 2 shows the extent of USACE jurisdiction within the APE. Table 2 also summarizes the delineated areas by habitat type.

Table 2

USACE Jurisdictional Drainages within the APE

	Total In APE (Acres)	**Type of Drainage**	
		Ephemeral Drainage	Navigable Waters
USACE Jurisdictional Drainages	**239.88**	71.07	168.81

4.2 Wetlands

Several wetlands were delineated along the Colorado River. Figure 2 depicts the delineations within the APE. Photographs of the wetlands are located in Appendix C. The standardized wetland delineation field forms are located in Appendix D.

The Colorado River is the primary aquatic habitat located approximately 1,300 feet east of the Topock Compressor Station. Little to no submergent vegetation exists within the river. However; fringe wetlands and adjacent wetlands associated with the Colorado River and where groundwater contributes directly to hydrology occur as small patches of emergent vegetation along or near the banks. Wetland vegetation consists primarily of common reed (*Phragmites communis*), cattails (*Typha* sp.), sedges (*Carex* sp.), and bulrush (*Scirpus* sp.). Several of these wetland patches are located at the confluence of Bat Cave Wash, near Moabi Regional Park, and below the I-40 over crossing. A large marsh also exists along the eastern

bank of the peninsula near the Topock Marina. The Topock Marsh, located northeast of the study area within the HNWR, provides important aquatic marsh and riparian habitat in the local vicinity.

Table 3 shows the extent of USACE wetland jurisdiction within the APE. Table 3 also summarizes the delineated areas by habitat type.

Table 3

USACE Jurisdictional Wetlands within the APE

	Total In APE (Acres)	**Type of Wetland**	
		Fringe Wetlands	Adjacent Wetlands
USACE Jurisdictional Wetlands	**4.11**	2.05	2.06

4.3 Southwestern Willow Flycatcher

The report documenting the 2005 survey results is located in Appendix E. Figure 3 depicts the survey area for this species. One possible southwestern willow flycatcher was detected along the California side of the APE near Moabi Regional Park. Although the bird was visually identified as a southwestern willow flycatcher, the distinctive "fitz-bew" call required for positive identification was not heard. This bird was possibly a transient since there were no subsequent detections of this species. Other than this single observation, no other flycatchers were seen or heard during the protocol survey of the APE.

4.4 Yuma Clapper Rail

The USFWS data documenting the 2004 survey results is located in Appendix F. Figure 3 depicts the survey area for this species. Several call stations within the APE have been surveyed annually for Yuma clapper rail. In 2004, 36 individuals were detected in the Topock Marsh. In past years, including 2004, this species has been detected south of the new south dike and north of the Topock Marina which is located within the APE. Additionally, the USBR monitors Yuma clapper rail habitat on lands in which it administers with the nearest detections occurring in Topock Gorge, south of the APE. Survey data is on file at the HNWR office in Needles, California and the USFWS Ecological Services office in Phoenix, Arizona.

4.5 Desert Tortoise

The report documenting the 2005 survey results is located in Appendix G. Figure 3 depicts the survey area for this species. No live desert tortoises were detected within the survey area. However, a disarticulated desert tortoise carcass was observed. The desert tortoise carcass indicates historical use of the area; however, no live desert tortoises, scats, tracks, or other evidence of recent use was observed. Burrows with entrances large enough to accommodate a desert tortoise were also observed during the surveys. The possible desert tortoise burrows had no scat, tracks, or other signs within or surrounding the burrows and were

likely created by a black-tailed jackrabbit or one of the other small burrowing mammal species that were observed during the survey.

4.6 Colorado Pikeminnow, Bonytail Chub, and Razorback Sucker

The Colorado pikeminnow is considered extirpated from the lower Colorado River.

Figure 3 depicts the area that the razorback sucker may occur within the APE. Extinction of the razorback sucker in the wild throughout the historic range is being forestalled by stocking of sub-adult fish into the remaining wild populations. Where natural recruitment is occurring, it is not known if the current level of recruitment will sustain the existing population levels. Where recruitment is not occurring, loss of the remaining wild populations is expected. Studies on the two populations where natural recruitment has been documented (Lake Mead and the Green River) are ongoing to obtain additional information that may be useful for future management that could provide for self sustaining populations.

Figure 3 depicts the area that the bonytail chub may occur within the APE. Extinction of the bonytail chub in the wild throughout its historic range is being forestalled by the stocking of sub-adult fish into the Upper Colorado River Basin and lakes Mohave and Havasu in the Lower Colorado River. These stockings are intended to create populations of young adults that may be expected to persist for 40 to 50 years. While it is expected that these young adults will reproduce, the successful recruitment of wild born young fish to the population may not occur without additional management of habitat and biological factors. Management and research on these populations will be critical to provide for the survival and recovery of the species.

5.0 Conclusion

5.1 Waters of the United States

Based on the survey results, it is concluded that Waters of U.S. are present in the APE. Dredge and fill activities that have the potential to alter drainages can be coordinated with the appropriate USACE, RWQCB, and CDFG offices before action is taken to determine any necessary permitting and mitigation ratios.

5.2 Wetlands

Based on the survey results, it is concluded that wetlands are present in the APE. Activities that have the potential to impact or alter wetland resources can be coordinated with the appropriate USACE, RWQCB, and CDFG offices before action is taken to determine any necessary permitting and mitigation ratios.

5.3 Southwestern Willow Flycatcher

Based on the survey results, it is concluded that the southwestern willow flycatcher may be present in the APE. The Topock Marsh supports breeding populations and is an important breeding and recovery habitat area for this species. Additionally, the Colorado River has been identified as a local riparian corridor for this species. Migrants may roost and forage within the APE, but are not expected to nest based on past surveys that indicate flycatchers are selecting the higher quality habitat at the Topock Marsh to the northeast of the APE. Activities that have the potential to impact this listed species can be coordinated with the appropriate USFWS office before action is taken to determine any necessary permitting requirements under FESA.

5.4 Yuma Clapper Rail

Based on the survey results, it is concluded that the Yuma clapper rail is present in the APE. Suitable habitat and species presence is known to occur on the Arizona side of the APE. The California side of the APE does not contain any suitable habitat or records of species presence. The Topock Marsh supports breeding populations and is an important breeding and recovery habitat area for this species. This species may be roosting, foraging, and nesting within the APE. Activities that have the potential to impact this listed species can be coordinated with the appropriate USFWS office before action is taken to determine any necessary permitting requirements under FESA.

5.5 Desert Tortoise

Based on the survey results, it is concluded that the desert tortoise is absent in the APE. Despite the absence of live tortoise observations, there is a possibility that desert tortoises could pass through the survey area. While it is possible that the desert tortoise could migrate into the area through the drainages or from the less rocky, steep terrain west of the survey area, the typical lack of annual vegetation and burrows, combined with the presence of steep rocky slopes of the Chemehuevi Mountains and associated deep drainages, make permanent occupation of the APE unlikely. Additionally, the overall habitat within the area

was relatively poor due to past disturbance and fragmentation by pipeline corridors, roads, Interstate 40, the BNSF railroad, Topock Compressor station, evaporation ponds, and other manmade facilities. Activities that have the potential to impact this listed species can be coordinated with the appropriate USFWS and CDFG offices before action is taken to determine any necessary permitting requirements under FESA and CESA, respectively.

5.6 Colorado Pikeminnow, Bonytail Chub, and Razorback Sucker

Based on the background research results, it is concluded that the pikeminnow is absent from the lower Colorado River. The chub and sucker are on the verge of extinction and stocked fish may be present within the APE. Activities that have the potential to impact these listed species can be coordinated with the appropriate USFWS office before action is taken to determine any necessary permitting requirements under FESA.

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Figures

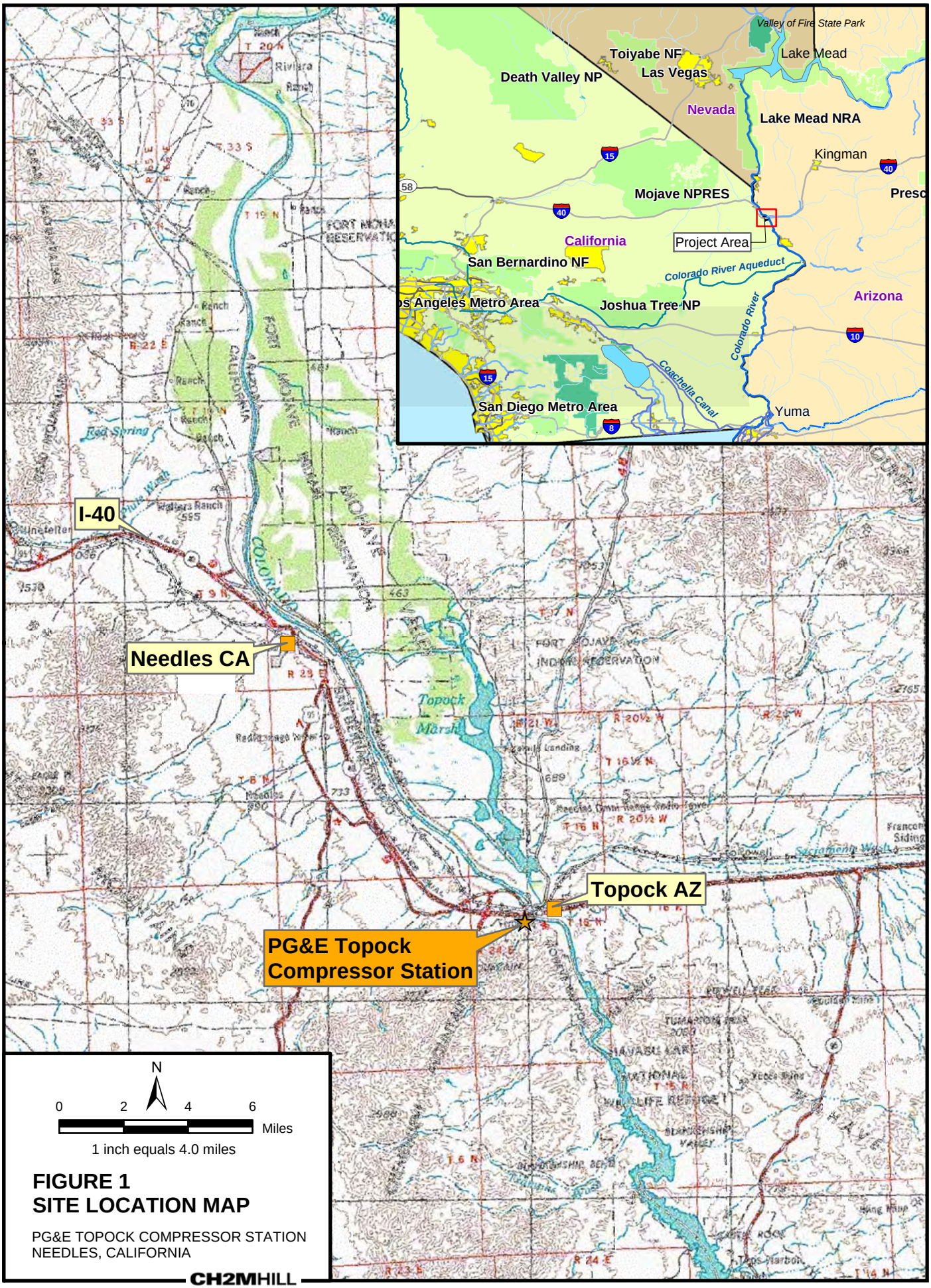

FIGURE 1
SITE LOCATION MAP

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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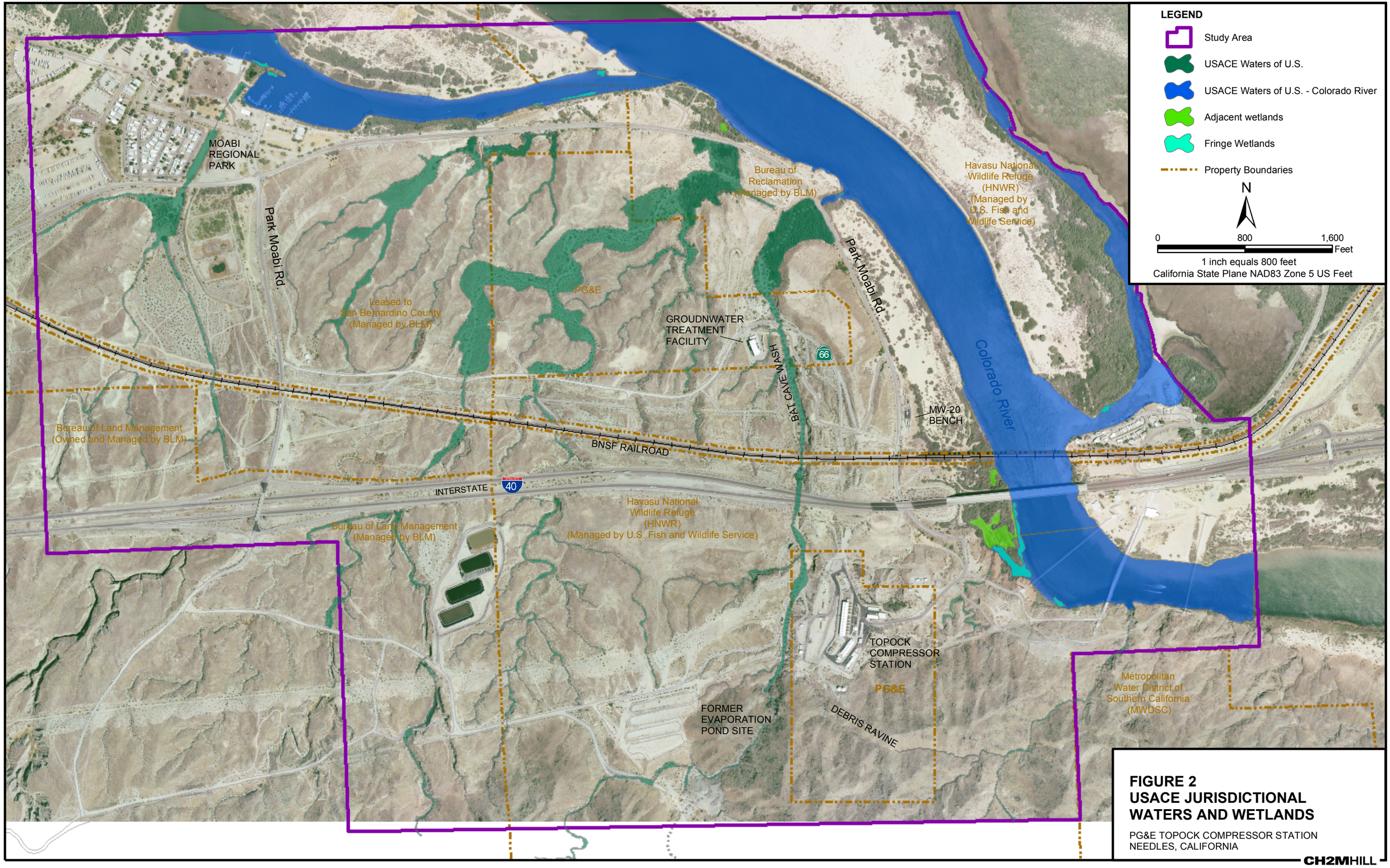

FIGURE 2
USACE JURISDICTIONAL WATERS AND WETLANDS

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

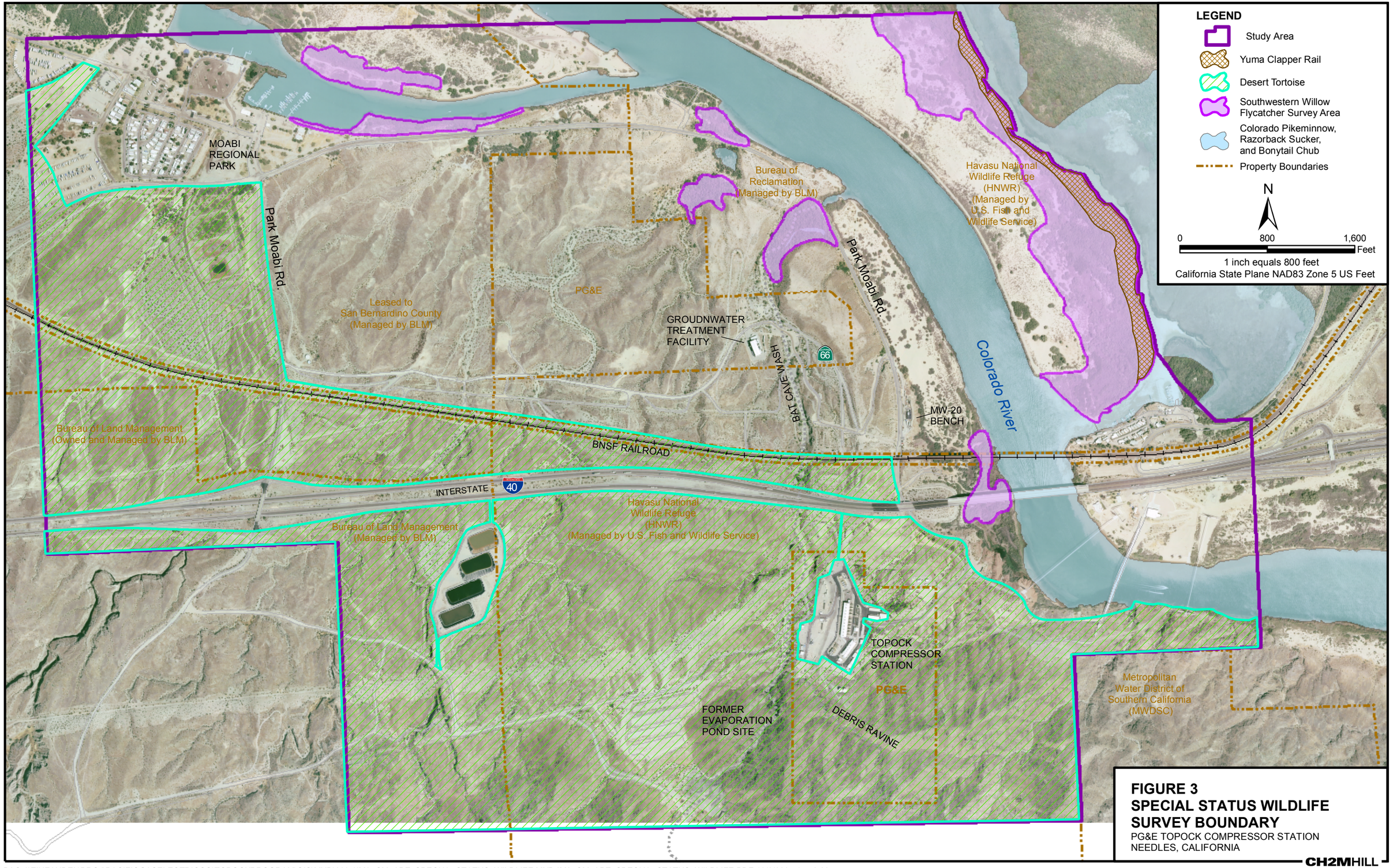

FIGURE 3
SPECIAL STATUS WILDLIFE SURVEY BOUNDARY
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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Appendix A

APE Work Plan

Pacific Gas and Electric Company®

Yvonne J. Meeks
Site Remediation - Portfolio Manager
Environmental Affairs

6588 Ontario Road
San Luis Obispo, CA 93405
Mailing Address
4325 South Higuera Street
San Luis Obispo, CA 93401

805.546.5243
Internal: 664.5243
Fax: 805.546.5232
E-Mail: YJM1@pge.com

March 24, 2005

Mark Howell
Bureau of Land Management
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406

Subject: Work Plan for Special Status Species Survey within the Area of Potential Effect (APE), Topock Compressor Station, Needles, California

Dear Mr. Howell:

This letter transmits the Work Plan for Special Status Species Survey within the Area of Potential Effect (APE) at the Pacific Gas and Electric Company (PG&E) Topock site. The purpose of this memo is to describe the background search, reconnaissance survey, and the proposed biological surveys that will be conducted in potential suitable habitat for special status species located within the APE.

If you have any questions, please do not hesitate to contact Mr. Ray Romero, CH2M HILL Senior Wildlife Biologist.

Sincerely,

Terri Hesson
for Yvonne Meeks

Cc: Arturo Delgado, California Department of Fish and Game
Cc: Jack Allen, U.S. Fish and Wildlife Service
Cc: John Earle, U.S. Fish and Wildlife Service
Cc: Norman Shopay, California Department of Toxic Substances Control

Work Plan for Special Status Species Survey within the Area of Potential Effect (APE)

PG&E Topock Site

Needles, California

PREPARED FOR: Mark Howell/BLM,
Jack Allen/USFWS
Arturo Delgado/CDFG

PREPARED BY: Ray Romero/CH2M HILL

DATE: March 23, 2005

Introduction

Pacific Gas and Electric Company (PG&E) is addressing hexavalent chromium in the groundwater at the Topock Compressor Station under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). PG&E has been directed to expand existing groundwater extraction and management facilities as part of the Interim Measures that are currently being implemented. Any future activities will be conducted as part of the Resource Conservation and Recovery Act (RCRA) Corrective Measures process.

A biological resources survey will be performed to identify special status species, and potential project constraints, within an Area of Potential Effect (APE). In consultation with the DTSC and United States Bureau of Land Management (BLM), approximately 1,800 acres is the proposed maximum APE (Appendix A). The results of the biological resources survey will be synthesized in a report which will be used as a planning tool for future activities to avoid, reduce, and mitigate potential impacts to sensitive resources and identify appropriate regulatory permits. The purpose of this memo is to describe the background search, reconnaissance survey, and the proposed biological surveys that will be conducted in potential suitable habitat for special status species located within the APE.

Scope

Background Search

A background search of databases, literature, and technical reports was performed and the following agencies/firms were consulted regarding sensitive resources in the area: BLM, Bureau of Reclamation (BOR), United States Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), Arizona Game and Fish Department (AGFD), and Steven W. Carothers and Associates (SWCA). Several sensitive resources were identified

including wetlands, waters of the U.S., and special status species. The special status species potentially occurring within the APE are identified in Table 1.

Table 1. Special Status Species Potentially Occurring within the APE

Common Name	*Scientific Name*	Status
Southwestern willow flycatcher	*Empidonax traillii extimus*	ESA-Endangered
Yuma clapper rail	*Rallus longirostris yumanensis*	ESA-Endangered
Desert tortoise	*Gopherus agassizii*	ESA-Threatened
Colorado squawfish	*Ptychocheilus lucius*	ESA-Endangered
Bonytail chub	*Gila elegans*	ESA-Endangered
Razorback sucker	*Xyrauchen texanus*	ESA-Endangered
Flannelmouth sucker	*Catostomus latipinnis*	ESA-Species of Concern

Reconnaissance Survey

Upon completion of the background search, a reconnaissance survey was performed to identify areas within the 1,800 acre APE that are: 1) in need of wetlands and waters of U.S. delineation, 2) suitable habitat for the aforementioned listed species, and 3) in need of USFWS protocol surveys. The necessary approvals were obtained from the BLM and USFWS to perform the reconnaissance survey on lands managed by these agencies.

Wetlands and Waters of U.S.

The wetlands and waters of U.S. delineations were completed during the winter 2004 in accordance with the Army Corp of Engineers (ACOE) and Wetland Training Institute (WTI) guidelines. Wetlands and waters of the U.S. located within the APE were delineated using a Trimble Geo XT Global Positioning System (GPS) unit and photo documented with a digital camera. The GPS data will be downloaded into the Geographic Information System (GIS) to plot the delineations on an aerial map. Wetland data was recorded on standardized field forms. The field forms, photographs, and aerial map will be included in the survey report.

Southwestern willow flycatcher

Since the start of field surveys for the southwestern willow flycatcher (SWFL) on the Lower Colorado River in 1996 by the BOR, detections of SWFLs have been steadily increasing. Topock Marsh within the Havasu National Wildlife Refuge (HNWR) is included in the Lower Colorado River studies. In 2003, 25 individuals were detected at Topock Marsh and 8 individuals were detected in the Topock Gorge region (Koronkiewicz et al. 2004). The APE is located between these two regions and is not included in the BOR's SWFL surveys of the Lower Colorado River.

The SWFL presence/absence surveys will be conducted in accordance with protocols established by Sogge et al. (1997) and revised by the USFWS (2000). The surveys will be

performed within approximately 80 acres of potential SWFL suitable habitat located in the APE (Appendix A). Those areas containing a relatively consistent salt cedar thicket stand were identified as potential suitable habitat. As several *Empidonax* flycatchers look very similar and may pass through the Topock Marsh and Gorge areas of the Colorado River, positive identification of a SWFL will constitute hearing the "fitz-bew" song. The bird will be carefully watched, and the observer will note general behavior, focusing on documenting evidence of breeding, if possible. To minimize any behavioral disturbance, the location will be estimated on aerial photographs showing the point of initial detection, direction of movement while the bird is observed, and approximate locations of singing perches. All SWFL detections will be recorded on standardized data sheets from the USFWS protocol. Negative survey data will be recorded in the same manner. These data sheets will be completed daily. If possible, the species will be photographed. The field forms, photographs, and aerial map will be included in the survey report.

Yuma clapper rail

Extensive surveys for the Yuma clapper rail are conducted in the Topock Marsh area of the Lower Colorado River each year by the USFWS and BOR. Yuma clapper rail habitat has been surveyed on HNWR lands each year since 1969. All suitable habitat is surveyed each year, including habitat within the APE. The USFWS plans to continue these monitoring activities in 2005. In 2004, 36 individuals were detected in the Topock Marsh. Additionally, the BOR monitors Yuma clapper rail habitat on lands in which it administers with the nearest detections occurring in Topock Gorge, south of the APE. Survey data is on file at the HNWR office in Needles, California and the USFWS Ecological Services office in Phoenix, Arizona.

Because Yuma clapper rail surveys will continue to be conducted within suitable habitat of the APE by the USFWS, it was determined that PG&E and its contractor (CH2M HILL) should not duplicate these efforts. Additional surveys would only increase the disturbance to the Yuma clapper rails within the APE. The USFWS specifically requests that additional surveys not be conducted for this reason. A letter from the HNWR manager, John Earle, stating this request is attached to this work plan (Appendix B). The survey data will be collected from the respective offices for inclusion into the APE aerial map and the survey report.

Desert tortoise

The desert tortoise presence/absence surveys will be conducted in accordance with the USFWS survey protocol (USFWS, 1990b). The surveys will be performed within approximately 650 acres of potential desert tortoise suitable habitat located in the APE (Appendix A). The area bound by Park Moabi Road and the Burlington Northern Santa Fe (BNSF) railroad has been previously surveyed for the PG&E IM-3 project (CH2M HILL 2004). Additionally, those areas that are previously disturbed and no longer considered suitable habitat are not included in the survey area (e.g.; PG&E compressor station and holding ponds, Moabi Regional Park, I-40 freeway, and BNSF railroad).

Potentially suitable habitat within the APE will be surveyed using belt transects 10 yards or 30 feet wide (full coverage). In some locations, belt transects less or wider than 30 feet wide

may be appropriate. This situation may be appropriate in areas with dense vegetation or steep topography with a slope of greater than 20 percent. Zone of Influence transects will not be performed due to natural and man-made barriers to the desert tortoise outside the full coverage survey area. All tortoise sign (live tortoises, carcasses, scats, burrows, etc.) detected within the APE will be documented using the standardized field forms from the USFWS protocol. These data sheets will be completed daily. Negative survey data will be recorded in the same manner. Locations of live tortoises, carcasses, and burrows will be documented with a GPS unit and mapped using GIS technology. If detected, live tortoises and/or carcasses will be photographed if possible. The field forms, photographs, and aerial map will be included in the report.

Colorado squawfish, bonytail chub, razorback sucker, and flannelmouth sucker

It is anticipated that any potential work activities will not impact the four fish species listed in Table 1. Therefore, a field survey will not be performed and presence will be assumed within the portion of the river located in the APE.

Assumptions

1. Biologists will possess appropriate permits and qualifications to perform the protocol surveys.
2. Biologists possessing a USFWS permit to perform the SWFL surveys will be responsible for all USFWS reporting in accordance with the conditions of their permit.
3. Biologists will not handle desert tortoises, SWFL, or any other listed species.
4. Biologists will possess all necessary field equipment to perform the surveys.
5. Biologists will possess a copy of the USFWS SUP during surveys on HNWR and adhere to the conditions of the permit (Appendix C).

Timing

The SWFL survey will be conducted between May 15 and July 17 in accordance with the USFWS survey protocol. One survey will be conducted between May 15 and May 31, one survey will be conducted between June 1 and June 21, and three surveys will be conducted between June 22 and July 17, 2005.

The desert tortoise surveys will be conducted between March 25 and May 31, 2005 in accordance with the USFWS survey protocol.

Deliverables

A final copy of the survey report will be submitted to USFWS, BLM, and CDFG within 90 days of completion of the field surveys. The report will be written in scientific style to include introduction, study area, methods, results, conclusions, and references. The standardized field forms, photographs, and maps will be attached to the report.

Point of Contact

Please contact Mr. Ray Romero, CH2M HILL Senior Wildlife Biologist, should you have any questions or concerns regarding this work plan. Mr. Romero is currently working at the

Topock project site, so email (ray.romero@ch2m.com) or cell phone (661-609-7257) is best to reach him.

References

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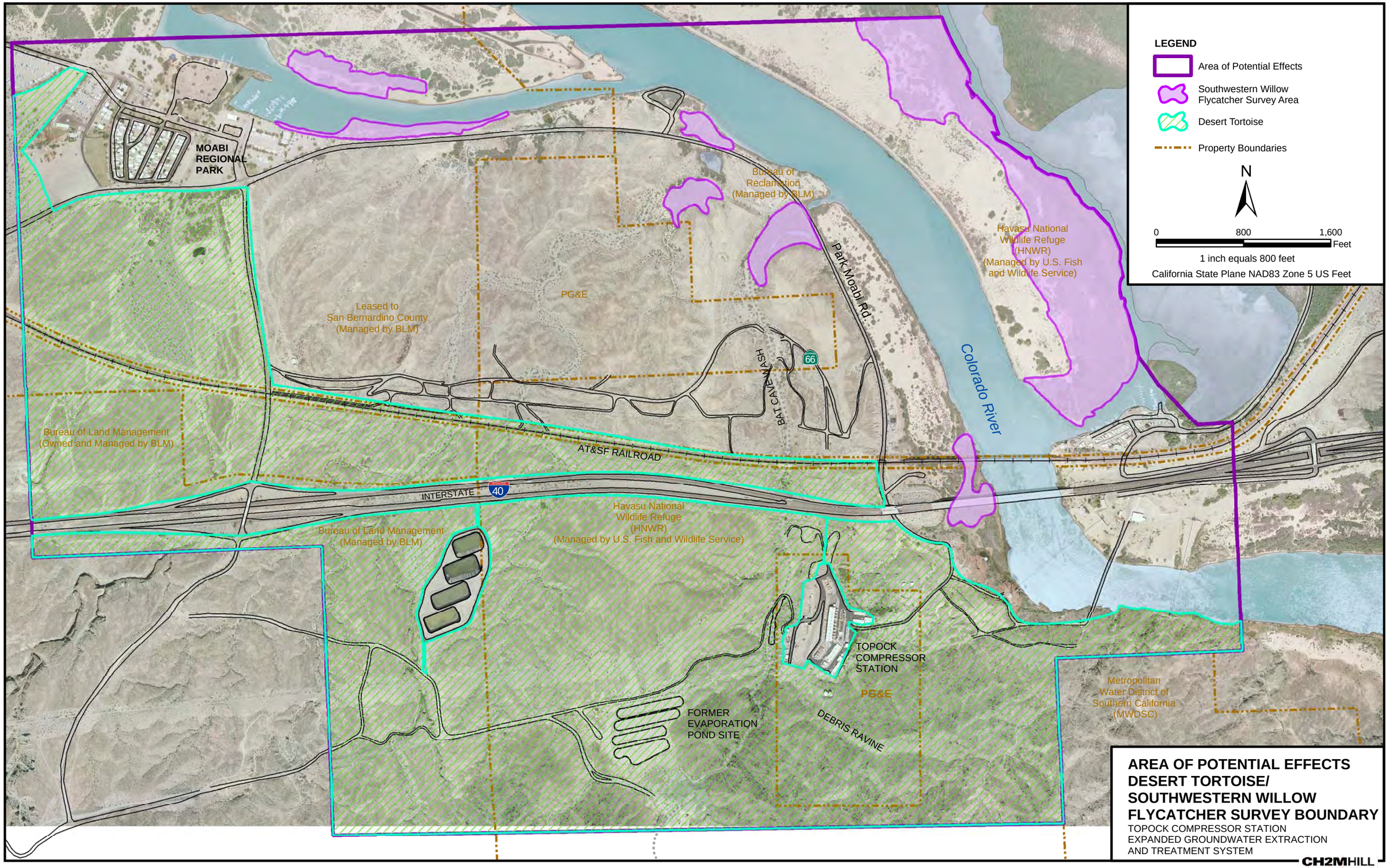
_____. 2002. Reinitiation of Formal Section 7 Consultation on Lower Colorado River Operations and Maintenance - Lake Mead to Southerly International Boundary, Arizona, California and Nevada. April 30, 2002

_____. 2002. Southwestern Willow Flycatcher Recovery Plan. Albuquerque, New Mexico. i-ix + 210pp., Appendices A-O.

_____. 2004. United States Fish and Wildlife Service Threatened and Endangered Species Database. http://ecos.fws.gov/tess_public/TESSWebpageUsaLists?state=AZ.



AREA OF POTENTIAL EFFECTS DESERT TORTOISE/ SOUTHWESTERN WILLOW FLYCATCHER SURVEY BOUNDARY

TOPOCK COMPRESSOR STATION
EXPANDED GROUNDWATER EXTRACTION
AND TREATMENT SYSTEM

CH2MHILL

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U.S. DEPARTMENT OF INTERIOR
FISH AND WILDLIFE SERVICE
Havasu National Wildlife Refuge
P.O. Box 3009
Needles, CA 92363
(760) 326-3853
Fax (760) 326-5745

January 26, 2005

Dear Ms. Herson,

At your request we have cross-referenced a map of the PG&E area of potential effect at the Topock station and Yuma Clapper rail habitat occurring on Havasu National Wildlife Refuge (NWR). Yuma Clapper rail habitat has been surveyed on Havasu NWR lands yearly since 1969. All suitable Yuma Clapper rail habitat is surveyed, including those refuge lands within the PG&E area of potential effect. Havasu NWR will continue to monitor all suitable habitat for Yuma Clapper rails in 2005. Survey data for these years is on file with Havasu NWR and the Ecological Services office in Phoenix, Arizona.

The refuge does not see a need for PG&E or its contractor to duplicate surveys already conducted on refuge lands within the area of potential effect. The refuge specifically requests that additional surveys not be conducted on refuge lands to reduce disturbance to the Clapper rails. Please contact Aimee Haskew, Wildlife Biologist, if further assistance is needed at (760) 326-3853 ext 27.

Sincerely,

John Earle
Refuge Manager

cc: Yvonne Meeks – PG&E

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Havasu National Wildlife Refuge

SPECIAL USE PERMIT

Station No. to be Credited	Permit Number
	78755

Date: 11-23-2004

Period of Use (inclusive)

From 11/23 , 2004

To 12/31 , 2005

Permittee Name	Permittee Address
Yvonne Meeks, Portfolio Manager	CH2M Hill 155 Grand Ave, Ste 1000 Oakland, CA 94064

Purpose (specify in detail privilege requested, or units of products involved)

To permit CH2M Hill, a contractor for PG&E to conduct biological and cultural rresource surveys on Havasu NWR in the area of potential effect (see attached email and map from CH2M Hill).

Description (specify unit numbers; metes and bounds, or other recognizable designations)
See attached map, email from CH2M Hill, and technical memorandum from Ray Romero of CH2M Hill.

Amount of fee _____ if not a fixed payment, specify rate and unit of charge: _____

☒ Payment Exempt -Justification: Cost for administering this permit are being recovered via other methods

☐ Full Payment

☐ Partial Payment -Balance of payments to be made as follows:

Record of Payments

Special Conditions
1. All activities are subject to the laws, regulations, and policies of the U.S. Fish & Wildlife Service, except as allowed by this permit.
2. Permittee assumes all liability for injuries (personal, property, private & publice) resulting from activities authorized by this permit.
3. A copy of this permit will be displayed on the dashboard of each vehicle when on the refuge.
4. Maximum vehicle speed on refuge is 20MPH
5. Havasu NWR will receive copies of all biological and cultural resource reports.

This permit is issued by the U.S. Fish and Wildlife Service and accepted by the undersigned, subject to the terms, covenants, obligations, and reservations, expressed or implied herein, and to the conditions and requirements appearing on the reverse side.

Permittee Signature	Issuing Officer Signature and Title
Ray Romero for Yvonne Meeks	Refuge Manager

Form 3-1383 (Rev. 6/85)

This form was electronically produced by Elite Federal Forms, Inc.

General Conditions

1. *Payments*

All payments shall be made on or before the due date to the local representative of the U.S. Fish and Wildlife Service by a postal money order or check made payable to the U.S. Fish and Wildlife Service.

2. *Use limitations*

The permittee's use of the described premises is limited to the purposes herein specified; does not unless provided for in this permit allow him/her to restrict other authorized entry on to his/her area; and permits to the Service to carry on whatever activities are necessary for (1) protection and maintenance of the premises and adjacent lands administered by the Service and (2) the management of wildlife and fish using the premises and other

3. *Damages*

The United States shall not be responsible for any loss or damages to property including but not limited to growing crops, animals, and machinery; or injury to the permittee, or his/her relatives, or to the officers, agents, employees, or any others who are on the premises from instructions or by the sufferance of the permittee or his/her associates; or for damages or interference caused by wildlife or employees or representatives of the Government carrying out their official responsibilities. The permittee agrees to save the United States or any of its agencies harmless from any and all claims for damages or losses that may arise or be incident to the flooding of the premises resulting from any associated Government river and harbor, flood control, reclamation, or Tennessee Valley Authority activity.

4. *Operating Rules and Laws*

The permittee shall keep the premises in a neat and orderly condition at all times, and shall comply with all municipal, county, and State laws applicable to the operations under the permit as well as all Federal laws, rules, and regulations governing National Wildlife Refuges and the area described in this permit. The permittee shall comply with all instructions applicable to this permit issued by the refuge officer in charge. The permittee shall take all reasonable precautions to prevent the escape of fires and to suppress fires and shall render all reasonable assistance in the suppression of refuge fires.

5. *Responsibility of Permittee*

The permittee, by operating on the premises, shall be considered to have accepted these premises with all the facilities, fixtures, or improvements in their existing condition as of the date of this permit. At the end of the period specified or upon earlier termination, the permittee shall give up the premises in as good order and condition as when received except for reasonable wear, tear, or damage occurring without fault or negligence. The permittee will fully repay the Service for any and all damage directly or indirectly resulting from negligence or failure on his/her part, or the part of anyone of his/her associates, to use reasonable care.

6. *Revocation Policy*

This permit may be revoked by the Regional Director of the Service without notice for noncompliance with the terms hereof or for violation of general and/or specific laws or regulations governing National Wildlife Refuges or for nonuse. It is at all times subject to discretionary revocation by the Director of the Service. Upon such revocation the Service, by and through any authorized representative, may take possession of the said premises for its own and sole use, or may enter and possess the premises as the agent of the permittee and for his/her account.

7. *Compliance*

Failure of the Service to insist upon a strict compliance with any of this permit's terms, conditions, and requirements shall not constitute a waiver or be considered as a giving up of the Service's right to thereafter enforce any of the permit's terms, conditions, or requirements.

8. *Termination Policy*

At the termination of this permit, the permittee shall immediately give up possession to the Service representative, reserving, however, the rights specified in paragraph 9. If he/she fails to do so, he/she will pay the Government, as liquidated damages, an amount double the rate specified in this permit for the entire time possession is withheld. Upon yielding possession, the permittee will still be allowed the reentor as needed to remove his/her property as stated in paragraph 9. The acceptance of any fee for liquidated damages or any other act of administration relating to the continued tenancy is not to be considered as an affirmance of the permittees action nor shall it operate as a waiver of the Government's rights to terminate or cancel the permit for the breach of any specified condition or requirement.

9. *Removal of Permittee's Property*

Upon the expiration or termination of this permit, if all rental charges and/or damage claims due to the Government have been paid, the permittee may within a reasonable period as stated in the permit or as determined by the refuge officer in charge but not to exceed 60 days, remove all structures, machinery, and/or other equipment, etc., from the premises for which he/she is responsible. Within the period the permittee must also remove any other of his/her property including his/her acknowledged share of products or crops grown, cut, harvested, stored, or stacked on the premises. Upon failure to remove any of the above items within the aforesaid period, they shall become the property of the United States.

10. *Transfer of Privileges*

This permit is not transferable, and no privileges herein mentioned may be sublet or made available to any person or interest not mentioned in this permit. No interest hereunder may accrue though lien or be transferred to a third party without the approval of the Regional Director of the U.S. Fish and Wildlife Service and the permit shall not be used for speculative purposes.

11. *Conditions of Permit not Fulfilled*

If the permittee fails to fulfill any of the conditions and requirements set forth herein, all money paid under this permit shall be retained by the Government to be used to satisfy as much of the permittee's obligation as possible.

12. *Official Barred from Participating*

No Member of Congress or Residential Commissioner shall participate in any part of this contract or to any benefit that may arise from it, but this provision shall not pertain to this contract if made with a corporation for its general benefit.

13. *Nondiscrimination in Employment*

The permittee agrees to be bound by the equal opportunity clause of Executive Order 11246, as amended.

Privacy Act Statement--Special Use Permit

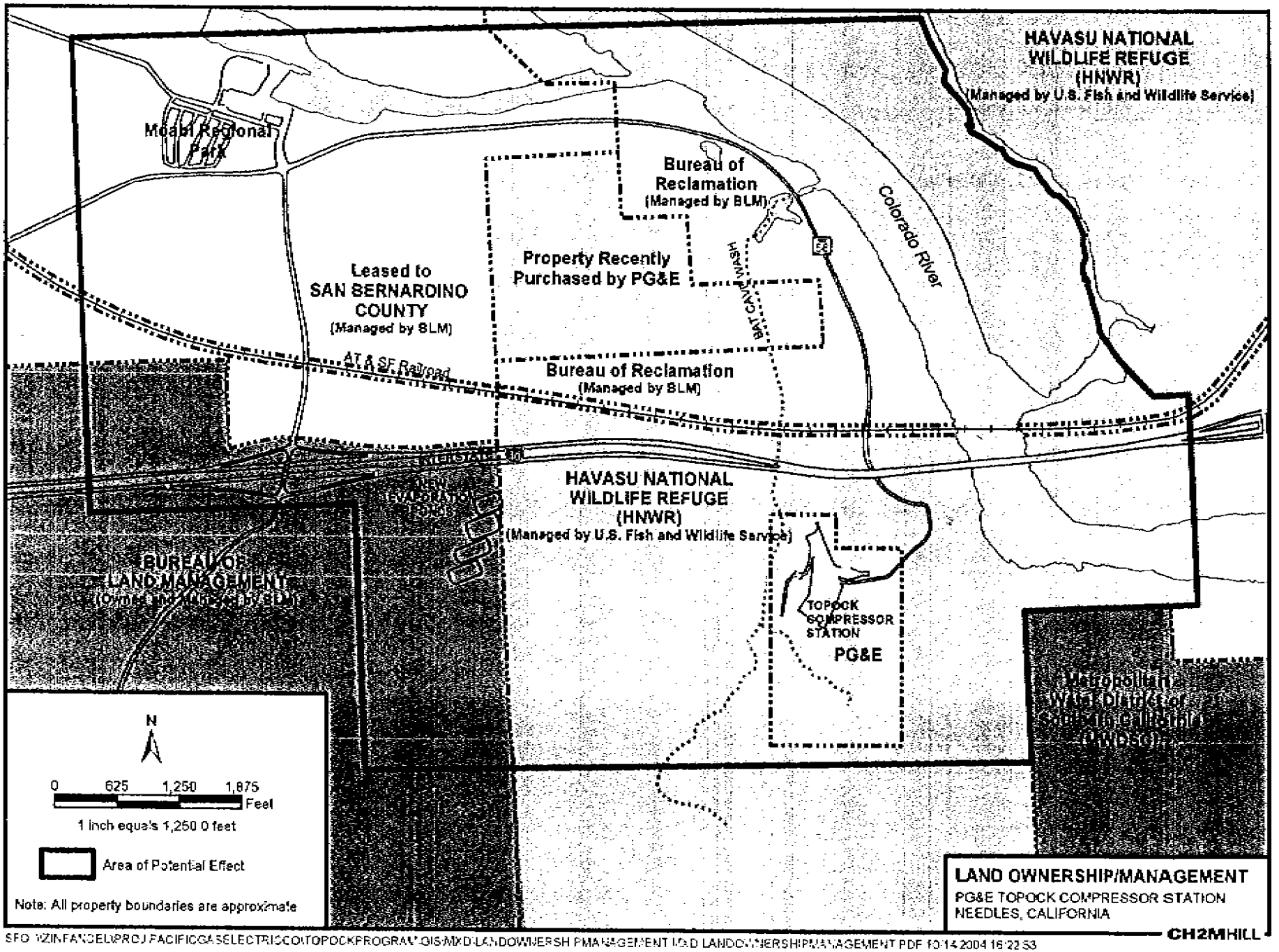
NOTICE: In accordance with the Privacy Act of 1974, 5 U.S.C. 552a, please be advised that:

1. The issuance of a permit and collection of fees on lands of the National Wildlife Refuge System is authorized by the National Wildlife Refuge System Administration Act (16 U.S.C. 668dd - 668ee), and the Refuge Recreation Act, (16 U.S.C. 460k-3); implemented by regulations in 50 CFR 25-36.

2. Information collected in issuing a permit may be used to evaluate and conclude the eligibility of, or merely document, permit applicants.

3. Routine use disclosures may also be made (1) to the U.S. Department of Justice when related to litigation or anticipated litigation; (2) of information indicating a violation or potential violation of a statute, regulation, rule, order or license, to appropriate Federal, State, local or foreign agencies responsible for investigating or prosecuting the violation or for enforcing or implementing the statute, rule, regulation, order or license; (3) from the record of the individual in response to an inquiry from a Congressional office made at the request of that individual; (4) to provide addresses obtained from the Internal Revenue Service to debt collection agencies for purposes of locating a debtor to collect or compromise a Federal claim against the debtor, or to consumer reporting agencies to prepare a commercial credit report for use by the Department (48FR 54716; December 6, 1983).

4. Any information requested is required to receive this permit. Failure to answer questions may jeopardize the eligibility of individuals to receive permits.



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<Smith.Steven@CH2M.com>

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To: <Jack_allen@fws.gov>
cc: <Terri.Herson@CH2M.com>, <Ray.Romero@CH2M.com>, <GGC3@pge.com>, <YJM1@pge.com>
Subject: FW: Cultural Resource Surveys on UFWS Havasu Refuge

Hi Jack,

Thanks for your follow-up regarding the proposed biological and cultural surveys on the USFWS Havasu National Wildlife Refuge (HNWR). Per your request, the information provided below summarizes the activities associated with the proposed surveys. In addition, I have attached a map of the survey area (delineated as "Area of Potential Effect" on the attached pdf file), which includes lands in the HNWR. Our understanding is that USFWS HNWR will issue a special use permit (SUP) to authorize the activities associated with the proposed surveys.

Cultural Resources

The cultural resources work to be performed on the USFWS Havasu Refuge would entail a pedestrian survey employing a crew of three archaeologists, lead by the Field Director, Bruce Gothar. The survey crew will walk parallel transects spaced at 10 meter intervals across the surface of the ground, and any potentially significant cultural resources will be formally documented on California Department of Parks and Recreation Archaeological Site Forms (DPR 523); site maps would be drawn to scale and site photographs would also be taken. No exclusionary fencing will be placed around the identified cultural resources as no impacts to these resources are anticipated. As well, these surveys would not require subsurface testing or disturbances to the existing ground surface. The Applied Earthworks' Principals overseeing all cultural resources work for the Project are: Susan K. Goldberg, M.A., RPA; Melinda C. Horne, M.A. RPA; and M. Colleen Hamilton, M.A. RPA. Cultural Resources work on the USFWS Havasu Refuge would commence immediately upon issuance of the Special Use Permit and is anticipated to be completed by the end of December 2004. A copy of the Archaeological Survey Report, including copies of the DPR 523 records, would be delivered to the USFWS upon completion of the Project.

Biological Resources

Ray Romero of CH2M HILL will lead the effort for biological resource surveys on the USFWS Havasu Refuge. USFWS protocol surveys will be conducted for the desert tortoise, Southwestern Willow Flycatcher, and Yuma Clapper Rail. These surveys generally entail walking transects at specified distances to observe the presence or evidence of sensitive species. In addition, wetland delineation surveys will be conducted where applicable. A more detailed description of the biological surveys is attached.

Please feel free to contact me for any clarifications or questions you have in preparing the SUP.

Thanks very much.

Steven H. Smith, AICP
CH2M HILL
155 Grand Avenue, Suite 1000
Oakland, CA 94612
510/587-7635 (phone)
510/622-9135 (fax)

LandOwnershipManagement.p USFWS Bio Support Memo for Expanded Work Are

TECHNICALMEMORANDUM **CH2MHILL**

PG&E Topock Expanded Work Area Biological Support Overview

PREPARED FOR: Jack Allen/USFWS

PREPARED BY: Ray Romero/CH2MHILL

DATE: November 23, 2004

Objective. The biological survey objective is to identify biological constraints within the proposed expanded work area. The intention is to avoid any adverse impacts to listed species and wetlands within the proposed expanded work area.

Sensitive Resources. It is anticipated that the following sensitive resources will need to be addressed as part of the expanded work area: wetlands, slender-horned spineflower, Colorado squaw fish, bonytail, razorback sucker, flannel mouth sucker, desert tortoise, southwestern willow flycatcher and Yuma clapper rail.

Step 1 - Background Research. Prior to conducting the survey, the following agencies/firms will be consulted regarding sensitive resources in the area and past and current biological resource studies within the proposed expanded work area: BLM, BOR, USFWS, CDFG, AGFD, SWCA, E&E, etc. The USFWS Recovery Plans for the Southwestern Willow Flycatcher, Yuma Clapper Rail, and Desert Tortoise; USFWS Lower Colorado National Wildlife Refuge Management Plan; and BOR Lower Colorado Management Plan will be consulted.

Step 2 - Reconnaissance Survey. Approvals from BLM and USFWS will be sought prior to performing the recon. survey on federal lands. The survey area will be overlaid onto an aerial map. A reconnaissance level survey will be performed to identify: 1) areas in need of wetlands delineation, 2) suitable habitat for the aforementioned listed species, and 3) areas in need of USFWS protocol surveys. This level of effort will involve at least two biologists on foot performing the survey during Winter 2004/05

Step 3 - Wetlands Delineation/Protocol Surveys. Upon completion of the recon. survey, suitable habitat for listed species and wetlands will be plotted on the aerial map. The map and survey methodology will be coordinated with the BLM prior to performing the surveys.

Slender-horned Spineflower and Wetlands. A Spring 2005 pedestrian survey for the spineflower will be performed by at least 2 biologists. Wetlands will be delineated along both banks of the portion of the Colorado River and the spit to Park Moabi Regional Park that is located within the expanded work area by at least 2 biologists. Wetlands and spineflower sightings will be photographed and mapped using GPS/GIS technology.

Colorado Squaw fish, Bonytail, Razorback Sucker, and Flannelmouth Sucker. It is anticipated that the work activities will not impact these fish species. Therefore, a field survey will not be performed, so presence will be assumed within the portion of the river

located in the expanded work area.

Desert Tortoise/ Southwestern Willow Flycatcher/Yuma Clapper Rail. USFWS protocol surveys will be performed to determine presence/absence for these listed species within suitable habitat by 3-5 biologists in Spring 2005. Desert tortoise protocol survey timing is March 25 – May 31. Flycatcher protocol survey timing is May 15 – July 17. Clapper rail protocol survey timing is March 15 – May 15. Attempts will be made to photograph sightings of these species. Locations will be mapped using GPS/GIS technology. Pedestrian transects, calls over a recorder, and possible boat use will be implemented. Qualified biologists will perform the surveys and appropriate permits will be obtained prior to conducting the protocol surveys.

Step 4 - Biological Resources Report. A report will be produced to document the survey methodology and findings once the surveys have been completed. The survey map and photographs will be attached to the report documenting the survey area, wetlands, and sensitive habitats. A copy of the report will be submitted to USFWS, BLM, CDFG, and AGFD.

Appendix B

Photographs: Waters of the United States

Viewing northwest at Batchave Wash just south of I-40

Viewing north at Batcave Wash from Old Route 66

Viewing East at the confluence of Batcave Wash and Colorado River

Viewing southwest at a large unnamed wash west of Batcave Wash just north of Old Route 66

Viewing south at the large unnamed wash at Park Moabi Road.

Appendix C

Photographs: Wetlands

Soil Pit 1: Viewing excavated soil test pit.

Soil Pit 2: Viewing excavated soil test pit.

Soil Pit 3: Viewing excavated soil test pit.

Soil Pit 4: Viewing excavated soil test pit.

Soil Pit 5: Viewing excavated soil test pit.

Soil Pit 6: Viewing excavated soil test pit.

Soil Pit 7: Viewing excavated soil test pit.

Soil Pit 8: Viewing excavated soil test pit.

Soil Pit 9: Viewing excavated soil test pit.

Soil Pit 10: Viewing excavated soil test pit.

Soil Pit 11: Viewing excavated soil test pit.

Soil Pit 12: Viewing excavated soil test pit.

Soil Pit 13: Viewing excavated soil test pit.

Soil Pit 14: Viewing excavated soil test pit.

Soil Pit 15: Viewing excavated soil test pit.

Soil Pit 16: Viewing excavated soil test pit.

Soil Pit 17: Viewing excavated soil test pit.

Soil Pit 18: Viewing excavated soil test pit.

Soil Pit 19: Viewing excavated soil test pit.

Soil Pit 20: Viewing excavated soil test pit.

Soil Pit 21: Viewing excavated soil test pit.

Soil Pit 22: Viewing excavated soil test pit.

Soil Pit 23: Viewing excavated soil test pit.

Soil Pit 24: Viewing excavated soil test pit.

Soil Pit 25: Viewing excavated soil test pit.

Soil Pit 26: Viewing excavated soil test pit.

Soil Pit 27: Viewing excavated soil test pit.

Soil Pit 28: Viewing excavated soil test pit.

Soil Pit 29: Viewing excavated soil test pit.

Soil Pit 30: Viewing excavated soil test pit.

Soil Pit 31: Viewing excavated soil test pit.

Soil Pit 32: Viewing excavated soil test pit.

Soil Pit 33: Viewing excavated soil test pit.

Soil Pit 34: Viewing excavated soil test pit.

Soil Pit35 : Viewing excavated soil test pit.

Soil Pit 36: Viewing excavated soil test pit.

Soil Pit 37: Viewing excavated soil test pit.

Soil Pit 38: Viewing excavated soil test pit.

Soil Pit 39: Viewing excavated soil test pit.

Soil Pit 40: Viewing excavated soil test pit.

Soil Pit 41: Viewing excavated soil test pit.

Soil Pit42 : Viewing excavated soil test pit.

Soil Pit 43 : Viewing excavated soil test pit.

Soil Pit 44: Viewing excavated soil test pit.

Soil Pit 45: Viewing excavated soil test pit.

Soil Pit 46: Viewing excavated soil test pit.

Soil Pit 47: Viewing excavated soil test pit.

Soil Pit 48: Viewing excavated soil test pit.

Soil Pit 49: Viewing excavated soil test pit.

Soil Pit 50: Viewing excavated soil test pit.

Soil Pit 51: Viewing excavated soil test pit.

Soil Pit 52: Viewing excavated soil test pit.

Soil Pit 53: Viewing excavated soil test pit.

Appendix D

Wetlands Delineations Forms

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Ray Romero	Date: 12/16/04 County: San Bernardino State: Calif.
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: WP-1 SP-1 Photo 1

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Common reed	Herb	FACW
2. Slender-leaved baccharis	Shrub	FAC up
3.		
4.		
5.		
6.		
7.		
8.		

Dominant Plant Species	Stratum	Indicator
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50%

Remarks:
~~100%~~ 50% Common reed (Phragmites sp.)
50% Slender-leaved baccharis (Baccharis sp.)

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: _____(in.)

Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:
Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ✓ Drift Lines
- ✓ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ✓ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Evidence of sediment on surface of leaves.

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-6	A	10YR 3/3	5YR 4/6	Common/large	Sandy loam - loamy sand
6-14	A	10YR 3/3			Sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ✓ High Organic Content in Surface Layer in Sandy Soils
- ✓ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)
Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

SITE IS A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Ray Romero	Date: 12/16/04 County: San Bernardino State: Calif.
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-2 WP2 plot2

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Common reed	Herb	Fac W
2. Slender leaved baccharis	Shrub	Fac UP
3. Bulrush	Herb	OBL
4.		
5.		
6.		
7.		
8.		

Dominant Plant Species	Stratum	Indicator
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 66%

Remarks:
69% common reed
1% baccharis
30% bulrush

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water:	0	(in.)
Depth to Free Water in Pit:	6	(in.)
Depth to Saturated Soil:	6	(in.)

Wetland Hydrology Indicators:
Primary Indicators:
- ___ Inundated
- ✓ Saturated in Upper 12 Inches
- ___ Water Marks
- ✓ Drift Lines
- ✓ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____
Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-1	A	10YR 5/3	—	—	Sand
1-7	A	10YR 3/1	—	—	~~Sandy loam~~ loamy sand
7-14	A	10YR 4/1	—	—	Sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ✓ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:
0-1 newly deposited sand at surface.
upper 6" moist throughout.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)
Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Fernandez Jay Romero	Date: 12/16/04 County: San Bernardino State: Calif.
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-3 WP3 MD3

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Common reed	Herb	FACW
2. Tamarisk	tree	FAC
3. Narrow leaved baccharis	shrub	FACU
4.		
5.		
6.		
7.		
8.		

Dominant Plant Species	Stratum	Indicator
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 66%

Remarks: 92% common reed
5% tamarisk
3% baccharis

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: _____ (in.)

Wetland Hydrology Indicators:
Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: HYDROLOGY CRITERIA NOT MET

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-16	A	10YR 6/4	5YR 5/8	many/coarse	Sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	Yes (No)	Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Ray Romero	Date: 12/16/04 County: San Bernardino State: Calif.
Do Normal Circumstances exist on the site? **Yes** No Is the site significantly disturbed (Atypical Situation)? Yes **No** Is the area a potential Problem Area? Yes **No** (If needed, explain on reverse.)	Community ID: ____ Transect ID: ____ Plot ID: SP-4 ~~WP4~~ Photo 4 *

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Common reed	Herb	FACW	9.		
2. narrow leaved baccharis	Shrub	FAC UP	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50%

Remarks:
~~98~~ ~~100%~~ common reed
2% narrow leaved baccharis

HYDROLOGY

✓ Recorded Data (Describe in Remarks): __ Stream, Lake, or Tide Gauge ✓ Aerial Photographs __ Other __ No Recorded Data Available Field Observations: Depth of Surface Water: — (in.) Depth to Free Water in Pit: — (in.) Depth to Saturated Soil: — (in.)	Wetland Hydrology Indicators: Primary Indicators: __ Inundated __ Saturated in Upper 12 Inches __ Water Marks ✓ Drift Lines ✓ Sediment Deposits __ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): __ Oxidized Root Channels in Upper 12 Inches __ Water-Stained Leaves __ Local Soil Survey Data ✓ FAC-Neutral Test __ Other (Explain in Remarks)

Remarks: Sediment on debris.

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-8	A	10YR 5/4	—	—	Sand
8-11	A	10YR 6/2	—	—	Sand
11-16	A	10YR 3/1	—	—	~~Sandy loam~~ loamy sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:
Soil saturated at 11".

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Daytona ID	Date: 12/16/04 County: San Bernardino State: Calif.
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-5 ~~DUP5~~ 71605

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Tamarisk	tree	Fac
2. Arrow weed	shrub	Facw
3.		
4.		
5.		
6.		
7.		
8.		

Dominant Plant Species	Stratum	Indicator
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
Tamarisk - 40%
Arrow weed 60%

HYDROLOGY

Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:
- Depth of Surface Water: _____(in.)
- Depth to Free Water in Pit: _____(in.)
- Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:
Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____
Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-1	O				
1-14	A	10YR 6/4	5YR 6/4	Many, fine, faint	Sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
✓ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	Yes (No)	Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Fernandez Gary Arnold	Date: 2/16/04 County: San Bernardino State: Calif.
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-6 WP6 Photo 6

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Common reed	herb	facw
2. Arrowweed	shrub	facw
3. Tamarisk	tree	fac
4.		
5.		
6.		
7.		
8.		

Dominant Plant Species	Stratum	Indicator
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
60% Common reed 40% Tamarisk
20% arrow weed

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: _____(in.)

Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
✓ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-7	A	10YR 5/3	—	—	Silty sand, very friable
7-14	A	10YR 6/4	7.5YR 5/6	few small faint	sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
✓ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:
high organic content

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks:
NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock
Applicant/Owner: PG&E
Investigator: Robert Fernandez, Doug Romero

Date: 12/16/04
County: San Bernardino
State: Calif.

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID:
Transect ID:
Plot ID: SP-7 WP7

photo 7 – core
photo 8 – pit

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Bulrush (Scirpus sp.)	Herb	Obl.
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
100% Scirpus

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: ~~7~~ (in.)
Depth to Free Water in Pit: 7 (in.)
Depth to Saturated Soil: 7 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
✓ Saturated in Upper 12 Inches
___ Water Marks
✓ Drift Lines
✓ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
✓ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: Soils moist throughout 7"

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-1	A	10YR5/3	—	—	Sand
1-14	A	Gley 1 4/N	—	—	Sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
✓ Sulfidic Odor
___ Aquic Moisture Regime
✓ Reducing Conditions
✓ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)
Is this Sampling Point Within a Wetland? (Yes) No

Remarks: pdugon 1
westbank 9+ feet, rip rap lined

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: RH DR	Date: 6/24/04 County: San Bern. State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-8 ~~JP18~~ JP9&10

8

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Tamarisk	tree	fac 80%	9.		
2. Mesquite	tree	fac up 20%	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 80%

Remarks:
Upward Drainage to CR. No standing water.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
✓ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
✓ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-8	A	10YR 5/3	—	—	Silt loam
8-14	A	10YR 6/3	—	—	Sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	Yes (No)	Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Ray Romero	Date: 12/21/04 County: San Bernardino State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: ____ Transect ID: ____ Plot ID: SP-9 ~~WP 1~~ ~~Poly 2~~ Photo 39 & 40

X

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Scirpus	herb	Obl.	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
100% Scirpus

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: 3 (in.)

Depth to Free Water in Pit: 12 (in.)

Depth to Saturated Soil: 12 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ✓ Inundated
- ✓ Saturated in Upper 12 Inches
- ___ Water Marks
- ✓ Drift Lines
- ✓ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Fringed wetland on shoreline of Colorado River.

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR5/3	—	—	Sand
3-12	A	Gley 1 3/N	—	—	loamy sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ? ✓ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)
Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

SITE IS A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Gay Romero	Date: 12/21/04 County: San Bernardino State: CA
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: ____ Transect ID: ____ Plot ID: SP-10 ~~WP2~~ Photo 41 & 42 12/21/04 WP02 - poly 1

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Scirpus	Herb	Obl.	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: 100% Scirpus
Fringed wetland along shoreline of Colorado River

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
✓ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: 7 (in.)

Depth to Saturated Soil: 7 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
✓ Water Marks
✓ Drift Lines
✓ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
✓ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: Upper 7" moist throughout

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR5/3	—	—	sand
3-14	A	10YR4/2	Gley1 3/N	common/large distinct	loamy sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	
Is this Sampling Point Within a Wetland?	(Yes) No	(Circle)

Remarks:

SITE IS A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Amy Romero	Date: 6/21/04 County: San Bernardino State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: A Transect ID: A Plot ID: SP-11 WP3 pn 43 & 44

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Scirpus	herb	Obl.	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: 100% Scirpus emergent vegetation along south bank. Wetland at confluence of Colorado River & Bat Cave Wash.

HYDROLOGY

✓ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water:	— (in.)
Depth to Free Water in Pit:	3 (in.)
Depth to Saturated Soil:	2 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ✓ Saturated in Upper 12 Inches
- ✓ Water Marks
- ✓ Drift Lines
- ✓ Sediment Deposits
- ✓ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: UPPER 2" WET THROUGHOUT

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____
Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-2"	A	10YR 5/3	—	—	SAND
2-14"	A	GLEY1 3/N	—	—	SAND - LOAMY SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
__/ Sulfidic Odor
___ Aquic Moisture Regime
__/ Reducing Conditions
__/ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

VERY CLEAR WETLAND INDICATORS.

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG & E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ / RAY ROMERO	Date: 12/21/04 County: SAN BERNARDINO State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: ~~WP-4~~ SP-12 Plot ID: PH45 #6

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. SCIRPUS	H	OBL	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: 100% SCIRPUS EMERGENT VEG CONFLUENCE of CO. RIVER & BAT CAVE WASH

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
_X_ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: – (in.)
Depth to Free Water in Pit: 3" (in.)
Depth to Saturated Soil: 3" (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
_✓_ Saturated in Upper 12 Inches
___ Water Marks
_✓_ Drift Lines
_✓_ Sediment Deposits
_✓_ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
_✓_ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-2"	A	10YR 5/3	—	—	SAND
2-14"	A	GLEY1 3/N	—	—	SAND - LOAMY SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)
Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

CLEAR WETLAND INDICATORS.

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Ray Romero	Date: 12/21/04 County: San Bernardino State: CA
Do Normal Circumstances exist on the site? **Yes** No Is the site significantly disturbed (Atypical Situation)? Yes **No** Is the area a potential Problem Area? Yes **No** (If needed, explain on reverse.)	Community ID: ____ Transect ID: ____ Plot ID: SP13 ~~WP5~~ Ph47&48

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Juncus	Herb	obl. 70%	9.		
2. Eleocharis	Herb	obl. 20%	10.		
3. Narrow-leaved Baccharis	~~Herb~~ Shrub	fac. 10%	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks: Small ~~wetland~~ area at southern ~~edge~~ shoreline of BCW.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ✓ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-14	A	10YR 5/3	10YR 4/2	many/lg/distinct	loamy sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:
Mottles appear to be several silt lenses throughout profile.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks:
NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: R&E Topock Applicant/Owner: R&E Investigator: Robert Hernandez Doug Powers	Date: 12/21/04 County: San Bernardino State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP14 WPL N 49 E 50

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Typha	Herb	OBL 50%
2. Distichlis	grass	FAC 32%
3. Baccharis	shrub	FAC 10%
4. Eleocharis	Herb	OBL 5%
5. Juncus	Herb	OBL 3%
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks: Area along south shoreline of BCW. Other grasses could not be identified in field.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-8	A	10YR 4/2	5YR 4/6	many/fine/distinct	silt loam
8-14	A	10YR 5/3	7.5YR 5/6	many/fine/distinct	Sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	~~Yes~~ No (Circle)		(Circle)
Wetland Hydrology Present?	Yes ~~No~~		
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland?	Yes (No)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Ray Romero	Date: 12/21/04 County: San Bernardino State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: Transect ID: Plot ID: SP-15 WP7 ph ~~51&52~~ 55&56

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Typha	Herb	Obl 60%	9.		
2. ~~Baccharis~~ Arrowweed	shrub	facw 35%	10.		
3. Mesquite	tree	facup 1%	11.		
4. Tamarisk	tree	fac 4%	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 75%

Remarks: River otter activity - tracks, ~~da~~ tail drags, slide, Accessing thru culvert under Park Moabi Rd. Coords - 2576389.87 US ft N 7088760.71 US ft E 136.11 msl Nad 83 (UTM coords)

HYDROLOGY

___ Recorded Data (Describe in Remarks): ___ Stream, Lake, or Tide Gauge ✓ Aerial Photographs ___ Other ___ No Recorded Data Available Field Observations: Depth of Surface Water: — (in.) Depth to Free Water in Pit: — (in.) Depth to Saturated Soil: — (in.)	Wetland Hydrology Indicators: Primary Indicators: ___ Inundated ___ Saturated in Upper 12 Inches ___ Water Marks ___ Drift Lines ___ Sediment Deposits ___ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ___ Oxidized Root Channels in Upper 12 Inches ___ Water-Stained Leaves ___ Local Soil Survey Data ✓ FAC-Neutral Test ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-14	A	10YR 5/3	—	—	Sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Ray Romero	Date: 12/21/04 County: San Bern. State: CA
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: Transect ID: Plot ID: SP-16 ~~WP 8~~ ph 57 & 58

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Typha	herb	obl 90%	9.		
2. Arrowweed	shrub ~~facw~~	facw 10%	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
✓ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
✓ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
✓ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-4	O	10YR 4/2	—	—	fine sandy silt
4-14	A	10YR 6/2	7.5YR 5/6	moderate/fine/ distinct	Sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: 0-2" high fiberous root content - Typha filamentous algae at soil surface. Soil mottling present.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

S/G IS A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Raymond	Date: 12/21/04 County: San Bern State: CA
Do Normal Circumstances exist on the site? **Yes** No Is the site significantly disturbed (Atypical Situation)? Yes **No** Is the area a potential Problem Area? Yes **No** (If needed, explain on reverse.)	Community ID: ____ Transect ID: ____ Plot ID: SP-17 WP 9 ph 59860

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Typha	Herb	OBL 50%	9.		
2. Tamarisk	Tree	Fac 20%	10.		
3. Arrowweed	Shrub	FACW 30%	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). ____

Remarks:
upland above typha.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-4	A	10YR 6/3	—	—	Sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	Yes (No)	Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez [illegible]	Date: 12/21/04 County: San Bern. State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: ____ Transect ID: ____ Plot ID: SP-18 ~~WP 10~~ ph 61&62

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Arrowweed	shrub	facw 65%	9.		
2. Tamarisk	tree	fac 10%	10.		
3. Typha	herb	obl. 25%	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-14	A	10YR 6/3	—	—	Sand

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	Yes (No)	Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Bayhomes	Date: 12/21/04 County: San Bern State: CA
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: ____ Transect ID: ____ Plot ID: SP-19 ~~WP11~~ ph 63&64

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Typha	herb	obl ~~[illegible]~~ 80%	9.		
2. Tamarisk	tree	fac 20%	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ✓ Water Marks
- ___ Drift Lines
- ✓ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ✓ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

filamentous algae

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-5	A	10YR 4/2	—	—	fine Sandy Silt
5-7	A	10YR 6/2	7.5YR 5/6	few/sm/distinct	Sand
7-14	A	10YR 5/2	7.5YR 5/6	few/sm/distinct	fin Sandy Silt

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:
Filamentous algae at soil surface
Fibrous roots within first 5".

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks: SITE IS A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Hernandez Raytheon	Date: 12/21/04 County: San Bern. State: CA
Do Normal Circumstances exist on the site? **Yes** No Is the site significantly disturbed (Atypical Situation)? Yes **No** Is the area a potential Problem Area? Yes **No** (If needed, explain on reverse.)	Community ID: Transect ID: Plot ID: SP-20 ~~WP12~~ ph 65 & 66

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Scirpus	herb	obl 25%	9.		
2. Common reed	her	facw 75%	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Area located on South shoreline to Park Moabi Regional Park Marina

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: ~~1~~ 0 (in.)

Depth to Free Water in Pit: 1 (in.)

Depth to Saturated Soil: 1 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ✓ Saturated in Upper 12 Inches
- ✓ Water Marks
- ✓ Drift Lines
- ✓ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ✓ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-4	—	—	—	—	sand/gravel — coarse
4-14	A	2.5Y 5/1	—	—	loamy sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

unconsolidated coarse sand & gravel, potential dredge material
soil pit dug in Scirpus along shoreline.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

SITE IS A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Robert Fernandez Holly Romero	Date: 12/21/04 County: San Bern. State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP21 ~~WP13~~ ph 67&68

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Phragmites	herb	facw 75%	9.		
2. Scirpus	herb	Obl. 25%	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ✓ Water Marks
- ✓ Drift Lines
- ✓ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-2	—	—	—	—	sand/gravel
2-14	A	7.5YR 4/2	60% 7.5YR 3/N	few/sm/distinct	Fine sandy silt
			2.5Y 8/1	few/lg/distinct	
			2.5Y 7/6	few/sm/distinct	

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:
Soil pit dug in Phragmites above shoreline.
Unconsolidated sand & gravel.
Black & white mottling 2-14"

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E @ Topock Applicant/Owner: PG&E Investigator: RH RH	Date: 12/21/04 County: San Bern State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: Transect ID: Plot ID: SP-22 ~~WP 14~~

ph 1 & 2

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Sarpus	Herb	Obl. 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Near marina to Park Moabi

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
✓ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
✓ Drift Lines
✓ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
✓ Water-Stained Leaves
___ Local Soil Survey Data
✓ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

Soil saturated

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-~~Bx~~5		—	—	—	unconsolidated gravel/sand
0.5-3	A	Gley1 3/N	—	—	fine sandy silt
3-14	A	10YR 5/3	2.5Y 6/2	few/lg/faint	clay silt

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: RH RH	Date: 12/21/04 County: San Bern. State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SA-23-WP5 pt 3&4

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Sarcpas	Herb	OBL 100%
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
Palm trees planted in area.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water:	0	(in.)
Depth to Free Water in Pit:	6	(in.)
Depth to Saturated Soil:	2	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ✓ Water Marks
- ___ Drift Lines
- ✓ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ✓ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: 18" culvert draining into area from Park to CR.

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-1	A	2.5Y 4/2	—	—	Silt
1-14	A	6B 4/1 3/N	—	—	fine Sandy Silt

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: RH DR	Date: 12/21/04 County: San Bern State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SD-24 ~~WP 16~~ WP 5&6

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Scirpus	herb	OBL 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Palm trees planted along shoreline.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
✓ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0 (in.)
Depth to Free Water in Pit: 4 (in.)
Depth to Saturated Soil: 3 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
✓ Drift Lines
✓ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
✓ Water-Stained Leaves
___ Local Soil Survey Data
✓ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-4	–	–	–	–	unconsolidated sand/gravel
4-14	A	2.5Y 4/1	–	–	loamy sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)
Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: RH DR	Date: 6/21/04 County: San Bern State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: Transect ID: Plot ID: SP-25 WPT pn 7&8

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Scirpus	herb	OBL	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100 %

Remarks: South shoreline near Park Moabi Marina.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water:	0 (in.)
Depth to Free Water in Pit:	2 (in.)
Depth to Saturated Soil:	1 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ✓ Water Marks
- ✓ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ✓ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-14	A	Gley 1 3/N	—	—	loamy sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:
Pit taken within scirpus along shoreline.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E POPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ	Date: 1-12-05 County: SB State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-26 ~~WRT~~

PHOTO 1 PT 2 STAN

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. SCIRPUS	H	OBL 50%	9.		
2. PHRAGMITES	H	FACW 50%	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)
Depth to Free Water in Pit: 11" (in.)
Depth to Saturated Soil: 8" (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: SOIL WET / MOIST THROUGHOUT

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-.5"	A	10YR 4/2	—	—	SILT
.5-14"	A	GLEY1 3/N	—	—	LOAMY SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: _____ Investigator: ROBERT HANAMOTO	Date: 1/12/05 County: SB State: CA
Do Normal Circumstances exist on the site? ~~Yes~~ No Is the site significantly disturbed (Atypical Situation)? Yes ~~No~~ Is the area a potential Problem Area? Yes ~~No~~ (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: ~~SA27-WA2~~ X PHOTO 1 - PIT 2 - STAND 3 - ADVENTITOUS ROOTS

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. PHRAGMITES	H	FACW 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 100%

Remarks:
- 100% PHRAGMITES.
- ADVENTITOUS ROOTS OBSERVED

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ✓ Saturated in Upper 12 Inches
- ___ Water Marks
- ✓ Drift Lines
- ___ Sediment Deposits
- ✓ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ✓ Other (Explain in Remarks) ADVENTITOUS ROOTS

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-4	O	10YR 3/1	—	—	FINE SANDY SILT
4-14	A	GLEY 1 3/N	—	—	LOAMY SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ✓ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: Investigator: ROBERT HERNANDEZ	Date: 1-12-05 County: SB State: CA
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: Transect ID: Plot ID: SP-28 ~~WP-3~~ PHOTO 6 - PIT 7 STAND

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. NARROW LEAF BACCHARIS	SHRUB		9.		
2. TAMARISK	SHRUB		10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
✓ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: ✓ (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
✓ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-20	A	10YR 5/4	7.5YR 5/8	COMMON/LARGE/DISTINCT	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	Yes (No)	Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: Investigator: ROBERT HENNMOL	Date: 1-12-05 County: SB State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: Transect ID: Plot ID: SP-29 ~~WP-4~~ PH 8 PIT

9 STAND

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. PHRAGMITES	H	FACW 10%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
__/__ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: —— (in.)

Depth to Free Water in Pit: —— (in.)

Depth to Saturated Soil: —— (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
__/__ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
__/__ FAC-Neutral Test
__/__ Other (Explain in Remarks) ADVENTITIOUS ROOTS

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-1.5	O	7.5Y 4/2	—	—	SILT
1.5-18	A	10YR 4/2	7.5YR 5/8	COMMON/SMALL/DISTINCT	LOAMY SAND
18-20	A	GLEY 1 5/N	—	—	LOAMY SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___/ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___/ Gleyed or Low-Chroma Colors
- ___/ Concretions
- ___/ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK
Applicant/Owner:
Investigator: ROBERT HERNANDEZ

Date: 1-13-05
County: San Mohave
State: CA AZ

Do Normal Circumstances exist on the site? Yes (No)
Is the site significantly disturbed (Atypical Situation)? (Yes) No
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID:
Transect ID:
Plot ID: SP-30 WP-1

PHOTO 1 = PIT
2 = STAND

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. SCIRPUS		OBL 75%
2. WILLOW SP		2%
3. ~~SPIKE RUSH~~ JUNCUS		OBL 5%
4.		
5.		
6.		
7.		
8.		

Dominant Plant Species	Stratum	Indicator
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 90%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
_/_ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)
Depth to Free Water in Pit: 11" (in.)
Depth to Saturated Soil: 4" (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
_/_ Saturated in Upper 12 Inches
_/_ Water Marks
_/_ Drift Lines
_/_ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
_/_ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: NORTH AT WEDGE OF TOPOCK MARINA

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____
Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-1	A	10YR 4/2	—	—	Sand
1-8	~~A~~	Clay 1 3/N	—	—	Loamy sand
8-14	A	10YR 4/4	Clay 1 3/N	many, lg distinct	Sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: SOILS MADE UP OF DREDGE MATERIAL

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks: North of Topock Marina

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E Topock Applicant/Owner: PG&E Investigator: Hernandez	Date: 1/13/04 County: Mohave State: AZ
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? (Yes) No Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-31 ~~UPZ~~

photo 3 pit
photo 4 stand

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Scirpus	Obl	93%
2. Willow sp.	FACW	2%
3. Juncus	Obl	5%
4.		
5.		
6.		
7.		
8.		

Dominant Plant Species	Stratum	Indicator
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
✓ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: _____(in.)

Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
✓ Drift Lines
✓ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
✓ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-4	A	10YR 4/2	7.5YR 5/8	few, sm, distinct	Fine sandy silt
4-6	A	10YR 4/2	—	—	Silt
6-14	A	10YR 5/3	7.5YR 5/8	many, lg, distinct	Loamy Sand

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:
SOILS APPEAR TO BE MADE UP OF DREDGED SOILS

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY ROMERO	Date: 1-13-04 County: MOHAVE State: AZ
Do Normal Circumstances exist on the site? Yes (No) Is the site significantly disturbed (Atypical Situation)? Yes (NO) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: ~~SP~~ Plot ID: SP-32

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. ARROWWEED	SHRUB	FACW 70%	9.		
2. WILLOW SP	SHRUB	FACW 30%	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

__✓__ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- __✓__ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: ~~_____~~ (in.)

Depth to Free Water in Pit: ~~_____~~ (in.)

Depth to Saturated Soil: ~~_____~~ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-14	A	10YR 5/4	—	—	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks: LOOSE SAND
SOILS APPEAR TO BE DREDGE MATERIAL

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY ROMERO	Date: 1-13-05 County: MOHAVE State: AZ
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-37

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. SCIRPUS SP	H	OBL 49%	9.		
2. DISTICHLIS SPICATA	H	FACW 5%	10.		
3. JUNCUS	H	OBL 1%	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)

Depth to Free Water in Pit: 11" (in.)

Depth to Saturated Soil: 4' (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ✓ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ✓ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-.5	A	10YR 5/3	—	—	FINE SANDY SILT
0.5-8	A	GLEY1 3/N	—	—	LOAMY SAND
8-14	A	10YR 4/2	—	—	SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:
STRONG WETLAND INDICATORS 0.5-8"

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)
Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY ROMERO	Date: 1-13-05 County: MOHAVE State: AZ
Do Normal Circumstances exist on the site? ~~Yes~~ No Is the site significantly disturbed (Atypical Situation)? Yes ~~No~~ Is the area a potential Problem Area? Yes ~~No~~ (If needed, explain on reverse.)	Community ID: _____ Transect ID: ~~SP-34~~ Plot ID: SP-34

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. NARROW LEAVED - BACCHARIS	SH	FACW 7%
2. TAMARISK	TREE	FAC 20%
3. WILLOW SP	SA	FACW 3%
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

- ✓ Recorded Data (Describe in Remarks):
  - ___ Stream, Lake, or Tide Gauge
  - ✓ Aerial Photographs
  - ___ Other
- ___ No Recorded Data Available

Field Observations:

- Depth of Surface Water: ~ (in.)
- Depth to Free Water in Pit: ~ (in.)
- Depth to Saturated Soil: ~ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:
NO HYDROLOGY

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0/	O	10YR 4/3	—	—	SAND
1-14	A	10YR 6/4	—	—	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:
SOILS APPEAR TO BE DREDGE MATERIAL

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes (No) (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

NOT A WETLAND.

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY ROMERO	Date: 1-13-05 County: MOHAVE State: AZ
Do Normal Circumstances exist on the site? Yes (No) Is the site significantly disturbed (Atypical Situation)? (Yes) No Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: ~~SP-35~~ Plot ID: SP-35

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. ARROWWEED	SH	FACW 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: _____(in.)

Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: NO HYDROLOGY

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR 4/3	—	—	LOAMY SAND
3-14	A	10YR 5/4	—	—	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:
SOILS AREAS TO BE DREDGE MATERIAL

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes (No) (Circle)		(Circle)
Wetland Hydrology Present?	Yes (No)	Is this Sampling Point Within a Wetland?	Yes (No)
Hydric Soils Present?	Yes (No)		

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HOFMANN02 RAY ROMERO	Date: 1-13-05 County: MOHAVE State: AZ
Do Normal Circumstances exist on the site? Yes (No) Is the site significantly disturbed (Atypical Situation)? (Yes) No Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP30

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. ARROWWEED	SA	FACW 40%
2. TAMARISK	TREE	FAC 60%
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: VEGETATION CRITERIA MET

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: ____ (in.)

Depth to Free Water in Pit: ____ (in.)

Depth to Saturated Soil: ____ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: NO HYDROLOGY

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-14	A	10YR 5/4	—	—	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

SOILS APPEAR TO BE MIDDLE NATIONAL.

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)		(Circle)
Wetland Hydrology Present?	Yes (No)	Is this Sampling Point Within a Wetland?	Yes (No)
Hydric Soils Present?	Yes (No)		

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY ROMERO	Date: 1-13-05 County: MOHAVE State: AZ
Do Normal Circumstances exist on the site? Yes (No) Is the site significantly disturbed (Atypical Situation)? (Yes) No Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-37

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. TAMARISK	T	FAC 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		✓
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
VEGETATION CRITERIA MET

HYDROLOGY

___ Recorded Data (Describe in Remarks): ___ Stream, Lake, or Tide Gauge ___ Aerial Photographs ___ Other ___ No Recorded Data Available Field Observations: Depth of Surface Water: _____(in.) Depth to Free Water in Pit: _____(in.) Depth to Saturated Soil: _____(in.)	Wetland Hydrology Indicators: Primary Indicators: ___ Inundated ___ Saturated in Upper 12 Inches ___ Water Marks ___ Drift Lines ___ Sediment Deposits ___ Drainage Patterns in Wetlands Secondary Indicators (2 or more required): ___ Oxidized Root Channels in Upper 12 Inches ___ Water-Stained Leaves ___ Local Soil Survey Data ___ FAC-Neutral Test ___ Other (Explain in Remarks)

Remarks:
NO HYDROLOGY

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-14	A	10YR 5/4	7.5YR 5/8	FEW, LARGE, DISTINCT	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes (No) (Circle)		(Circle)
Wetland Hydrology Present?	Yes (No)	Is this Sampling Point Within a Wetland?	Yes (No)
Hydric Soils Present?	Yes (No)		

Remarks:

NOT A WETLAND.

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK
Applicant/Owner: PG&E
Investigator: ROBERT HERNANDEZ
RAY ROMERO

Date: 1/13/05
County: MOHAVE
State: AZ

Do Normal Circumstances exist on the site? ~~Yes~~ No
Is the site significantly disturbed (Atypical Situation)? Yes ~~No~~
Is the area a potential Problem Area? Yes ~~No~~
(If needed, explain on reverse.)

Community ID: _____
Transect ID: _____
Plot ID: SA-38

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. SALIX SP	~~SHRUB~~	FACW 25%
2. SCIRPUS SP	H	OBL 25%
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
VEGETATION CRITERIA MET

HYDROLOGY

✓ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:
- Depth of Surface Water: ___ (in.)
- Depth to Free Water in Pit: ___ (in.)
- Depth to Saturated Soil: ___ (in.)

Wetland Hydrology Indicators:
Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ✓ Water Marks
- ___ Drift Lines
- ✓ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ✓ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ✓ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:
HYDROLOGY CRITERIA MET

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-1	A	10YR 5/4	—		SAND
1-8	A	10YR 4/1	—		SILT LOAM
8-14	A	10YR 5/4	7.5YR 5/8	MANY; SMALL; DISTINCT	SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

LOW CHROMA

SOIL CRITERIA MET

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)		(Circle)
Wetland Hydrology Present?	(Yes) No		
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland?	(Yes) No

Remarks:

SITE IS A WETLAND

NOTE: BEAVER ACTIVITY IN AREA - CUT DOWN WILLOWS, HUT ACROSS CHANNEL (LEAF SHOWING) TRACKS VISABLE

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY ROMERO	Date: 1-13-05 County: MOHAVE State: AZ
Do Normal Circumstances exist on the site? Yes (No) Is the site significantly disturbed (Atypical Situation)? (Yes) No Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-39

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. TAMARISK	T	FAC 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

✓ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: ____ (in.)

Depth to Free Water in Pit: ____ (in.)

Depth to Saturated Soil: ____ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: NO HYDROLOGY

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-14	A	10YR 4/4	—	—	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks: SOIL CRITERIA NOT MET

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

Is this Sampling Point Within a Wetland? (Circle) Yes (No)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY RAMOND.	Date: 1-13-05 County: MOHAVE State: AZ
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-40

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. SCIRPUS	H	OBL 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: HYDROLOGY CRITERIA NOT

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: ___ (in.)

Depth to Free Water in Pit: ___ (in.)

Depth to Saturated Soil: ___ (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: HYDROLOGY CRITERIA NOT

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10 YR 5/4	7.5YR 5/8	MANY, LAG, DISTINCT	SAND
2-14	A	10 YR 4/1	GLEY 1 3/N	MANY, LAG, DISTINCT	LOAMY SAND
14-16	A	GLEY 1 4/N	—		LOAMY SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:
SOIL CRITERIA MET

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:
SITE IS A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY RUMPLE	Date: 1-13-05 County: MOHAVE State: AZ
Do Normal Circumstances exist on the site? Yes (No) Is the site significantly disturbed (Atypical Situation)? (Yes) No Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: Plot ID: SP-41

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. ARROWWEED	SH	FACW 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
VEGETATION CRITERIA MET

HYDROLOGY

✓ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:
- Depth of Surface Water: _____(in.)
- Depth to Free Water in Pit: _____(in.)
- Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:
Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:
HYDROLOGY NOT MET

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-14	A	10YR 5/4	7.5YR 5/8	FEW, LARGE, DISTINCT	SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

SOIL CRITERIA NOT MET

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	~~Yes~~ No (Circle)		(Circle)
Wetland Hydrology Present?	Yes (NO)		
Hydric Soils Present?	Yes ~~No~~	Is this Sampling Point Within a Wetland?	Yes (No)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY RAMONO	Date: 1-13-05 County: SB State: CA
Do Normal Circumstances exist on the site? ~~Yes~~ No Is the site significantly disturbed (Atypical Situation)? Yes ~~No~~ Is the area a potential Problem Area? Yes ~~No~~ (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: ~~SA-42~~

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. TAMARISK	T	FAC 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
VEGETATION CALTOMIA NOT

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: _____ (in.)

Wetland Hydrology Indicators:
Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: DRY CRACKED SOILS
HYDROLOGY CALTOMIA NOT

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-3	A	2.5Y 6/3	—	—	SILT CLAY
3-9	A	5Y 7/3	2.5Y 6/6	FEW, SMALL, DISTINCT	SILT CLA
9-14	A	5Y 6/3	—	—	CLAY SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

SOIL CRITERIA NOT MET

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	~~Yes~~ No (Circle)		(Circle)
Wetland Hydrology Present?	~~Yes~~ No		
Hydric Soils Present?	Yes (No)	Is this Sampling Point Within a Wetland?	Yes (No)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY ROMERO	Date: 1-13-05 County: SB State: CA
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-43

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. TAMARISK	T	FAC 90%
2. MESQUITE	T	FACU 10%
3.		
4.		
5.		
6.		
7.		
8.		

Dominant Plant Species	Stratum	Indicator
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50%

Remarks:

HYDROLOGY

✓ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ✓ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water:	—— (in.)
Depth to Free Water in Pit:	—— (in.)
Depth to Saturated Soil:	—— (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ✓ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: DRY CRACKED SOILS.
SOIL CAMEDIA MAT

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-7	A	10YR 5/3	7.5YR 4/6	MANY, LARGE, DISTINCT	SILT CLAY.
7-14	A	5Y 6/3	2.5Y 6/6	FEW, SMALL, DISTINCT	SILT CLAY

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

SOIL CRITERIA NOT MET

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	Yes (No)	Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HENNAMOR RAY ROMERO	Date: 1-18-05 County: SB State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP44

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. TAMARISK	T	FAC 60%
2. MESQUITE	T	FACU 20%
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50%

Remarks:

HYDROLOGY

✓ Recorded Data (Describe in Remarks):
- ✓ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: ___ (in.)

Depth to Free Water in Pit: ___ (in.)

Depth to Saturated Soil: ___ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ✓ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: (R4) ~~SOIL~~ CRITERIA MET

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10YR 4/4	—	—	SAND
2-4	A	10YR 4/3	—	—	FINE SANDY SILT

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

SOIL CRITERIA NOT MET

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	~~Yes~~ No (Circle)		(Circle)
Wetland Hydrology Present?	~~Yes~~ No		
Hydric Soils Present?	Yes (No)	Is this Sampling Point Within a Wetland?	Yes ~~No~~

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK
Applicant/Owner: PG&E
Investigator: ROBERT HENNADER
RAY RAMIRO

Date: 7-19-05
County: SB
State: CA

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID: _____
Transect ID: _____
Plot ID: SP-45

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. PHRAGMITES	H	FACW
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: VEGETATION CRITERIA MET.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:
Depth of Surface Water: ___ (in.)
Depth to Free Water in Pit: ___ (in.)
Depth to Saturated Soil: ___ (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: 10" FROM WATER EDGE

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-8	A	10YR 2/1	7.5YR 4/6	MANY, LARGE, DISTINCT	SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:
SOIL CRITERIA MET

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:
SITE IS A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HANNABER RAY ROMERO	Date: 1-19-05 County: SB State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SA-46

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. ARROWWEED	H	FACW 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
VEGETATION CRITERIA MET

HYDROLOGY

(X) Recorded Data (Describe in Remarks):
- ( ) Stream, Lake, or Tide Gauge
- (X) Aerial Photographs
- ( ) Other

( ) No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:
Primary Indicators:
- ( ) Inundated
- ( ) Saturated in Upper 12 Inches
- ( ) Water Marks
- ( ) Drift Lines
- ( ) Sediment Deposits
- ( ) Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ( ) Oxidized Root Channels in Upper 12 Inches
- ( ) Water-Stained Leaves
- ( ) Local Soil Survey Data
- ( ) FAC-Neutral Test
- ( ) Other (Explain in Remarks)

Remarks:
HYDROLOGY CRITERIA NOT MET

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-13	A	10YR 4/4	—	—	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

SOIL CRITERIA NOT MET

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes (No) (Circle)	(Circle)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	Yes (No)	Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HOWARTH RAY ROMERO	Date: 1-19-05 County: SB State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-47

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. PHRAGMITES	H	FACW 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:
VEGETATION CRITERIA MET

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: — (in.)

Depth to Free Water in Pit: — (in.)

Depth to Saturated Soil: — (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: HYDROLOGY CRITERIA MET

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR 4/4	7.5YR 4/6	MAT, LARG, DISTINCT	SAN

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

SOIL CRITERIA MET

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)		(Circle)
Wetland Hydrology Present?	(Yes) No		
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland?	(Yes) No

Remarks:

SITE IS A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HOMMEDIEU RAY ROMERO	Date: 1-19-05 County: SB State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-48

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. ARROWWOOD	SA	FACW 100%
2.		
3.		
4.		
5.		
6.		
7.		
8.		

Dominant Plant Species	Stratum	Indicator
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: VOC CANTONIA MOT

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: _____(in.)

Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: NO HYDROLOGY

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-3	A	10YR 6/4	—	—	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

SOIL CRITERIA NO MET

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes No (Circle)		(Circle)
Wetland Hydrology Present?	Yes (No)		
Hydric Soils Present?	Yes (No)	Is this Sampling Point Within a Wetland?	Yes (NO)

Remarks:

NOT A WETLAND

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY ROMERO	Date: 7-19-05 County: SB State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SD-49

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. SCIRPUS	H	OBL 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

- ✓ Recorded Data (Describe in Remarks):
  - ___ Stream, Lake, or Tide Gauge
  - ✓ Aerial Photographs
  - ___ Other
- ___ No Recorded Data Available

Field Observations:

Depth of Surface Water:	✓ (in.)
Depth to Free Water in Pit:	✓ (in.)
Depth to Saturated Soil:	✓ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ✓ Drift Lines
- ✓ Sediment Deposits
- ✓ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: ~10 FT FROM WATER EDGE
FILAMENTOUS ALGAE

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-0.5	A	10YR 5/3	—	—	FINE SANDY SILT
0.5-8	A	GLEY 1 3/N	10YR 5/3	MANY, LARGE, DISTINCT.	LOAMY SAND
8-10	A	10YR 5/2	—	—	SAND
10-14	A	GLEY 1 3/N	—	—	LOAMY SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ✓ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HERNANDEZ RAY ROMERO	Date: 1-19-05 County: _____ State: _____
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-90

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. SCIRPUS	H	OBL 75%
2. SPIKE RUSH	H	FACW 25%
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: _____ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: SOILS MOIST THROUGHOUT. FILAMENTOUS ALGAE

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____
Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-14	A	10YR 5/3	7.5YR 5/8	MANY, MED, DISTINCT	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: R64E TOPOCK Applicant/Owner: P64E Investigator: ROBERT HERNANDEZ RAY ROMERO	Date: 1-19-05 County: SB State: CA
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: SP-51

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. SCIRPUS	H	OBL 100%	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

- ✓ Recorded Data (Describe in Remarks):
  - ___ Stream, Lake, or Tide Gauge
  - ✓ Aerial Photographs
  - ___ Other
- ___ No Recorded Data Available

Field Observations:

Depth of Surface Water:	_____ (in.)
Depth to Free Water in Pit:	12 (in.)
Depth to Saturated Soil:	10 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ✓ Saturated in Upper 12 Inches
- ___ Water Marks
- ✓ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-2	A	10YR 6/3	—	—	SAND
2-14	A	6GY 7/1	—	—	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)
Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK
Applicant/Owner: PG&E
Investigator: ROBERT HERNANDEZ
RAY ROMERO

Date: 1-19-05
County: SB
State: CA

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID: _____
Transect ID: _____
Plot ID: SD-52

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. TYPHA	H	OBL (FACW)
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

Recorded Data (Describe in Remarks):
- Stream, Lake, or Tide Gauge
- Aerial Photographs
- Other

No Recorded Data Available

Field Observations:
- Depth of Surface Water: _____ (in.)
- Depth to Free Water in Pit: _____ (in.)
- Depth to Saturated Soil: _____ (in.)

Wetland Hydrology Indicators:
Primary Indicators:
- Inundated
- Saturated in Upper 12 Inches
- Water Marks
- Drift Lines
- Sediment Deposits
- Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- Oxidized Root Channels in Upper 12 Inches
- Water-Stained Leaves
- Local Soil Survey Data
- FAC-Neutral Test
- Other (Explain in Remarks)

Remarks: FILAMENTOUS ALGAE

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-7	A	10YR 6/3	GLEY 1 3/N	MANY LARG DISTINCT	SAND
7-14	A	10YR 6/4	—	—	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
__✓ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
__✓ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ~~Yes~~ No (Circle)
Wetland Hydrology Present? ~~Yes~~ No
Hydric Soils Present? ~~Yes~~ No

(Circle)
Is this Sampling Point Within a Wetland? ~~Yes~~ No

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: PG&E TOPOCK Applicant/Owner: PG&E Investigator: ROBERT HOWARD OZ RAY ROMERO	Date: 1-19-05 County: SB State: CA
Do Normal Circumstances exist on the site? ~~Yes~~ No Is the site significantly disturbed (Atypical Situation)? Yes ~~No~~ Is the area a potential Problem Area? Yes ~~No~~ (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: ~~SP~~ 53

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. BLEDHAMIS	H	~~FACW~~ 65%	9.		
2. PHRAGMITES	H	FACW 30%	10.		
3. SCIRPUS	H	OBL 5%	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks.

HYDROLOGY

~~Recorded~~ Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: _____ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: NO HYDROLOGY

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Field Observations

Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.
0-14	A	10YR 6/4	—	—	SAND

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	(Yes) No (Circle)		(Circle)
Wetland Hydrology Present?	Yes (No)	Is this Sampling Point Within a Wetland?	Yes (No)
Hydric Soils Present?	Yes (No)		

Remarks:

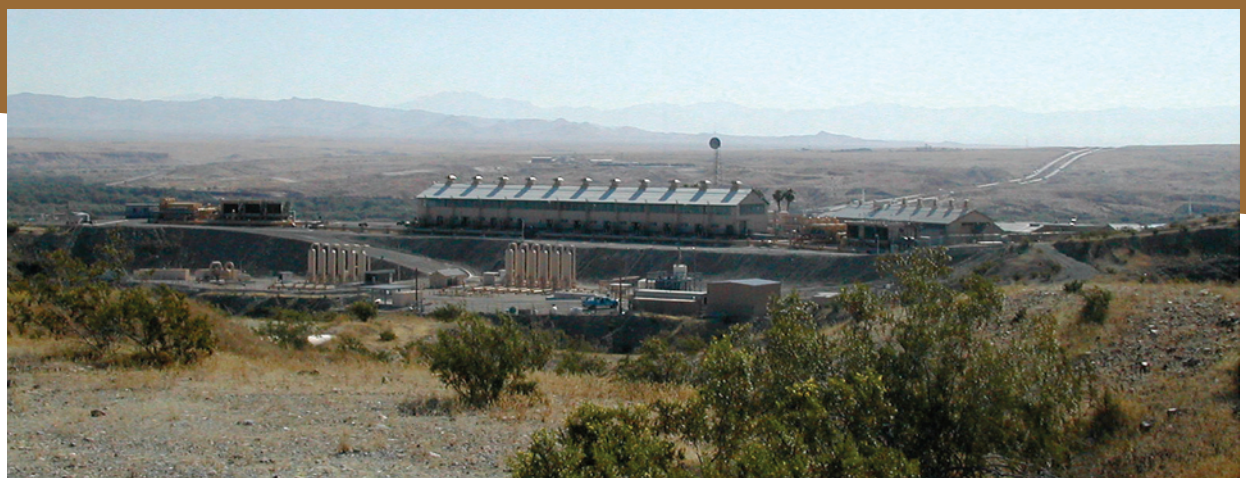
Approved by HQUSACE 3/92

Appendix E

Southwestern Willow Flycatcher Report

August 2005

SOUTHWESTERN WILLOW FLYCATCHER PRESENCE/ABSENCE SURVEYS FOR THE PG&E COMPRESSOR STATION EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM, TOPOCK, CALIFORNIA



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GARCIA and ASSOCIATES

NATURAL & CULTURAL RESOURCE CONSULTANTS

GANDA

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Appendix A: Photo Log
Appendix B: Incidentally Observed Plant and Vertebrate Species
Appendix C: Call Points and UTM Coordinates
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Introduction

Garcia and Associates (GANDA) conducted presence/absence protocol surveys in 2005 for the southwestern willow flycatcher (SWFL) *Empidonax trailii extimus* for Pacific Gas and Electric Company's Topock Compressor Station Expanded Groundwater Extraction and Treatment System Project. The purpose of the survey was to determine if SWFL were present and occupying any potential habitat within the project's area of potential effect (APE). The survey followed the protocol outlined in *A Southwestern Willow Flycatcher Natural History and Survey Protocol* (Sogge et al. 1997) including the changes outlined in the U.S. Fish and Wildlife Service (USFWS) 2000 revision.

One possible SWFL was found on one occasion within one site of the APE.

Site Description

The survey area consisted of seven sites totaling 80 acres surrounding the Topock Compressor Station. The compressor station is located adjacent to the Colorado River, 15 miles southeast of Needles, California in San Bernardino County. The survey sites are located on either side of the Colorado River, in both San Bernardino County, California and Mojave County, Arizona. The largest of the seven sites was in Arizona on the Havasu National Wildlife Refuge. The other six sites were all located in California, with three sites on BLM land, two sites in the Moabi Regional Park, and one site in the California portion of the Havasu National Wildlife Refuge (Figures 1-5). The sites varied in elevation from 400 to 500 feet above sea level.

Vegetation and Habitat

All seven sites were located along the Colorado River and either contained surface water or were bordered by it. The most abundant plant species found were salt cedar (*Tamarix ramosissima*), coyote willow (*Salix exigua*), catclaw acacia (*Acacia greggii*), Arrowweed (*Pluchea sericea*), and palo verde (*Cercidium microphyllum*). Salt cedar, the most dominant species throughout the survey area, often formed dense thickets and reached heights of greater then eight feet. The vegetation composition in conjunction with the presence of ground water make the sites good candidates for SWFL, especially since there are known SWFL populations in nearby areas (Smith et al 2004). A photo of each site is located in Appendix A. A list of the plant species encountered is in Appendix B.

The Topock Marsh, a large wetland with abundant wildlife and bird species, borders the survey area on the East side. Creosote dominated desert surrounded the rest. Both of these habitats influenced the type and number of species encountered.

The most commonly observed non-avian vertebrate species were beaver (*Castor Canadensis*), black-tailed jackrabbit (*Leptus californicus*), coyote (*Canis latrans)*, bullfrog (*Rana catesbeiana*), and western side blotched lizard (*Uta stansburiana*). The most commonly observed avian species were great-tailed grackle (*Quiscalus mexicanus*), white winged dove (*Zenaida asiatica*), lesser nighthawk (*Chordeiles acutipennis*), and black-tailed gnatcatcher (*Polioptila melanura*). Complete lists of the avian and non-avian vertebrate species encountered are presented in Appendix B.

Figure 1. Map of all Southwestern Willow Flycatcher Survey Sites

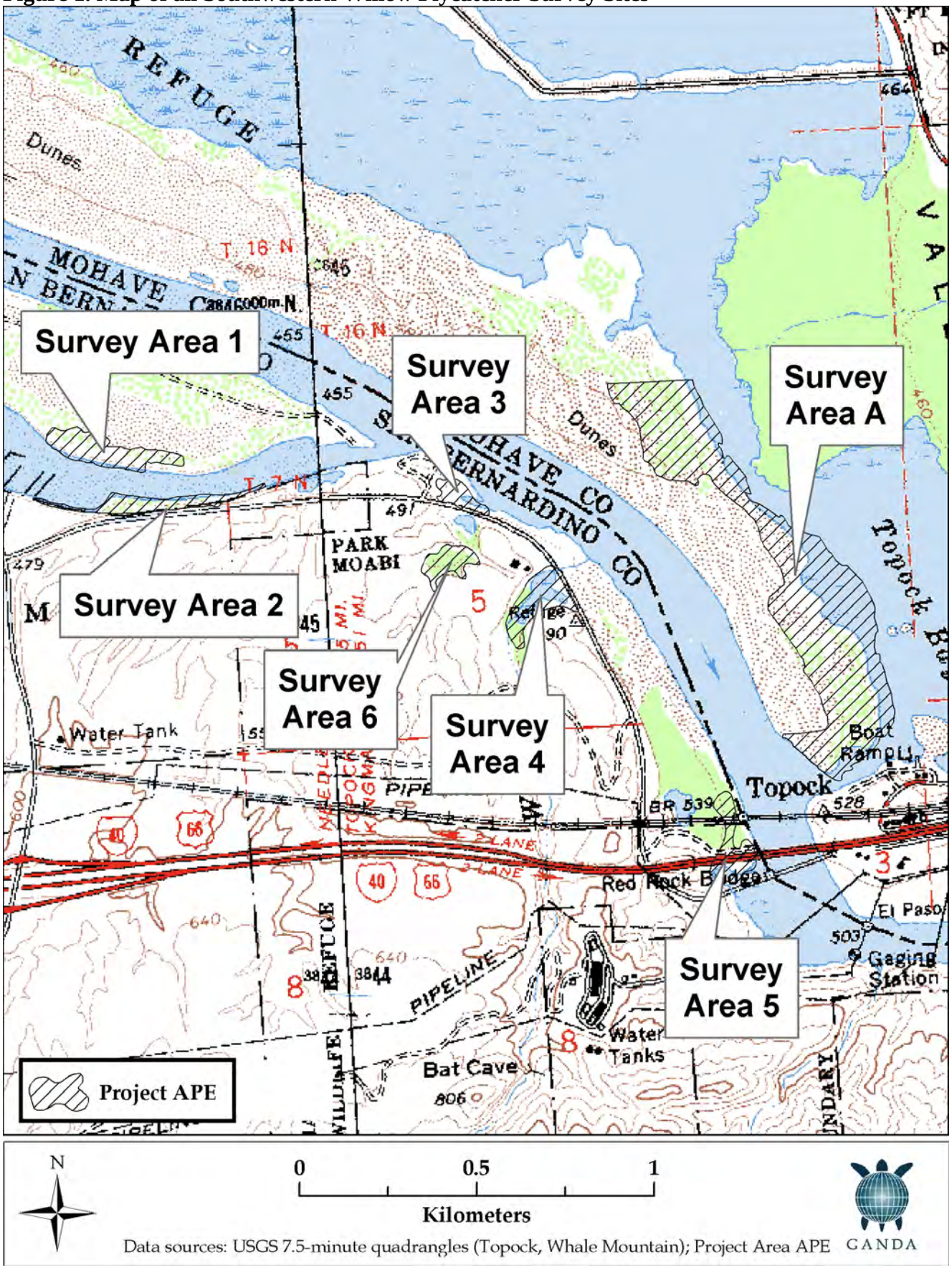


Figure 2. Map of Survey Areas 1 and 2

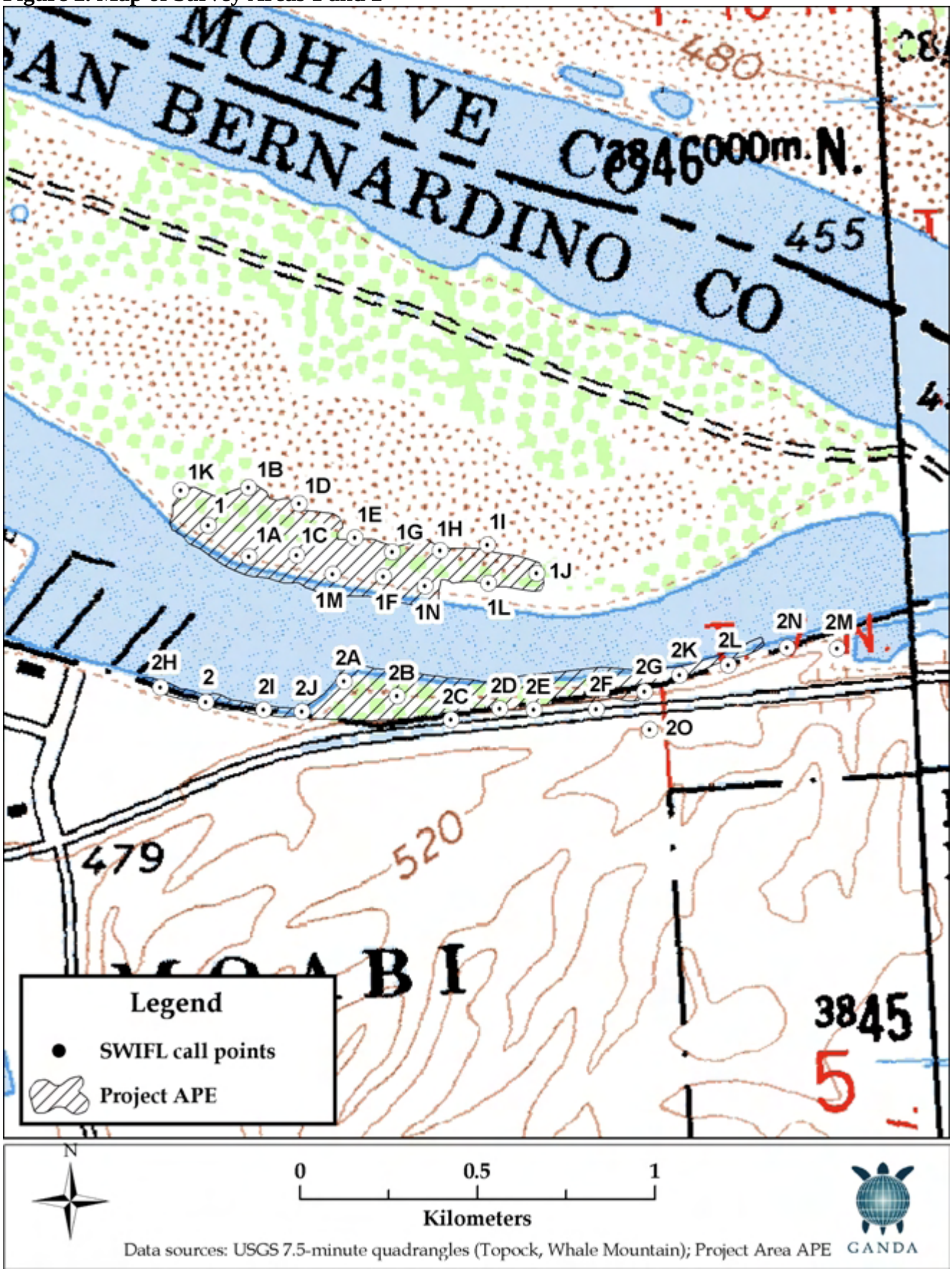


Figure 3. Map of Survey Areas 3, 4 and 6

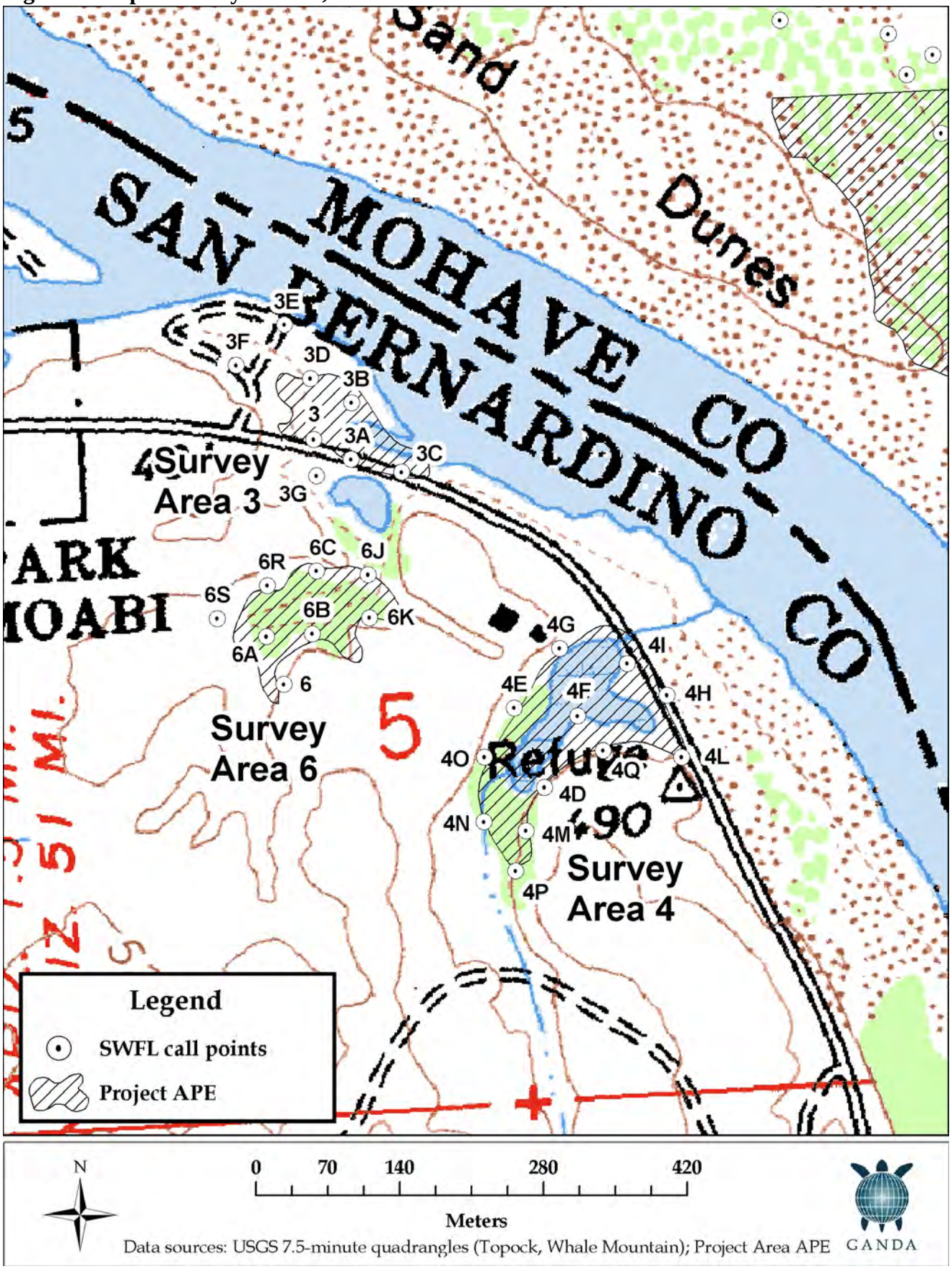


Figure 4. Map of Survey Area 5

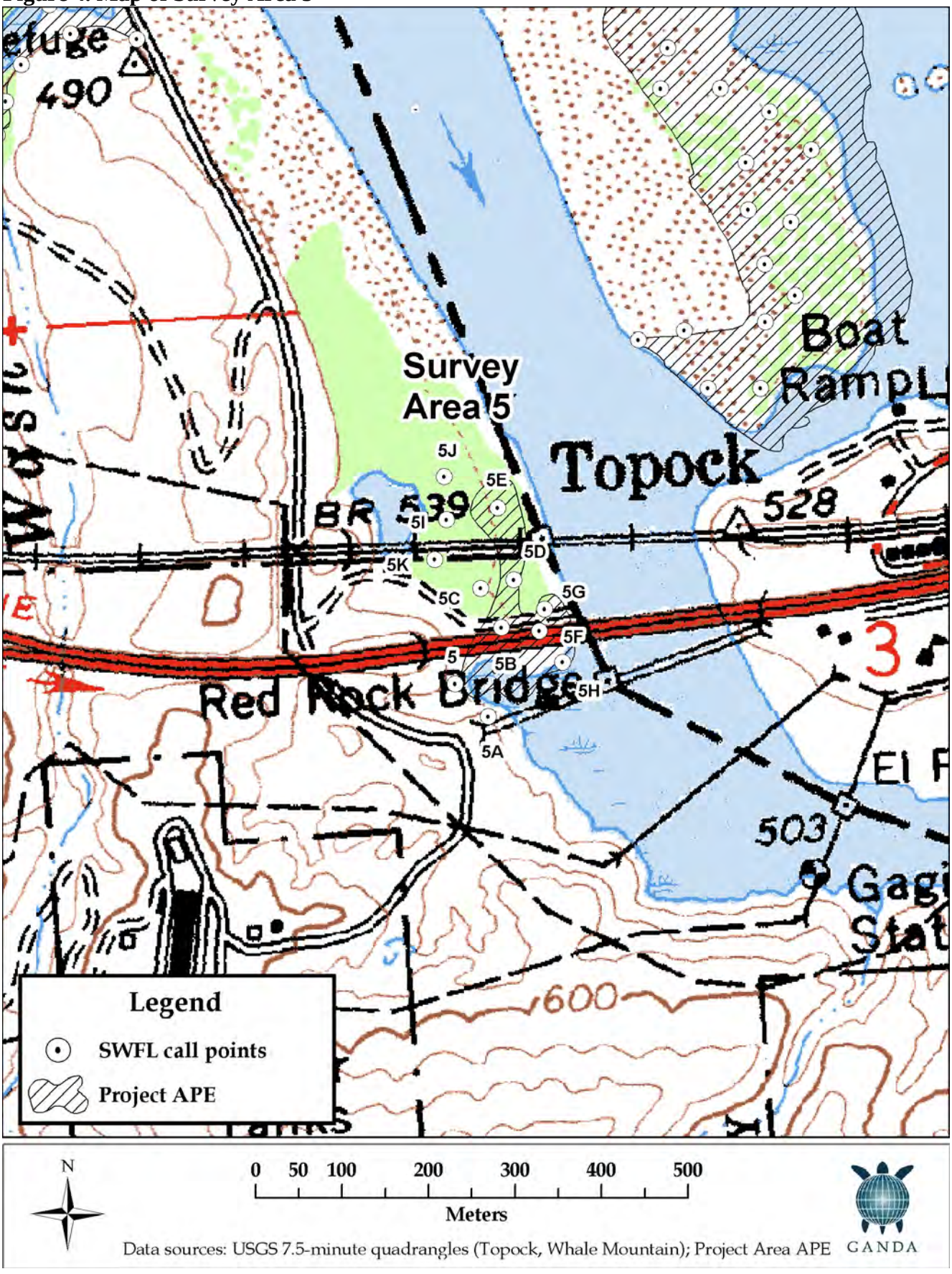
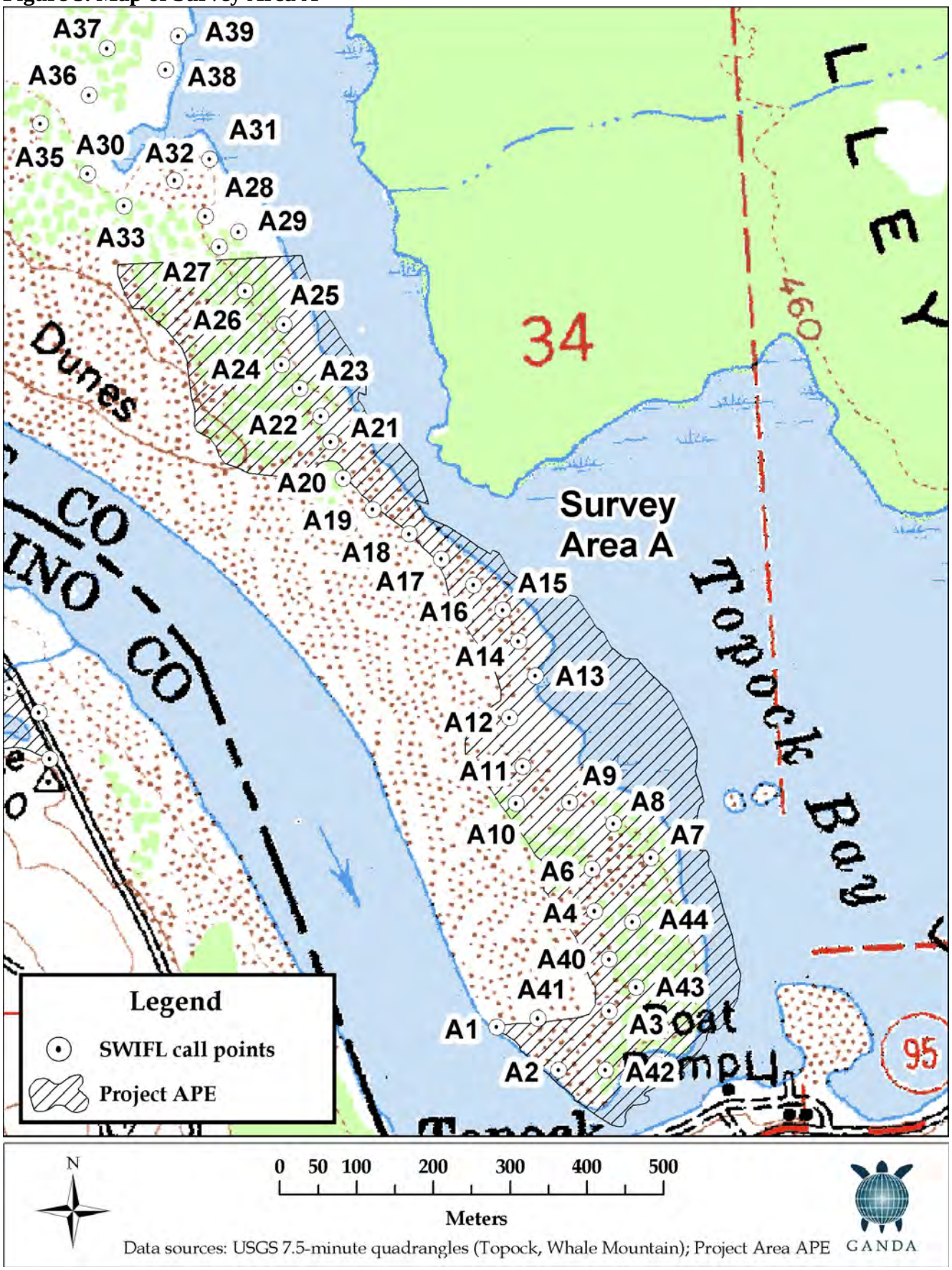


Figure 5. Map of Survey Area A



Survey Methods

GANDA wildlife biologist Jeff Steinman (USFWS permit #TE-085026; Arizona Game and Fish Department Permit #SP-662819) conducted all surveys, excluding the first survey of the Arizona portion of the APE, which was conducted by CH2M Hill biologist Gabe Valdes (USFWS Permit #TE-092622; Arizona Game and Fish Department Permit #SP-660965).

The survey method followed the protocol for project-related surveys as outlined in the 2000 USFWS protocol revision, which recommends that five surveys be conducted during three survey periods, with three surveys occurring during the last survey period. These periods are from May 15 to 31, June 1 to 21, and June 22 to July 17.

The first survey occurred on May 19 and 20, 2005 for the California portion and on May 28 to 31 for the Arizona portion. The subsequent surveys for both portions occurred on June 7 to June 11, June 21 to June 25, June 28 to July 1 and July 11 to 14, 2005. All surveys occurred between 0430 and 1000 hours.

The survey method consisted of using a portable tape player to broadcast calls of SWFL from established call points. Call points were established in the field using aerial photographs, topographic maps, and global positioning system (GPS) units in order to ensure that the same call points were used for each survey and to ensure that call points were not placed greater then 30 to 50 meters apart. The placement and distance between call points varied depending on the quality of the habitat, thickness of vegetation and the accessibility. A Trimble GeoExplorer 3 GPS unit was used to record the location of each call point in the event that future surveys are required, with the exception of those call points in the Northern section of the Arizona site which were not recorded with the Trimble but with a Garmin V due to failure of the Trimble unit. See Appendix C for a complete list of call point and UTM coordinates, and see Figure 2 for a map of all call points.

In order to increase coverage of the Arizona portion of the project area, an additional 12 survey points were added during the second survey.

At the start of the survey for each survey area, the surveyor listened for ten minutes in order to establish the presence of any singing males before commencing with broadcast calls. Each call point was surveyed by repeatedly calling for 30 seconds followed by listening for 60 seconds. This was repeated for four to five minutes at each call point. The surveyor then proceeded to the next call point.

The start time and call point order for each visit at each survey area was varied to reduce bias.

Results

One possible SWFL was detected on June 7 in survey area 3 along the California side of the Colorado River and East of the Moabi Regional Park Marina (Figure 3). The initial observation was made by two URS biologists, Ellen Howard and Nick Duncan, who

heard a single *whitt* call while conducting reconnaissance in the area. Although the bird, which appeared visually to be a SWFL, was observed by the two URS biologists and Mr. Steinman, the *fitz-bew* call required for a confirmed detection was not heard. The survey of the same area the following day resulted in no detection of SWFL, nor were there any other detections on subsequent visits.

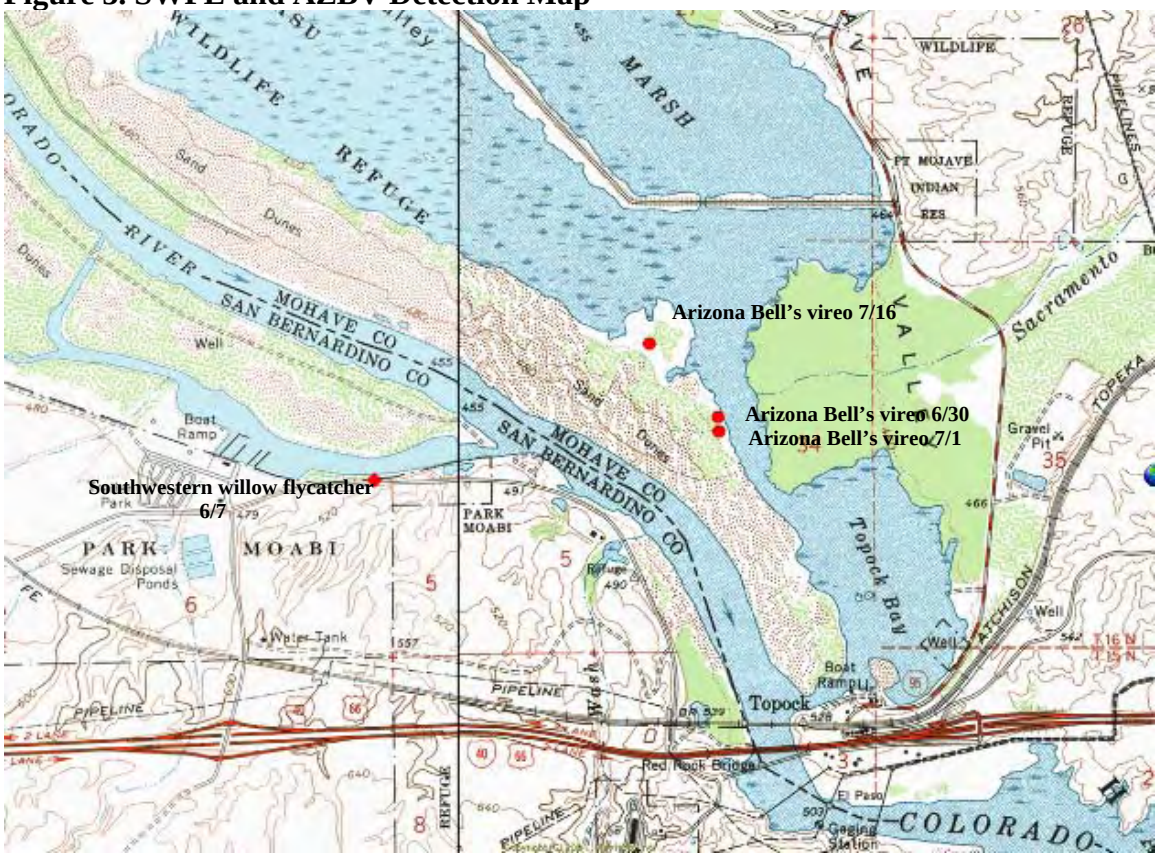
Incidental Wildlife Observations

A variety of wildlife species were observed during the SWFL survey. These species included numerous birds, reptiles, and mammals. Of particular interest is the detection of both Arizona Bell's vireos (AZBV) and brown-headed cowbirds.

Three detections of AZBV occurred in northern portion of the Arizona survey area. Although this species has no Arizona State or federal protective status, they are considered an endangered species in California. Two of the detections occurred in the middle of the survey area and one occurred at its northern end. The detection on July 1, which occurred in the middle of the survey area, included an adult male and at least one juvenile, which could indicate breeding in the surrounding area.

Brown-headed cowbirds were observed at every site in the project area. Brown-headed cowbirds are known nest parasites of SWFL and other songbirds, and their presence may be reducing SWFL presence in the area.

Figure 3. SWFL and AZBV Detection Map



Conclusions

Although no SWFL were found to be occupying the APE, there was one possible detection of a SWFL. This detection was most likely a transient since there were no subsequent detections. However, the known presence of nearby populations, combined

with the suitability of the habitat and the detection of a possible transient male make it likely that an increase in breeding success and survivorship in the nearby areas may result in future use by SWFL of the APE.

In the event that this species is later found to be occupying the APE, protective measures should be implemented to avoid or minimize potential impacts to the SWFL. These include, but are not limited to, an education program for all personnel working within the survey area boundaries, continued surveying of the project area during the breeding season, and contacting a qualified biologist should a potential SWFL be suspected.

References

Smith, A.B., P.E.T. Dockens, A.A. Tudor, H.C. English, B.L. Allen. 2004. Southwestern Willow Flycatcher 2003 Survey and Nest Monitoring Report.. Arizona Game and Fish Department, Phoenix.

Sogge, M.K., R.M. Marshall, S.J. Sferra, and T.J. Tibbits. 1997. A Southwestern Willow Flycatcher Natural History Summary And Survey Protocol. National Park Service Cooperative Studies Unit. USGS Colorado Plateau Research Station- Northern Arizona University, Flagstaff, Arizona.

U.S. Fish and Wildlife Service (USFWS). 2000. Southwestern Willow Flycatcher Protocol Revision 2000. July 11, 2000.

Appendix A

Photographs

Site 1: Photo taken from 2C looking at 300 degrees.

Site 2: Photo taken from 2C looking at 45 degrees.

Site 3: Photo taken from 3C looking at 320 degrees.

Site 4: Photo taken from 4L looking at 320 degrees.

Site 5: Photo taken from 5A looking at 320 degrees

Site 6: Photo taken from 6C looking at 210 degrees.

Site A: Photo taken from A4 looking at 345 degrees.

Appendix B

Incidental Plant and Vertebrate Species

Incidental Plant Species

Common Name	Scientific Name
Arrowweed	*Plucha sericea*
Cheesebush	*Hymenoclea salsola*
Prickly Lettuce	*Lactuca serriola*
Teddy Bear Cholla	*Cylindropuntia* c.f. *achanthocarpa*
California Barrel Cactus	*Ferocactus cylindraceus* var *cylindraceus*
Beavertail	*Opuntia basilaris* var. *basilaris*
Fish-Hook Cactus	*Mammillaria dioica*
Russian Thistle	*Salsola tragus*
Catclaw Acacia	*Acacia greggii*
Palo Verde	*Cercidium microphyllum*
Honey Mesquite	*Prosopis glandulosa* var *torreyana*
Salt Cedar	*Tamarix ramosissima*
Coyote Willow	*Salix exigua*
Gooding's Willow	*Salix gooddingii*
Cattail	*Typha angustifolia*
American Great bulrush	*Scirpus validus*

Incidental Mammals and Reptiles

Common Name	Scientific Name
Coyote	*Canis latrans*
Desert Cottontail	*Sylvilagus audubonii*
Black-tailed Jackrabbit	*Lepus californicus*
Beaver	*Castor canadensis*
Desert Iguana	*Dipsosaurus dorsalis*
Side-blotched Lizard	*Uta stanburiana*
Western Whiptail	*Cnemidophorus tigris*

Incidental Bird Species

Common Name	Scientific Name
Canada Goose	*Branta canadensis*
Mallard	*Anas platyrhynchos*
Gambel's Quail	*Callipepla gambelii*
Western Grebe	*Aechmophorus occidentalis*
Clark's Grebe	*Aechmophorus clarkia*
Double-crested Cormorant	*Phalacrocorax auritus*
American Bittern	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Great Blue Heron	*Ardea herodias*
Green Heron	*Butorides virescens*
Black-crowned Night-Heron	*Nycticorax nycticorax*
White-faced Ibis	*Plegadis chihi*
Turkey Vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
American Kestrel	*Falco sparverius*
American Coot	*Fulica americana*
Killdeer	*Charadrius vociferous*
American Avocet	*Recurvirostra americana*
Caspian Tern	*Sterna caspia*
Rock Pigeon	*Columba livia*
White-winged Dove	*Zenaida asiatica*
Mourning Dove	*Zenaida macroura*
Inca Dove	*Columbina inca*
Greater Roadrunner	*Geococcyx californianus*
Lesser Nighthawk	*Chordeiles acutipennis*
Black-chinned Hummingbird	*Archilochus alexandri*
Anna's Hummingbird	*Calypte anna*
Costa's Hummingbird	*Calypte costae*
Ladder-backed Woodpecker	*Picoides scalaris*
Black Phoebe	*Sayornis nigricans*
Say's Phoebe	*Sayornis saya*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Brown-crested Flycatcher	*Myiarchus tyrannulus*
Loggerhead Shrike	*Lanius ludovicianus*
Bell's Vireo	*Vireo bellii*
Common Raven	*Corvus corax*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Cliff Swallow	*Petrochelidon pyrrhonota*
Verdin	*Auriparus flaviceps*
Bewick's Wren	*Thryomanes bewickii*
Marsh Wren	*Cistothorus palustris*
Black-tailed Gnatcatcher	*Polioptila melanura*
Northern Mockingbird	*Mimus polyglottos*
Crissal Thrasher	*Toxostoma crissale*
European Starling	*Sturnus vulgaris*
Lucy's Warbler	*Vermivora luciae*
Yellow Warbler	*Dendroica petechia*
Common Yellowthroat	*Geothlypis trichas*
Yellow-breasted Chat	*Icteria virens*
Summer Tanager	*Piranga rubra*
Abert's Towhee	*Pipilo aberti*
Black-throated Sparrow	*Amphispiza bilineata*
Song Sparrow	*Melospiza melodia*
Blue Grosbeak	*Passerina caerulea*
Indigo Bunting	*Passerina cyanea*
Red-winged Blackbird	*Agelaius phoeniceus*
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
Great-tailed Grackle	*Quiscalus mexicanus*
Brown-headed Cowbird	*Molothrus ater*
Bullock's Oriole	*Icterus bullockii*
House Finch	*Carpodacus mexicanus*
Lesser Goldfinch	*Carduelis psaltria*

Appendix C

Call Points and UTM coordinates

Call Point	Northing	Easting
Site 1		
1	34.7287023	114.5086978
1A	34.7283877	114.5082587
1B	34.7290362	114.5082202
1C	34.7283767	114.5077127
1D	34.7288573	114.5076507
1E	34.7285071	114.5070372
1F	34.7281293	114.5067438
1G	34.7283547	114.5066217
1H	34.7283437	114.5060757
1I	34.7283693	114.5055359
1J	34.7280777	114.5049927
1K	34.7290484	114.5089878
1L	34.7280077	114.5055517
1M	34.7281790	114.5073177
1N	34.7280152	114.5062765
Site 2		
2	34.7270477	114.5088447
2A	34.7271701	114.5072564
2B	34.7270027	114.5066627
2C	34.7267487	114.5060653
2D	34.7268256	114.5055053
2E	34.7267972	114.5051156
2F	34.7267690	114.5044044
2G	34.7269073	114.5038429
2H	34.7272117	114.5093527
2I	34.7269448	114.5081916
2J	34.7269087	114.5077567
2K	34.7270438	114.5034344
2L	34.7271090	114.5028740
2M	34.7272046	114.5016267
2N	34.7272409	114.5021941
2O	34.7265482	114.5038114
Site 3		
3	34.7266066	114.4968334
3A	34.7264137	114.4964485
3B	34.7269123	114.4964092
3C	34.7262786	114.4959193
3D	34.7271437	114.4968306
3E	34.7276294	114.4970733
3F	34.7272984	114.4976113
3G	34.7262869	114.4968244
Site 4		
4D	34.7234366	114.4945918
4E	34.7241494	114.4948672

Call Point	Northing	Easting
4F	34.7240427	114.4941947
4G	34.7246473	114.4943451
4H	34.7241802	114.4932324
4I	34.7244817	114.4936357
4L	34.7236327	114.4931157
4M	34.7230606	114.4948162
4N	34.7231627	114.4952587
4O	34.7237292	114.4952113
4P	34.7227150	114.4949501
4Q	34.7237269	114.4939468
Site 5		
5	34.7167161	114.4895676
5A	34.7163575	114.4891762
5B	34.7172730	114.4889426
5C	34.7176950	114.4891746
5D	34.7177678	114.4887486
5E	34.7185247	114.4889027
5F	34.7172167	114.4884643
5G	34.7174399	114.4883834
5H	34.7168767	114.4881948
5I	34.7184326	114.4895547
5J	34.7188832	114.4895511
5K	34.7180249	114.4897361
Site 6		
6	34.7244710	114.4973025
6A	34.7249002	114.4974595
6B	34.7249037	114.4969708
6C	34.7254506	114.4968827
6J	34.7253937	114.4963377
6K	34.7250157	114.4963497
6R	34.7253507	114.4974186
6S	34.7250823	114.4979739
Site A		
A1	34.7201930	114.4869984
A10	34.7227959	114.4865362
A11	34.7232189	114.4864155
A12	34.7237988	114.4865631
A13	34.7242722	114.4861577
A14	34.7246916	114.4863712
A15	34.7250658	114.4865683
A16	34.7253807	114.4869605
A17	34.7257065	114.4873952
A18	34.7260185	114.4878299
A19	34.7263354	114.4883260
A2	34.7196456	114.4861564
A20	34.7267180	114.4887242
A21	34.7271551	114.4888669

Call Point	Northing	Easting
A22	34.7274569	114.4889890
A23	34.7277959	114.4892613
A24	34.7280890	114.4895070
A25	34.7285576	114.4894346
A26	34.7289766	114.4899624
A27	34.7295078	114.4902939
A28	34.7298750	114.4904642
A29	34.7296709	114.4900060
A3	34.7203015	114.4853867
A30	34.7304525	114.4920946
A31	34.7305431	114.4903565
A32	34.7303194	114.4908694
A33	34.7300530	114.4916106
A35	34.7310743	114.4927285
A36	34.7313701	114.4920116
A37	34.7319069	114.4917183
A38	34.7316184	114.4909052
A39	34.7320004	114.4906932
A4	34.7214798	114.4855149
A40	34.7209055	114.4853451
A41	34.7202607	114.4864104
A42	34.7196133	114.4854915
A43	34.7205603	114.4849893
A44	34.7213290	114.4849859
A6	34.7219756	114.4855115
A7	34.7220680	114.4846749
A8	34.7224913	114.4851773
A9	34.7227674	114.4857807

Appendix D

Survey Forms

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Steinman Phone #(415) 458-5803
Affiliation Garcia and Associates E-mail JSteinman@Garciaandassociates.com
Site Name PG&E Topock Compressor Station CA 6 Date Report Completed _____

Did you verify that this site name is consistent with that used in previous years? (Yes) / No (circle one)
If name is different, what name(s) was used in the past? N/A
If site was surveyed last year, did you survey the same general area this year? (Yes) / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) / No If no, summarize in comments below.

Management Authority for Survey Area (circle one): (Federal) Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) Bureau of Land Management

Length of area surveyed: 500 ft (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☒ Mixed native and exotic plants (mostly exotic)

☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima, Acacia greggii, Cercidium microphyllum

Average height of canopy (Do not put a range): 15 ~~ft~~ ft. (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) / No (circle one)
Distance from the site to surface water or saturated soil: 20 ft (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes / (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Steinman Phone # 415 458 5803
Affiliation Garcia and Associates E-mail JSteinman@GarciaandAssociates.com
Site Name Topock Compressor Station CA 1 Date Report Completed

Did you verify that this site name is consistent with that used in previous years? (Yes) / No (circle one)
If name is different, what name(s) was used in the past? N/A
If site was surveyed last year, did you survey the same general area this year? (Yes) No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) No If no, summarize in comments below.

Management Authority for Survey Area (circle one): Federal (Municipal/County) State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) Mohave Regional Park

Length of area surveyed: 1500 Ft. (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☐ Mixed native and exotic plants (mostly exotic)

☒ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima, Cercidium microphyllum

Average height of canopy (Do not put a range): 10 feet (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) / No (circle one)
Distance from the site to surface water or saturated soil: 0 (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name Topock Compressor station CA 1 State CA County San Bernadino
USGS Quad Name Whale Mountain Elevation 440 feet / meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N HOT 3845821 E 1107280 81 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 45 722 E 1107284 49 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found ? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Steinman	Date 5/20 Start 0834 Stop 0958 Total hrs	0	0	0	N	N	N	
2 Jeff Steinman	Date 6/8 Start 0753 Stop 0932 Total hrs	0	0	0	N	N	N	
3 Jeff Steinman	Date 6/23 Start 0734 Stop 0915 Total hrs	0	0	0	N	Y	N	
4 Jeff Steinman	Date 6/29 Start 0840 Stop 1000 Total hrs	0	0	0	N	N	N	
5 Jeff Steinman	Date 7/11 Start 0836 Stop 1000 Total hrs	0	0	0	N	N	N	

Overall Site Summary (Total **resident** WIFLs only) Total survey hrs	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No If yes, report color combination(s) in the comments section on back of form
	0	0	0		

Reporting Individual Jeff Steinman Date Report Completed
US Fish and Wildlife Service Permit # TE 082026-0 AZ Game and Fish Department (or other state) Permit # SP662819

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Stenman Phone #(415)458-5803
Affiliation Garcia and Associates E-mail Jstenman@Garciaandassociates.com
Site Name PGE Topock Compressor station CA 2 Date Report Completed

Did you verify that this site name is consistent with that used in previous years? (Yes) No (circle one)
If name is different, what name(s) was used in the past? N/A
If site was surveyed last year, did you survey the same general area this year? (Yes) No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) No If no, summarize in comments below.

Management Authority for Survey Area (circle one): Federal ~~Municipal/County~~ State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) Mojave Regional Park

Length of area surveyed: 2500 ft (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☐ Mixed native and exotic plants (mostly exotic)

☒ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima / Acacia greggii

Average height of canopy (Do not put a range): 15 ft (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) No (circle one)
Distance from the site to surface water or saturated soil: 0 (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name Topock Compressor Station CA 2 State CA County San Bernardino
USGS Quad Name Whale Mountain Elevation 480 feet / meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 45 617 E 11 07 28 053 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 45 633 N E 11 07 28 760 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found ? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Steinman	Date 5/20 Start 0631 Stop 0816 Total hrs 2		0	0	N		N	
2 Jeff Steinman	Date 6/8 Start 0535 Stop 0733 Total hrs 2	6/7 1 0	0 0	0 0	N N	N	N N	On 6/7 1 possible SWFL was seen at 1000 on the eastern most end of the site by myself and URS....
3 Jeff Steinman	Date 6/23 Start 0535 Stop 0728 Total hrs 2		0	0	N		N	(cont) biologists but no fitz-bew was heard. No SWFL were detected on 6/8
4 Jeff Steinman	Date 6/29 Start 0650 Stop 0857 Total hrs 2		0	0	N		N	
5 Jeff Steinman	Date 7/12 Start 0530 Stop 0719 Total hrs 2		0	0	N		N	
Overall Site Summary (Total **resident** WIFLs only) Total survey hrs 10		Adults 1	Pairs 0	Territories 0	Nests 0	Were any WIFLs color-banded? Yes (No) If yes, report color combination(s) in the comments section on back of form		

Reporting Individual Jeff Steinman Date Report Completed
US Fish and Wildlife Service Permit # TE085086-0 AZ Game and Fish Department (or other state) Permit # SP663819

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Steinman Phone # (415) 458-5803
Affiliation Garcia and Associates E-mail JSteinman@Garciaandassociates.com
Site Name PG&E Topock Compressor Station CA3 Date Report Completed _____

Did you verify that this site name is consistent with that used in previous years? (Yes) / No (circle one)
If name is different, what name(s) was used in the past? N/A
If site was surveyed last year, did you survey the same general area this year? (Yes) / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) / No If no, summarize in comments below.

Management Authority for Survey Area (circle one): (Federal) Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) Bureau of Land Management

Length of area surveyed: 500 feet (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☒ Mixed native and exotic plants (mostly exotic)

☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima, Acacia greggii,

Average height of canopy (Do not put a range): 10 feet (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) / No (circle one)
Distance from the site to surface water or saturated soil: 0 (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes / (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name PG&E Topock Compressor Station CS 3 State CA County San Bernardino
USGS Quad Name Topock Elevation 440 (feet) / meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 45 653 E 11 07 29 128 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 45 544 E 11 07 29 285 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Stemmas	Date 5/19 Start 0838 Stop 0955 Total hrs 1	0	0	0	N	N	N	
2 Jeff Stemman	Date 6/7 Start 0502 Stop 0558 Total hrs 1	0	0	0	N	N	N	
3 Jeff Stemman	Date 6/22 Start 0817 Stop 0859 Total hrs 1	0	0	0	N	Y	N	
4 Jeff Stemman	Date 6/29 Start 0606 Stop 0649 Total hrs 1	0	0	0	N	N	N	
5 Jeff Stemman	Date 7/13 Start 0505 Stop 0600 Total hrs 1	0	0	0	N	N	N	
Overall Site Summary (Total **resident** WIFLs only) Total survey hrs 5		Adults: 0	Pairs: 0	Territories: 0	Nests: 0	Were any WIFLs color-banded? Yes No If yes, report color combination(s) in the comments section on back of form		

Reporting Individual Jeff Stemman Date Report Completed
US Fish and Wildlife Service Permit # TE-085026-0 AZ Game and Fish Department (or other state) Permit # SP662819

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Stenman Phone # (415) 458-5803
Affiliation Garcia and Associates E-mail JStenman@GarciaandAssociates.com
Site Name PG&E Topock Compressor Station CA4 Date Report Completed _____

Did you verify that this site name is consistent with that used in previous years? (Yes) / No (circle one)
If name is different, what name(s) was used in the past? N/A
If site was surveyed last year, did you survey the same general area this year? (Yes) / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) / No If no, summarize in comments below.

Management Authority for Survey Area (circle one): (Federal) Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) Bureau of Land Management

Length of area surveyed: 800 ft. (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☒ Mixed native and exotic plants (mostly exotic)

☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima, Acacia greggii, Cercidium microphyllum

Average height of canopy (Do not put a range): 15 Feet (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) / No (circle one)
Distance from the site to surface water or saturated soil: 0 (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes / (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name PG-E Topock Compressor Station CA 4 State CA County San Bernardino
USGS Quad Name Topock Elevation 520 feet/ meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 45 150 E 11 07 29 384 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 45 317 E 11 07 29 537 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Steinman	Date 5/19 Start 0651 Stop 0818 Total hrs 1.5	0	0	0	N	N	N	
2 Jeff Steinman	Date 6/7 Start 0837 Stop 0957 Total hrs 1.5	0	0	0	N	Y	N	
3 Jeff Steinman	Date 6/22 Start 0456 Stop 0631 Total hrs 1.5	0	0	0	N	N	N	
4 Jeff Steinman	Date 6/28 Start 0724 Stop 0914 Total hrs 1.5	0	0	0	N	Y	N	
5 Jeff Steinman	Date 7/12 Start 0825 Stop 0935 Total hrs 1.5	0	0	0	N	N	N	

Overall Site Summary (Total **resident** WIFLs only) Total survey hrs 7.5	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No If yes, report color combination(s) in the comments section on back of form
	0	0	0	0	

Reporting Individual Jeff Steinman Date Report Completed
US Fish and Wildlife Service Permit # TE085026-0 AZ Game and Fish Department (or other state) Permit # SP662819

Submit original form by August 1st. Retain a copy for your records.

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name PG-E Topock Compressor Station CA 4 State CA County San Bernardino
USGS Quad Name Topock Elevation 520 feet/ meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 45 150 E 11 07 29 384 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 45 317 E 11 07 29 537 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Steinman	Date 5/19 Start 0651 Stop 0818 Total hrs 1.5	0	0	0	N	N	N	
2 Jeff Steinman	Date 6/7 Start 0837 Stop 0957 Total hrs 1.5	0	0	0	N	Y	N	
3 Jeff Steinman	Date 6/22 Start 0456 Stop 0631 Total hrs 1.5	0	0	0	N	N	N	
4 Jeff Steinman	Date 6/28 Start 0724 Stop 0914 Total hrs 1.5	0	0	0	N	Y	N	
5 Jeff Steinman	Date 7/12 Start 0825 Stop 0935 Total hrs 1.5	0	0	0	N	N	N	

Overall Site Summary (Total **resident** WIFLs only) Total survey hrs 7.5	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No If yes, report color combination(s) in the comments section on back of form
	0	0	0	0	

Reporting Individual Jeff Steinman Date Report Completed
US Fish and Wildlife Service Permit # TE085026-0 AZ Game and Fish Department (or other state) Permit # SP662819

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Stemman Phone #(415) 458-5803
Affiliation Garcia and Associates E-mail JStemman@GarciaandAssociates.com
Site Name PG&E Topock Compressor Station CA5 Date Report Completed

Did you verify that this site name is consistent with that used in previous years? Yes / No (circle one)
If name is different, what name(s) was used in the past? N/A
If site was surveyed last year, did you survey the same general area this year? Yes / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) / No If no, summarize in comments below.

Management Authority for Survey Area (circle one): (Federal) Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) USFWS- Havasu National Wildlife Refuge

Length of area surveyed: 900 ft (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

- ☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)
- ☐ Mixed native and exotic plants (mostly native)
- ☐ Mixed native and exotic plants (mostly exotic)
- ☒ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix aphylla, Acacia greggii, Salix exigua

Average height of canopy (Do not put a range): 10 feet (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) / No (circle one)
Distance from the site to surface water or saturated soil: 0 (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes / (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name PG+E Topock Compressor Station CAS State CA County San Bernardino
USGS Quad Name Topock Elevation _____ feet / meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 44 730 E 11 07 29 889 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 44 458 E 11 07 29 930 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found ? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Steinman	Date 5/19 Start 0581 Stop 0651 Total hrs 1.5	0	0	0	N	N	N	
2 Jeff Steinman	Date 6/7 Start 0700 Stop 0832 Total hrs 1.5	0	0	0	N	N	N	
3 Jeff Steinman	Date 6/22 Start 0635 Stop 0803 Total hrs 1.5	0	0	0	N	N	N	
4 Jeff Steinman	Date 6/28 Start 0540 Stop 0715 Total hrs 1.5	0	0	0	N	N	N	
5 Jeff Steinman	Date 7/11 Start 0635 Stop 0815 Total hrs 1.5	0	0	0	N	Y	N	
Overall Site Summary (Total **resident** WIFLs only) Total survey hrs 7.5		Adults: 0	Pairs: 0	Territories: 0	Nests: 0	Were any WIFLs color-banded? Yes No If yes, report color combination(s) in the comments section on back of form		

Reporting Individual Jeff Steinman Date Report Completed _____
US Fish and Wildlife Service Permit # TE085086-0 AZ Game and Fish Department (or other state) Permit # SP662 819

Submit original form by August 1st. Retain a copy for your records.

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name PG+E Topock Compressor Station CA 6 State CA County San Bernardino
USGS Quad Name Topock Elevation 480 (feet) / meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 45 406 E 1107 29 101 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 45 444 E 11 07 29 250 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found ? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Steinman	Date 5/20 Start 0455 Stop 0617 Total hrs 1	0	0	0	N	N	N	
2 Jeff Steinman	Date 6/7 Start 0558 Stop 0649 Total hrs 1	0	0	0	N	Y	N	
3 Jeff Steinman	Date 6/22 Start 0859 Stop 0942 Total hrs 1	0	0	0	N	N	N	
4 Jeff Steinman	Date 6/29 Start 0505 Stop 0604 Total hrs 1	0	0	0	N	N	N	
5 Jeff Steinman	Date 7/12 Start 0725 Stop 0815 Total hrs 1	0	0	0	N	N	N	

Overall Site Summary (Total **resident** WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Total survey hrs 5	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Reporting Individual Jeff Steinman Date Report Completed
US Fish and Wildlife Service Permit #TE085086-0 AZ Game and Fish Department (or other state) Permit #SP662819

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Steinman Phone # (415) 458-5803
Affiliation Garcia and Associates E-mail: JSteinman@GarciaandAssociates.com
Site Name PG&E Topock Compressor Station AZA Date Report Completed 8/1

Did you verify that this site name is consistent with that used in previous years? (Yes) / No (circle one)
If name is different, what name(s) was used in the past? NA
If site was surveyed last year, did you survey the same general area this year? (Yes) / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) / No If no, summarize in comments below.

Management Authority for Survey Area (circle one): (Federal) Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) ~~Topock~~ USFWS. Havasu National Wildlife Refuge

Length of area surveyed: 3800 ft (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☐ Mixed native and exotic plants (mostly exotic)

☒ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix aphylla, Acacia greggii, Salix exigua

Average height of canopy (Do not put a range): 15 ft. (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) / No (circle one)
Distance from the site to surface water or saturated soil: 20 ft. (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes / (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name PG&E Topock Compressor Station A State AZ County Mohave
USGS Quad Name Topock Elevation 440 (feet) meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 46 178 E 114 07 29 655 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 44 828 E 114 07 30 259 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Gabe Valdes	Date 5/26 Start 0600 Stop 1000 Total hrs 4	0	0	0	N	N	N	
X1 Gabe Valdes	Date 5/27 Start 0520 Stop 1050 Total hrs 4.5	0	0	0	N	N	N	
X & Gabe Valdes	Date 5/28 Start 0530 Stop 0930 Total hrs 4	0	0	0	N	N	N	
X2 Jeff Steinman	Date 6/9 Start 0546 Stop 0957 Total hrs 3	0	0	0	N	Y	N	
X2 Jeff Steinman	Date 6/10 Start 0535 Stop 0895 Total hrs 3	0	0	0	N	Y	N	

Overall Site Summary (Total **resident** WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Total survey hrs 18.5	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Reporting Individual Jeff Steinman Date Report Completed
US Fish and Wildlife Service Permit # TE 035096 AZ Game and Fish Department (or other state) Permit # SP662819

Submit original form by August 1st. Retain a copy for your records.

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name PG&E Topock Compressor Station A State AZ County Mohave
USGS Quad Name Topock Elevation 440 (feet) meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N_____ E_____ UTM Datum NAD83 (NAD27 preferred)
Stop: N_____ E_____ UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
K2	Date 6/11 Start 0508 Stop 0745 Total hrs 2.5	0	0	0	N	Y	N	
K3	Date 6/24 Start 0520 Stop 0920 Total hrs 3	0	0	0	N	N	N	
3	Date 6/25 Start 0531 Stop 0831 Total hrs 3	0	0	0	N	Y	N	
4	Date 6/30 Start 0520 Stop 0836 Total hrs 3	0	0	0	N	Y	N	
K4	Date 7/1 Start 0501 Stop 0801 Total hrs 3	0	0	0	N	N	N	

Overall Site Summary (Total **resident** WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Total survey hrs 14.5	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Reporting Individual Jeff Steinman Date Report Completed _____
US Fish and Wildlife Service Permit # TE085026-0 AZ Game and Fish Department (or other state) Permit # SP660819

Submit original form by August 1st. Retain a copy for your records.

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name PG&E Topock Compressor Station A State A County Mohave
USGS Quad Name Topock Elevation 440 feet / meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ Yes ☐ No

Site Coordinates: Start: N 38 46 178 E 11 07 29 655 UTM Datum WGS83 (NAD27 preferred)
Stop: N 38 44 828 E 11 07 30 259 UTM Zone 11

*** Fill in additional site information on back of this page ***

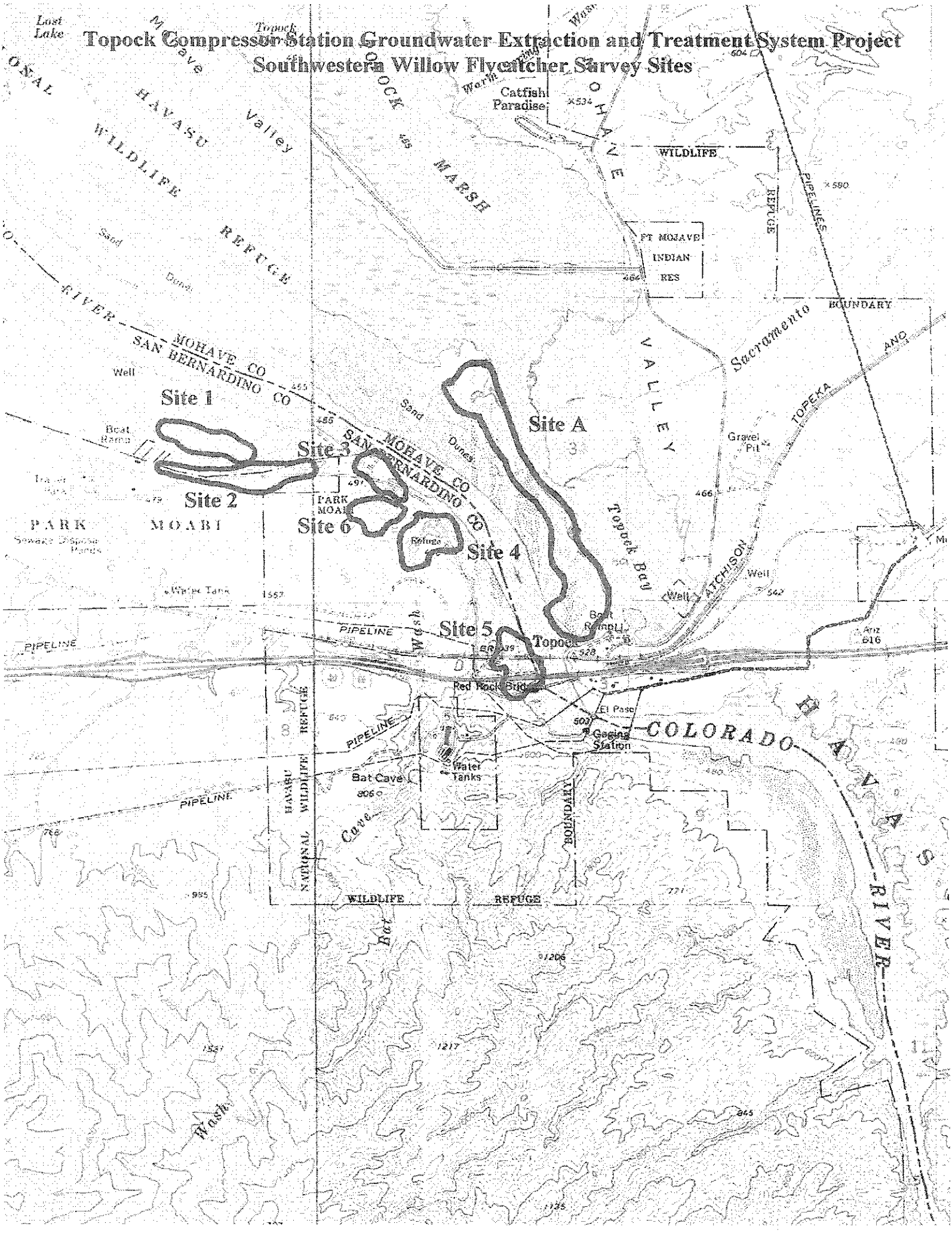
Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen, territorial limits)
X 5	Date 7/13 Start [illegible] 0644 Stop 0909 Total hrs 3.5	0	0	0	N	N		
X 5	Date 7/14 Start 0605 Stop 0931 Total hrs 2.5	0	0	0	N	N		
3	Date Start Stop Total hrs							
4	Date Start Stop Total hrs							
5	Date Start Stop Total hrs							

Overall Site Summary (Total resident WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Plus 5 Total survey hrs 38					If yes, report color combination(s) in the comments section on back of form

Reporting Individual _____ Date Report Completed _____
US Fish and Wildlife Service Permit # _____ AZ Game and Fish Department (or other state) Permit # _____

Submit original form by August 1st. Retain a copy for your records.

Topock Compressor Station Groundwater Extraction and Treatment System Project
Southwestern Willow Flycatcher Survey Sites



Appendix F

USFWS Clapper Rail Data

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
ARIZONA ECOLOGICAL SERVICES FIELD OFFICE
2321 W. Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 FAX: (602) 242-2513

FACSIMILE TRANSMISSION

DATE: 7/27/2005 TIME: 315P

TO Ray Romano

OFFICE/ROOM:

AGENCY: CH2M Hill

FAX NUMBER: 714-424-2085

FROM: Lesley Fitzpatrick

SUBJECT: YCR Surveys

COMMENTS: The New Sath Dike route, points 1-6, are the closest to the marina.

NUMBER OF PAGES: 3
(including this page)

If there are problems with copy quality, please call person who sent the document.

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ate: 3/16/04 Location: HAVASU NWR Route: SOUTH DIKE " Page: 1 ROUND 1 2004

ut an 's' in appropriate column if bird was seen but not heard, '1s' if bird was seen and heard
se one line for each individual (example, YCRA 1, YCRA 2 etc.). If a pair is detected, note which birds are paired in the comments

sta #	time start MST	Species of Individual detected	Responded During: pass 1 min 0-1	YCRA 1st 1-2	YCRA 2nd 2-3	silent 1st 3-4	silent 2nd 4-5	YCRA 3rd 5-6	YCRA 4th 6-7	pass 1 min 7-8	calls heard	repeat?	distance (estimate) YARDS	direction	Comments
1	0622	YCRA 1	✓	✓	✓	✓	✓	✓	✓		KEK		20	E	1 - 4 and 3 YCR PRIOR TO SURVEY
		YCRA 2	✓	✓	✓	✓	✓	✓	✓	✓	KEK		~~30~~	NE	MIN 3-4 TRAIN
		YCRA 3			✓	✓		✓	✓	✓	KEK		30	SE	
2	0637	YCRA 1	✓	✓	✓	✓	✓	✓	✓	✓	KEK		15	N	
		YCRA 2			✓	✓	✓	1S			KEK		15	S	
		YCRA 3	✓	✓	✓			✓	✓	✓	KEK	✓	100	SE	
		YCRA 4	✓				✓				KEK		15	W	
3	0654	YCRA 1	✓	✓	✓	✓	✓		✓	✓	KEK	✓		S	0-1 TRAIN
		YCRA 2			✓	✓	✓	✓	✓	✓	KEK			SE	7-8 MIN BEAVER SWIM
4	0707	YCRA 1	✓	✓	✓	✓	✓	✓	✓	✓	KEK		20	NE	2 - 4M FISH, BOAT PASSED
		YCRA 2				✓	✓	✓		✓	KEK		50	SE	
5	0718	YCRA 1	✓	✓	✓	✓	✓	✓	✓	✓	KEK		40	SE	B
		YCRA 2			✓	✓	✓		✓		KEK		50	N	B
6	0732	YCRA 1			✓						KEK		75	N	0-1 MIN PLANE OVERHEAD. N-SIDE OF S. DIKE
		YCRA 2				✓		✓	✓	✓	KEK		60	SE	3-4 TRAIN 7-8 MIN TRAIN
7	0746														7-8 MIN - BASS BOAT DIE-EN, - Prefishing
8	0847														
9	0903	YCRA 1		✓	✓	✓	✓	✓	✓	✓	KEK		20	NE	B BROWN GREEN SHOOTS
10	0915	YCRA 1				✓		✓			KEK	✓	100+	W	
11	0933	YCRA 1		✓	✓						CLATTER		20	E	B
12	0940	YCRA													

Date: APRIL 14, 2004 Location: HAVASU NWR Route: SOUTH DIKE Page: PG. 1 ROUND 2

Put an 's' in appropriate column if bird was seen but not heard, '1s' if bird was seen and heard
Use one line for each individual (example, YCRA 1, YCRA 2 etc.). If a pair is detected, note which birds are paired in the comments

sta #	time start	Species of individual detected	Responded During: pass 1 min 0-1	YCRA 1st 1-2	YCRA 2nd 2-3	silent 1st 3-4	silent 2nd 4-5	YCRA 3rd 5-6	YCRA 4th 6-7	pass 1 min 7-8	calls heard	N	repeat?	distance (estimate)	direction	Comments
1	5:42	YCRA 1	✓				✓	✓			KEK	2		30	NE	AUTO, TRAIN NOISE
	—	YCRA 2				✓					KEK			35	N	
		YCRA 1							✓		GRUNT			35	NW	
		YCRA 3								✓	KEK			30	SE	
2	6:01	YCRA 1			✓						CLATTER	0		45	N	
3	6:13	YCRA 1						✓			CLATTER	0		30	NW	
	—	YCRA 2							✓		CLATTER			40	N	
	—	YCRA 3								✓	CLATTER			50	SE	TRAIN NOISE
4	6:26	YCRA 1		✓							CLATTER	0	✓	90	SE	
5	6:37	—														
6	6:49	—														
7	7:19	YCRA 1	✓	✓	✓	✓	✓	✓	✓	✓	KEK	1		45	W	
—	—	YCRA 2			✓				✓		KEK / CLATTER			35	NE	
8	7:38	—														TRAIN NOISE
9	7:53	YCRA 1		✓							CLATTER	0		30	N	BULRUSH TRAIN NOISE
10	0805	YCRA							✓		CLATTER			30	W	RESPONDED TO ULTRALIGHT FLYING OVER
11	0831	YCRA		✓					✓		CLATTER	0		20	SE	
—	—	LEBI				✓	✓	✓		✓	COO	2		60	SW	
12	0841	YCRA 1			✓						CLATTER	9		40	S	PAIR BULRUSH
—	—	YCRA 2			✓					✓	CLATTER			40	S	"
	0852	—														

P. 03
FAX NO. 6022422513
JUL-27-2005 WED 03:16 PM USFWS

[redacted] Location: HAVASU NWR Route: SOUTH DIKE 1ST HALF Page: 1 ROUND 3

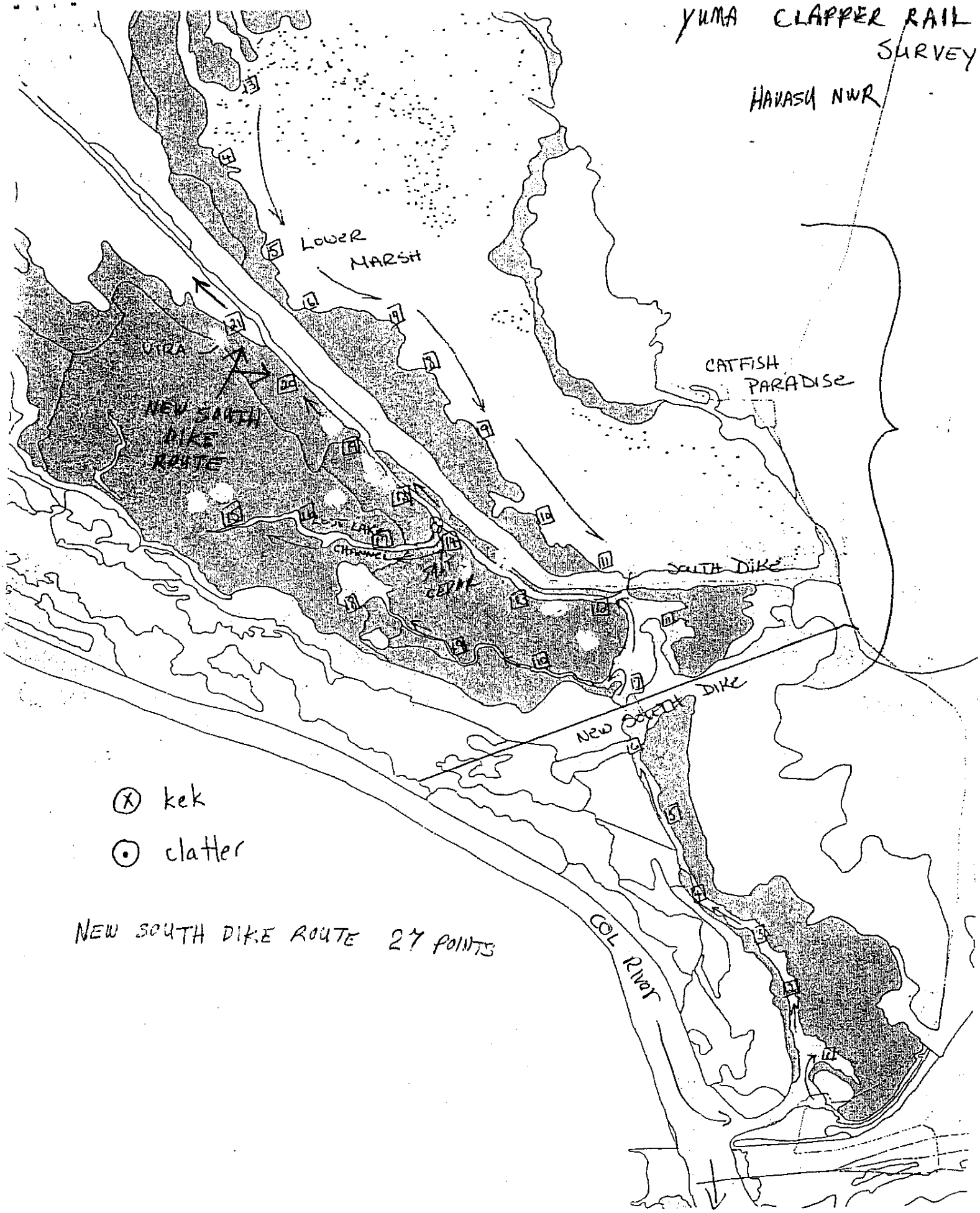
SUNRISE 5:41 AM

...n appropriate column if bird was seen but not heard, '1s' if bird was seen and heard

...ne line for each individual (example, YCRA 1, YCRA 2 etc.). If a pair is detected, note which birds are paired in the comments

sta #	time start	Species of Individual detected	Responded During: pass 1 min 0-1	YCRA 1st 1-2	YCRA 2nd 2-3	silent 1st 3-4	silent 2nd 4-5	YCRA 3rd 5-6	YCRA 4th 6-7	pass 1 min 7-8	calls heard	repeat?	distance (estimate) (YARDS)	direction N 0°	Comments
1	0532	YCRA 1		✓		✓					KEK, CLATTER		50	NW	TRAIN BULRUSH
		YCRA 2			✓						CLATTER		35	NE	" "
		YCRA 3					✓	✓	✓		CLATTER		30	E	" "
		YCRA 4									KEK		25	SW	" "
2	0544	YCRA 1	✓		✓	✓		✓		✓	KEK, CLATTER		30	NW	2 BULRUSH
		YCRA 2		✓	✓	✓	✓				KEK CLATTER		30	E	"
		YCRA 3					✓			✓	KEK CLATTER		25	SE	PR
		YCRA 4								✓	CLATTER		30	E	BULRUSH
3	0556	YCRA 1	✓	✓	✓	✓	✓	✓	✓	✓	KEK		35	W	1 2 BULRUSH TRAIN
		YCRA 2					✓				CLATTER		25	E	"
4	0609	YCRA 1	✓	✓		✓			✓	✓	KEK		30	S	1 2 BULRUSH/CATTAIL TRAIN
		YCRA 2		✓							KBURR		25	E	BULRUSH
		YCRA 3								✓	CLATTER		35	NE	"
5	0619	YCRA 1		✓					✓		CLATTER		35	NE	BULRUSH 3 2
		YCRA 2		✓	✓				✓		CLATTER		30	S	"
		YCRA 3					✓		✓		CLATTER		15	E	"
6	0630	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7	0641	LEBI	✓	✓									50	NE	2 1 COO
		LEBI	✓	✓									50	NW	COO
		YCRA 1			✓				✓		CLATTER		50	NW	1

P. 04 FAX NO. 6022422513 JUL-27-2005 WED 03:16 PM USFWS


YUMA CLAPPER RAIL SURVEY
HAVASU NWR
LOWER MARSH
CATFISH PARADISE
NEW SOUTH DIKE ROUTE
SOUTH DIKE
NEW SOUTH DIKE
COL RIVER
kek
clatter
NEW SOUTH DIKE ROUTE 27 POINTS

Appendix G

Desert Tortoise Report

July 2005

DESERT TORTOISE PRESENCE/ABSENCE SURVEYS FOR THE PG&E COMPRESSOR STATION EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM, TOPOCK, CALIFORNIA

Prepared By:

Garcia and Associates

1 Saunders Avenue

San Anselmo, CA 94960

GARCIA and ASSOCIATES

NATURAL & CULTURAL RESOURCE CONSULTANTS

GANDA

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Table 1. Summary of Desert Tortoise Survey Results....6

Appendices

Appendix A: Photo Log
Appendix B: Incidentally Observed Plant Species
Appendix C: Incidentally Observed Wildlife Species

Introduction

Garcia and Associates (GANDA) conducted a spring field survey for desert tortoise (*Gopherus agassizii*) on the lands surrounding Pacific Gas and Electric Company's (PG&E's) compressor station along its natural gas pipeline in Topock, California. The purpose was to determine the presence or absence of the federally and state-threatened desert tortoise. The survey followed the guidelines published in the United States Fish and Wildlife Service (USFWS) *Field Survey Protocol for any Federal Action that May Occur Within the Range of the Desert Tortoise* (protocol) (USFWS 1992).

No live desert tortoises were found within the survey area. However, two possible desert tortoise burrows and a set of probable desert tortoise shell bone fragments were observed (Figure 1; Appendix A, photos 1-4). The following report describes the survey methods, findings, and conclusions.

Site Description

The survey area comprises approximately 650 acres surrounding the Topock Compressor Station, which is in the Mojave Desert approximately 15 miles southeast of Needles, California in San Bernardino County. The Colorado River flows adjacent to the site and to the north and east. The majority of the northern boundary is defined by the Atchison, Topeka & Santa Fe (AT&SF) Railroad; however, these tracks also transect the western portion of the survey area. Interstate 40 also transects the survey area and divides it into a northern and a southern section at the Park Moabi Road exit (Figure 1). The elevation within the survey area ranges from approximately 200 to 1,000 feet above sea level. The terrain includes sparsely vegetated desert, slopes, unvegetated desert pavement, numerous shallow to deep washes, gently rolling hills, and the base of the Chemehuevi Mountains in the southeastern portion of the survey area (Appendix A, photos 5 and 6). Manmade facilities include the compressor station, paved and unpaved access roads, a set of four existing evaporation ponds, a rock quarry, and a portion of a 34-inch-diameter natural gas pipeline that runs partially above and partially below ground (Appendix A, Photo 7). A set of four previously filled, former evaporation ponds are located southeast of the existing evaporation ponds.

The compressor station and surrounding lands are on PG&E property, while the central and eastern portions of the survey area are part of the Havasu National Wildlife Refuge, managed by the USFWS. The western third of the survey area is on land managed by the Bureau of Land Management (BLM).

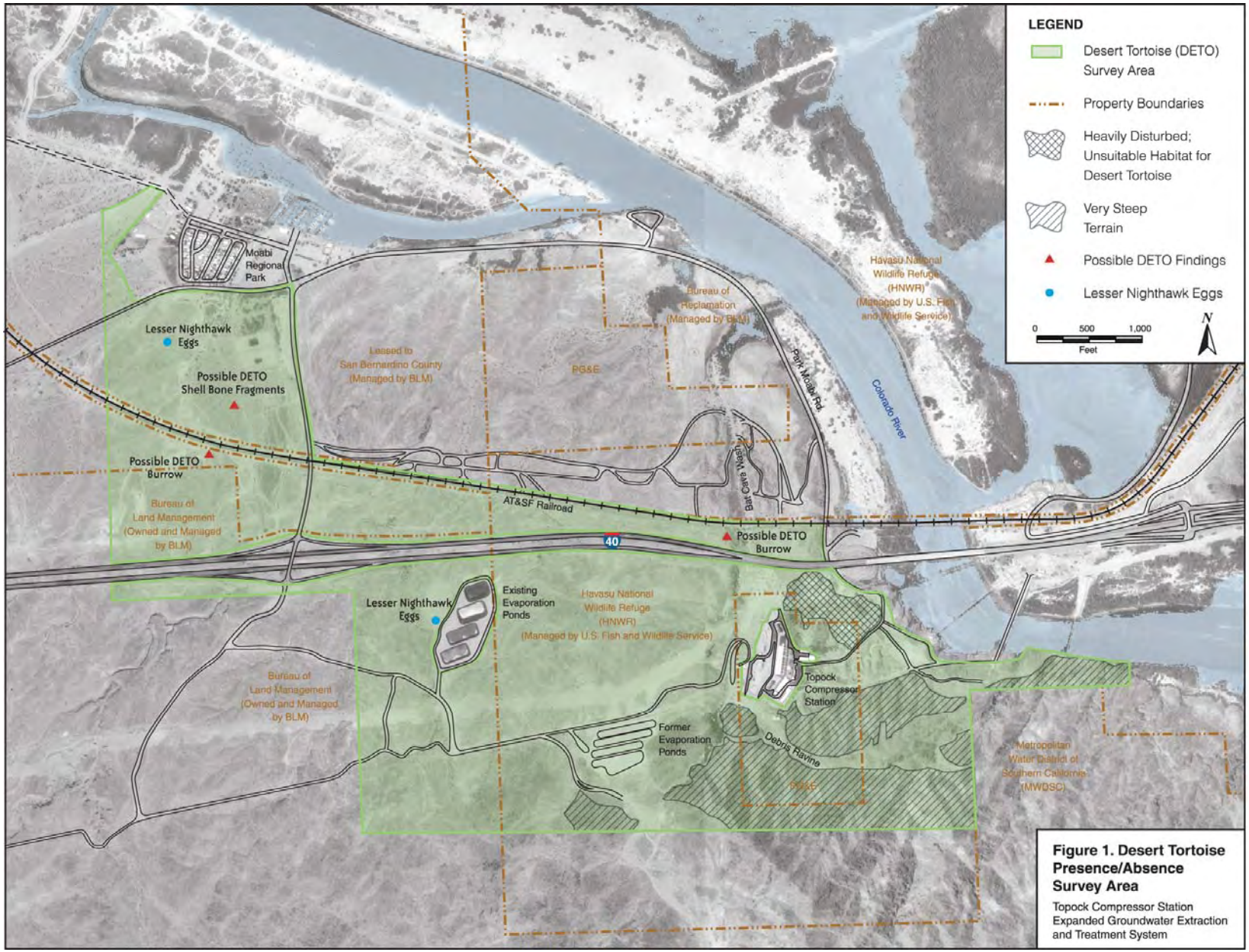


Figure 1. Desert Tortoise Presence/Absence Survey Area

Topock Compressor Station
Expanded Groundwater Extraction and Treatment System

Vegetation and Wildlife Habitat

There are two distinct habitat types within the survey area. They are the creosote bush (*Larrea tridentata*)-dominated areas and the dry washes. Creosote bushes dominate the upland and alluvial areas (Appendix A, Photo 6). Other perennial shrubs in these areas include bursage (*Ambrosia dumosa*), white ratany (*Krameria grayi*) and brittlebush (*Encelia farinosa*). Annuals were very abundant, especially this year due to abundant winter and spring rain. Desert indianwheat (*Plantago ovata*) interspersed with little desert buckwheat (*Eriogonum trichopes*) and Arabian schismus (*Schismus arabicus*) covered the ground in the majority of these areas (Appendix A, Photo 8). A list of plant species that were incidentally observed during the desert tortoise survey is presented in Appendix B.

The dry washes were predominantly vegetated with desert lavender (*Hyptis emoryi*), sweetbush (*Bebbia juncea*), cat-claw acacia (*Acacia gregii*), palo verde (*Cercidium microphyllum*), and tamarisk (*Tamarix ramosissima*) (Appendix A, Photo 9).

The survey area provides habitat for a variety of arid-adapted wildlife species. Common vertebrates found in this community include the desert iguana (*Dipsosaurus dorsalis*), western whiptail (*Cnemidophorus tigris*), zebra-tailed lizard (*Callisauras draconoides*), desert horned lizard (*Phrynosoma platyrhinos*), western diamond-backed rattlesnake (*Crotalus atrox*), sidewinder (*Crotalus cerastes*), turkey vulture (*Cathartes aura*), common raven (*Corvus corax*), black-throated sparrow (*Amphispiza bilineata*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), desert kangaroo rat (*Dipodomys deserti*), antelope ground squirrel (*Ammospermophilus leucurus*), and coyote (*Canis latrans*).

Survey Methods

GANDA wildlife biologists Rob Gilman, Jason Brooks, and Bill Trautwein conducted desert tortoise presence/absence surveys from May 18 to 21 and May 23 to 26, 2005, which is during the active season for this species, in accordance with the protocol. The weather during the survey was hot and sunny with calm winds in the afternoons, ranging from five to ten miles per hour. Air temperatures ranged from approximately 29 to 46° C (85 to 114° F). The surveys were performed between 0600 and 1400 hours.

Linear transects were walked systematically to search for desert tortoises, desert tortoise burrows, and sign (scat, tracks, burrows, shells, bones, etc.). Particular emphasis was placed on searching around the bases of creosote bushes and along the banks of the numerous washes. The survey area was surveyed at 100% coverage by spacing transects 10 meters apart. A zone of influence around the survey area was not surveyed due to the natural and artificial barriers that surround the majority of the survey area. These barriers constitute unsuitable habitat for desert tortoise and would likely prevent individuals from entering the survey area. The boundaries of the survey area are described further in the site description section of this report.

Aerial photographs, topographic maps, and global positioning system (GPS) units were used to navigate and assist in determining the boundaries of the survey area, suitable desert tortoise habitat, and the extent and location of the natural and artificial barriers. A Trimble GeoExplorer 3 GPS unit was used in conjunction with flagging, a Garmin V GPS unit, and a compass to ensure that the entire survey area was covered and to maintain proper orientation and spacing between transects. On relatively level terrain, the group of three surveyors walked parallel transects aligned east-west or north-south in the UTM coordinate system. A surveyor at one end of the group served as the navigator and used the UTM readout of the GPS unit to maintain a constant northing or easting for the transects. At the end of each transect, the transect starting point was shifted 30 meters (10 meters x 3 surveyors) using the UTM readout. In areas where obstacles such as mountains, compressor station facilities, and canyons prevented the surveyors from walking linear transects, the 10-meter spacing was maintained by using the navigation feature on the map-screen of the Garmin V GPS unit. This feature plotted the survey transect curves as the surveyors walked and allowed the navigator to determine which areas had already been surveyed and to maintain the appropriate ten-meter spacing between transect centerlines. Due to safety concerns and a lack of desert tortoise habitat, the steep slopes of the Chemehuevi Mountains that surround the Debris Ravine in the southeast corner of the survey area were excluded from the survey (Figure 1, Appendix A, Photo 7). The heavily disturbed, fenced area immediately northeast and adjacent to the compressor station was also not surveyed (Figure 1). It had almost no vegetation and consisted of loose spoil piles and compressor station facilities.

During the surveys, any burrows with a large enough entrance to accommodate a desert tortoise were inspected using a mirror to reflect sunlight into their far ends. The locations of the possible desert tortoise burrows and shell bone fragments were recorded using a Trimble GeoExplorer 3. Associated data such as the burrow class, dimensions, and additional field notes were recorded on data forms.

Results

No live desert tortoises were detected within the survey area. However, possible desert tortoise sign was found and is described in detail below.

A set of approximately 13 small shell bone fragments were discovered in a shallow wash located in the northwestern portion of the survey area (Figure 1; Appendix A, photos 3 and 4). The fragments ranged in size between 0.5 and 4 cm and were most likely desert tortoise remains. This conclusion was primarily made in the field based on the surveyors' knowledge and past observations of desert tortoise remains. To strengthen this conclusion, known desert tortoise carapace bones were examined at the BLM office in Needles, California. The bones on display were similar with respect to their coloration, roughness, serrated edges, and curvature. The *Keys and Figures for Estimating Time Since Death for Shell-skeletal Remains of Desert Tortoises* (Berry and Woodman, 1984) was also consulted. This document indicates that the individual died at least four years prior to the survey, due to the bone shell fragments being completely ossified and the surfaces showing pronounced peeling and mosaic cracking. The information index for desert tortoise sign

provided in the protocol (USFWS 1992) defines disarticulated and scattered remains of this kind as Class 5 shell remains (Table 1).

Two burrows with entrances large enough to accommodate a desert tortoise were found during the survey (Appendix A, photos 1 and 2). Both were possibly desert tortoise burrows in good condition and were categorized as Class 6 burrows (Table 1) using the index for desert tortoise sign provided in the protocol (USFWS 1992). The three surveyors searched for desert tortoise sign in the burrows and in the areas surrounding them, but none was discovered.

Table 1. Summary of Desert Tortoise Survey Results

ID #	Type of Find	Class[1,2]	Size: (centimeters)	End visible? Depth (D) (centimeters)	Entrance Direction	Latitude (UTM N)[3]	Longitude (UTM E)	Photo #	Comments
1	Shell Remains	5	W = 0.5 – 4	Not Applicable	Not Applicable	3845091	0727776	3, 4	13 bone fragments found in shallow wash. Appear to be bones under scutes. Edges are serrated. Surfaces on top and bottom are peeling. Coloration is white and bones are completely ossified.
2	Burrow	6	H = 10 W = 18	Yes; D = 61 cm	NW	3844621	0729382	1	No sign of desert tortoise in or around burrow.
3	Burrow	6	H = 15 W = 25	Yes; D = 30 cm	E	3844900	0727670	2	No sign of desert tortoise in or around burrow.

1. Burrow Class:
   1 = currently active, with tortoise or recent tortoise sign
   2 = good condition, definitely tortoise, no evidence of recent use
   3 = fair condition, definitely tortoise
   4 = deteriorated, definitely tortoise
   5 = deteriorated, possibly tortoise
   6 = good condition, possibly tortoise

2. Shell Remains Class:
   1 = fresh or putrid
   2 = normal color; scutes adhere to bone
   3 = scutes peeling off bone
   4 = shell bone is falling apart; growth rings on scutes are peeling
   5 = disarticulated and scattered

3. UTM Zone 11, NAD 83

Incidental Wildlife Observations

A variety of wildlife species was incidentally observed during the desert tortoise survey. These species included numerous birds, reptiles, and small burrowing mammals including desert woodrat (*Neotoma lepida)*, desert cottontail, black-tailed jackrabbit, and antelope ground squirrel. Sign of wildlife species observed included two pairs of lesser nighthawk (*Chordeiles acutipennis*) eggs (Appendix A, Photo 10) and a large amount of bat guano and insect remains in the caves of Bat Cave Wash (Appendix A, Photo 11). A complete list of the animals observed during the survey is provided in Appendix C.

Conclusions

Based on the results of the survey, desert tortoises are concluded to be absent in the survey area, which was surveyed to protocol at 100% coverage. The possible desert tortoise shell bone fragments may indicate historical use of the survey area; however, no desert tortoise scats, tracks, or other evidence of live tortoises or recent tortoise use was observed anywhere within the survey area.

The overall habitat within the survey area was relatively poor for desert tortoise. The AT&SF railroad, Interstate 40, Topock compressor station, and steep Chemehuevi Mountains and associated deep drainages are unsuitable habitat for desert tortoise and act as barriers for desert tortoise migration. The survey area contained very few burrows, only two of which had entrances large enough to accommodate a desert tortoise. The drainages periodically carry large volumes of water to the adjacent Colorado River, which would prevent the long-term establishment of burrows. The two possible desert tortoise burrows had no desert tortoise sign within or surrounding them and were more likely created by a black-tailed jackrabbit or one of the other small burrowing mammal species that were observed during the survey (Appendix C). The small, ossified bone shell fragments were probably desert tortoise carapace bones, however this isolated finding was located in a shallow drainage near a large culvert. These fragments may have washed in from outside the survey area during a rainstorm. This interpretation is based on the location of the find, surrounding topography, and the lack of any other apparent desert tortoise sign within the survey area.

Despite the absence of live tortoise observations during our survey, there is still a possibility that desert tortoises could pass through the survey area. Desert tortoises spend approximately 80% of their lives dormant in their burrows; however, in the spring (approximately March through May) and late summer (approximately August through October), when temperatures are not extreme, desert tortoises become active and emerge to mate, forage and drink before returning to their burrows. During these periods, they are more likely to be out in the open and will occasionally migrate up to several miles or more. The unusually heavy rainstorms during the winter of 2004-2005 produced an abundance of spring vegetation; however, during years of normal rainfall the survey area typically supports little annual vegetation (R. Romero, pers. comm.). While it is possible that the desert tortoise could migrate into the survey area through the drainages or from the less rocky, steep terrain west of the survey area, the typical lack of annual vegetation and burrows combined with the presence of steep rocky slopes make permanent

occupation of the survey area unlikely. In addition, the habitat within the survey area has been disturbed and fragmented by pipeline corridors, roads, Interstate 40, the AT&SF railroad, Topock Compressor station, evaporation ponds and other manmade facilities.

In the unlikely event that this species is encountered, protective measures should be implemented to avoid or minimize potential impacts to desert tortoise. These include, but are not limited to, a tortoise education program for all personnel working within the survey area boundaries, checking for tortoises in open trenches and under vehicles prior to moving them, using only existing routes of travel to and from the maintenance and inspection sites, and contacting a qualified biologist should a tortoise be found. Desert tortoises should only be handled only by personnel authorized by the USFWS, except in circumstances in which the life of the tortoise is in immediate danger.

References

Berry, K. H. and A. P. Woodman. 1984. Keys and Figures for Estimating Time Since Death for Shell-skeletal Remains of Desert Tortoises.

USFWS (United States Fish and Wildlife Service). 1992. Field Survey Protocol for any Federal Action that May Occur Within the Range of the Desert Tortoise. January 1992.

Personal Communication

Romero, Ray. CH2MHILL, Caliente, California. Telephone conversation with Rob Gilman, Garcia and Associates, June 23, 2005.

Appendix A

Photographs

Photo 1. Possible desert tortoise burrow located in the eastern portion of the survey area.

Photo 2. Possible desert tortoise burrow located in the western portion of the survey area.

Photo 3. Probable desert tortoise bone shell fragments found in a shallow wash in the northwestern portion of the survey area.

Photo 4. A close-up of the larger probable desert tortoise bone shell fragments. Note the serrated edges, mosaic cracking, and complete ossification of these fragments.

Photo 5. Gently rolling hills west of the compressor station. Note the Chemehuevi Mountains in the background.

Photo 6. The steep slopes of the Chemehuevi Mountains in the background with the rock quarry at the base.

Photo 7. An above-ground portion of the natural gas pipeline over Bat Cave Wash.

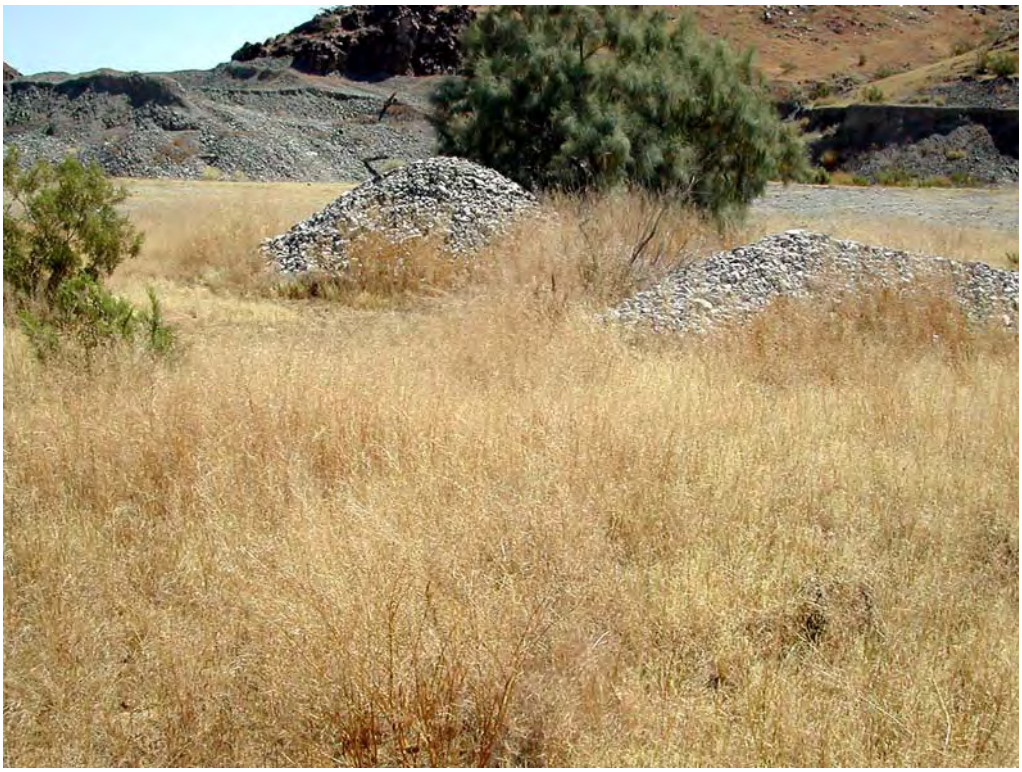


Photo 8. *Plantago ovata,* interspersed with *Eriogonum trichopes* and *Schismus arabicus* covered the ground in the majority of the creosote bush-dominated areas.

Photo 9. One of numerous dry washes in the southeastern portion of the survey area.

Photo 10. Lesser nighthawk eggs observed under a creosote bush in the eastern portion of the survey area.

Photo 11. Bat sign observed in Bat Cave Wash.

Appendix B

Incidentally Observed Plant Species

Latin Name	Common Name
Dicots	
AMARANTHACEAE	**amaranth family**
Amaranthus sp.	pigweed
Tidestromia oblongifolia	honeysweet
ASCLEPIADACEAE	**milkweed family**
Asclepias subulata	rush milkweed
Sarcostemma cynanchoides ssp. *hartwegii*	climbing milkweed
ASTERACEAE	**sunflower family**
Ambrosia dumosa	bursage
Atrichoseris platyphylla	gravel-ghost
Bebbia juncea	sweetbush
Chaenactis carphoclinia	pebble pincushion
Geraea cansescens	desert sunflower
Hymenoclea salsola	cheesebush
Lactuca serriola	prickly lettuce
Palafoxia arida	Spanish needle
Perityle emoryi	emory rock daisy
Peucephyllum schottii	pygmy-cedar
Psathyrotes ramosissima	velvet turtleback
Stephanomeria sp.	skeletonweed
Trichoptilium incisum	yellowhead
BORAGINACEAE	**borage family**
Cryptantha circumscissa	cushion cryptantha
Tiquilia plicata	fanleaf crinklemat
BRASSICACEAE	**mustard family**
Descurrania pinnata	tansy mustard
Lepidium sp.	pepperweed
Sisymbrium altissimum	tumble mustard
CACTACEAE	**cactus family**
Cylindropuntia c.f. *achanthocarpa*	buckhorn cholla
Cylindropuntia echinocarpa	silver cholla
Cylindropuntia ramosissima	pencil cholla
Ferocactus cylindraceus var *cylindraceus*	California barrel cactus
Opuntia basilaris var. *basilaris*	beavertail
Mammillaria dioica	fish-hook cactus
CHENOPODIACEAE	**goosefoot family**
Atriplex spinifera	spinescale
Salsola tragus	Russian thistle
CUCURBITACEAE	**gourd family**
Cucurbita palmata	coyote gourd

Latin Name	Common Name
Dicots	
EUPHORBIACEAE	**spurge family**
Chamaesyce micromera	desert spurge
FABACEAE	**legume family**
Acacia greggii	catclaw acacia
Cercidium microphyllum	palo verde
Dalea mollis	silk dalea
Prosopis glandulosa var *torreyana*	honey mesquite
FOUQUIERIACEAE	**ocotillo family**
*Fouquieria splendens*ssp *splendens*	ocotillo
HYDROPHYLLACEAE	**waterleaf family**
Phacelia crenulata ssp *crenulata*	notch-leaved phacelia
KRAMERIACEAE	**rhatany family**
Krameria grayi	white ratany
LAMIACEAE	**mint family**
Hyptis emoryi	desert-lavender
MALVACEAE	**mallow family**
Sphaeralcea ambigua var *ambigua*	apricot mallow
ONAGRACEAE	**evening primrose family**
Camissonia breivipes	yellow cups
Camissonia cardiophylla var *cardiophylla*	heartleaf sun-cup
PLANTAGINACEAE	**plantain family**
Plantago ovata	desert indianwheat
POLEMONIACEAE	**phlox family**
Langloisia setosissima ssp *setosissima*	bristly langloisia
POLYGONACEAE	**buckwheat family**
Chorizanthe brevicornu var *brevicornu*	brittle spineflower
Chorizanthe corrugata	wrinkled spineflower
Chorizanthe rigida	spiney rigid herb
Eriogonum deflexum var *deflexum*	flatcrown buckwheat
Eriogonum inflatum	desert trumpet
Eriogonum trichopes	little desert buckwheat
SCROPHULARIACEAE	**Figwort family**
Mimulus bigelovii	Bigelow's monkeyflower

Latin Name	Common Name
Dicots	
SOLONACEAE	**Nightshade family**
Lycium andersonii	Anderson wolfberry
Lycium cooperi	Cooper's wolfberry
Nicotiana obtusifolia	desert tobacco
Physalis crassifolia	thick-leaf ground cherry
TAMARICACEAE	**Tamarisk family**
Tamarix ramosissima	tamarisk
Monocots	
LILIACEAE	**Lily family**
Hesperocallis undulata	desert lily
POACEAE	**Grass family**
Avena barbata	slender wildoat
Bromus arizonicus	Arizona brome
Bromus sp	brome
Cynodon dactylon	bermuda grass
Elytrigia repens	quackgrass
Erioneuron pulchellum	fluff grass
Phalaris arundinacea	reed canary grass
Schismus arabicus	Arabian schismus
Vulpia microstachys var *microstachys*	desert fescue
Vulpia octoflora	six weeks fescue

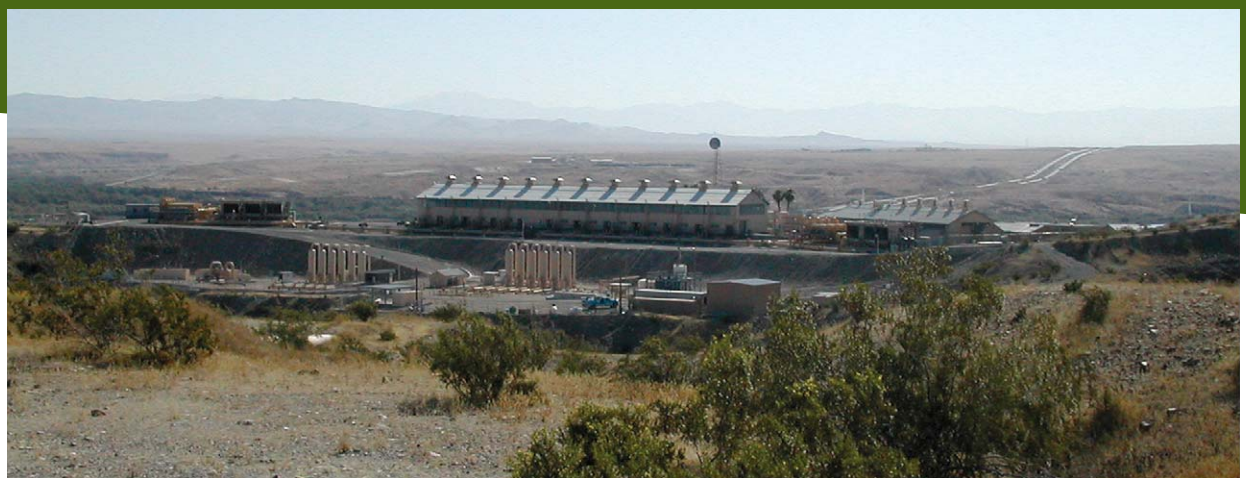
Appendix C

Incidentally Observed Wildlife Species

Latin Name	Common Name
Reptiles	
Dipsosaurus dorsalis	desert iguana
Sauromalus obesus	common chuckwalla
Uta stansburiana	common side-blotched lizard
Phrynosoma platyrhinos	desert horned lizard
Cnemidophorus tigris	western whiptail
Salvadora hexalepis	western patch-nosed snake
Crotalus mitchellii	speckled rattlesnake
Birds	
Cathartes aura	turkey vulture
Callipepla gambelii	Gambel's quail
Columba livia	rock pigeon
Zenaida asiatica	white-winged dove
Zenaida macroura	mourning dove
Chordeiles acutipennis	lesser nighthawk
Picoides scalaris	ladder-backed woodpecker
Sayornis saya	Say's phoebe
Myiarchus cinerascens	ash-throated flycatcher
Tyrannus verticalis	western kingbird
Lanius ludovicianus	loggerhead shrike
Corvus corax	common raven
Stelgidopteryx serripennis	northern rough-winged swallow
Auriparus flaviceps	verdin
Thryomanes bewickii	Bewick's wren
Polioptila melanura	black-tailed gnatcatcher
Vermivora luciae	Lucy's warbler
Geothlypis trichas	common yellowthroat
Amphispiza bilineata	black-throated sparrow
Quiscalus mexicanus	great-tailed grackle
Molothrus ater	brown-headed cowbird
Mammals	
Sylvilagus audubonii	desert cottontail
Lepus californicus	black-tailed jackrabbit
Ammospermophilus leucurus	antelope ground squirrel
Neotoma lepida	desert woodrat

August 2006

SOUTHWESTERN WILLOW FLYCATCHER PRESENCE/ABSENCE SURVEYS FOR THE PG&E TOPOCK COMPRESSOR STATION EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM



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Appendices

A: Incidental Plant and Vertebrate Species
B: Photo Log
C: Call Points and UTM Coordinates
D: Survey Forms

Acronyms

APE	Area of Potential Effects
AZBV	Arizona Bell's vireo
BHCO	brown-headed cowbird
BLM	United States Bureau of Land Management
GANDA	Garcia and Associates
PG&E	Pacific Gas and Electric Company
SWFL	Southwestern willow flycatcher
USFWS	United States Fish and Wildlife Service

Introduction

Garcia and Associates (GANDA) conducted a protocol survey for the southwestern willow flycatcher (SWFL) (*Epidonax trailii extimus*) for Pacific Gas and Electric (PG&E) near the Topock Compressor Station. The purpose of the survey was to determine the presence or absence of the federally- and State of California-threatened SWFL. The survey followed the protocol outlined in *A Southwestern Willow Flycatcher Natural History and Survey Protocol* (Sogge *et al.* 1997) including the changes outlined in the 2000 United States Fish and Wildlife Service (USFWS) revision (USFWS 2000). This report is intended to fulfill the Bureau of Land Management's (BLM's) wildlife stipulation number 28 as part of the Interim Measures No. 3 facility approval. This stipulation states:

> *Riparian areas surrounding the proposed action site will be surveyed for southwestern willow flycatchers according to the protocol established by the U. S. Fish and Wildlife Service. These surveys will be completed each year by a biologist permitted by the U. S. Fish and Wildlife Service to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports will be provided to the biologists in the BLM Lake Havasu Field Office on an annual basis.*

No SWFLs were found within the survey area. The following report describes the survey methods, findings, and conclusions.

Site Description

The survey area consisted of seven sites totaling 80 acres surrounding the Topock Compressor Station. The compressor station is located adjacent to the Colorado River, 15 miles southeast of Needles, California, in San Bernardino County. The survey area was not located within designated critical habitat for the SWFL. The sites were located on either side of the Colorado River, in San Bernardino County, California, and Mojave County, Arizona. The largest of the seven sites was in Arizona on the Havasu National Wildlife Refuge. The other six sites were all located in California, with three sites on BLM land, two sites in the Moabi Regional Park, and one site in the California portion of the Havasu National Wildlife Refuge, as shown on Figures 1-5. Survey sites varied in elevation from 400 to 500 feet above mean sea level.

Vegetation, Habitat Quality, and Wildlife

The most abundant plant species encountered in the survey area were salt cedar (*Tamarix ramosissima*), coyote willow (*Salix exigua*), catclaw acacia (*Acacia greggii*), arrowweed (*Pluchea sericea*), and palo verde (*Cercidium microphyllum*). Salt cedar, the most dominant species throughout the survey area, often formed dense thickets and reached heights of over eight feet. A list of the plant species observed is included in Appendix A.

Figure 1. Map of all Southwestern Willow Flycatcher Survey Sites

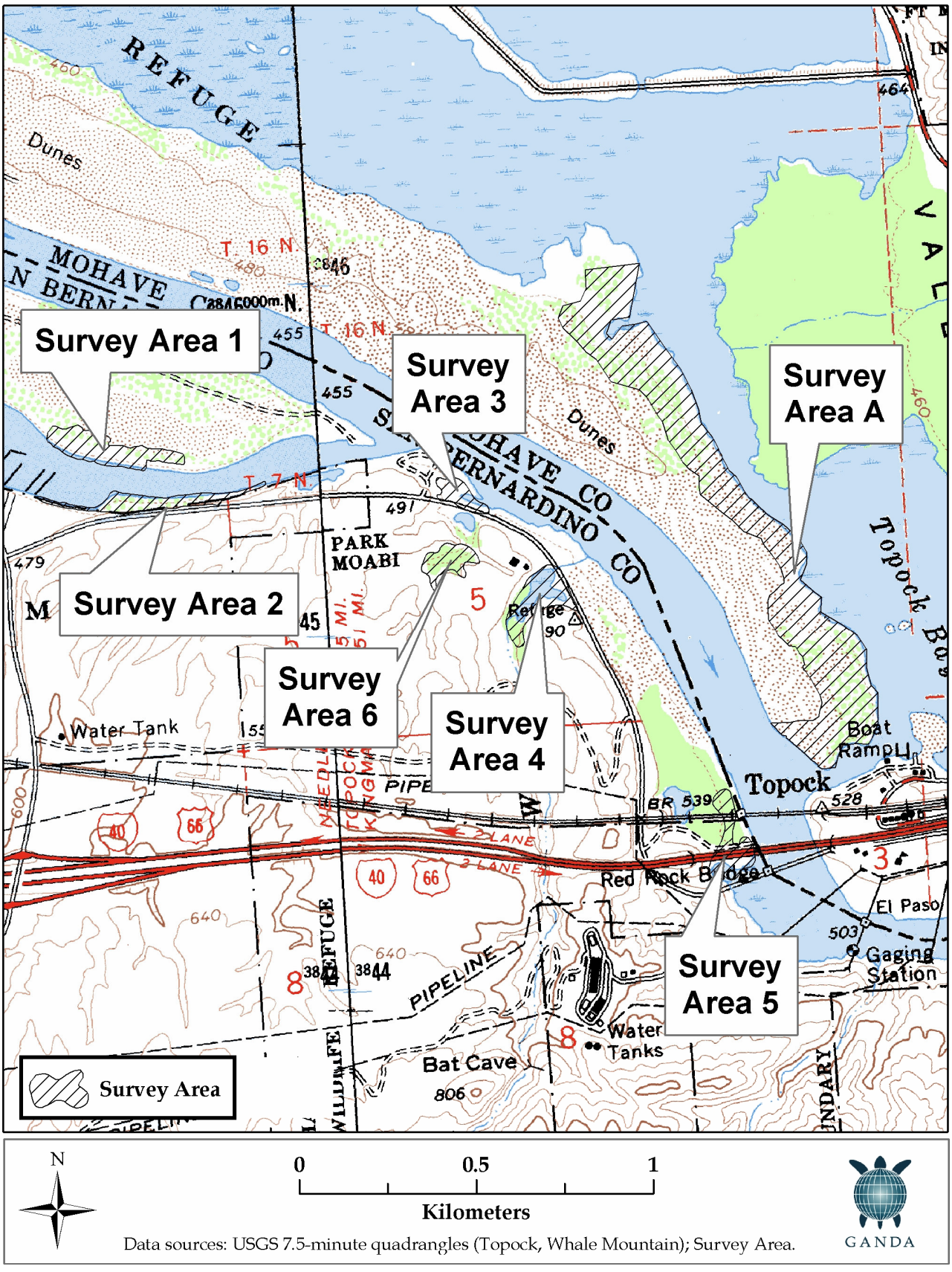


Figure 2. Map of Survey Areas 1 and 2

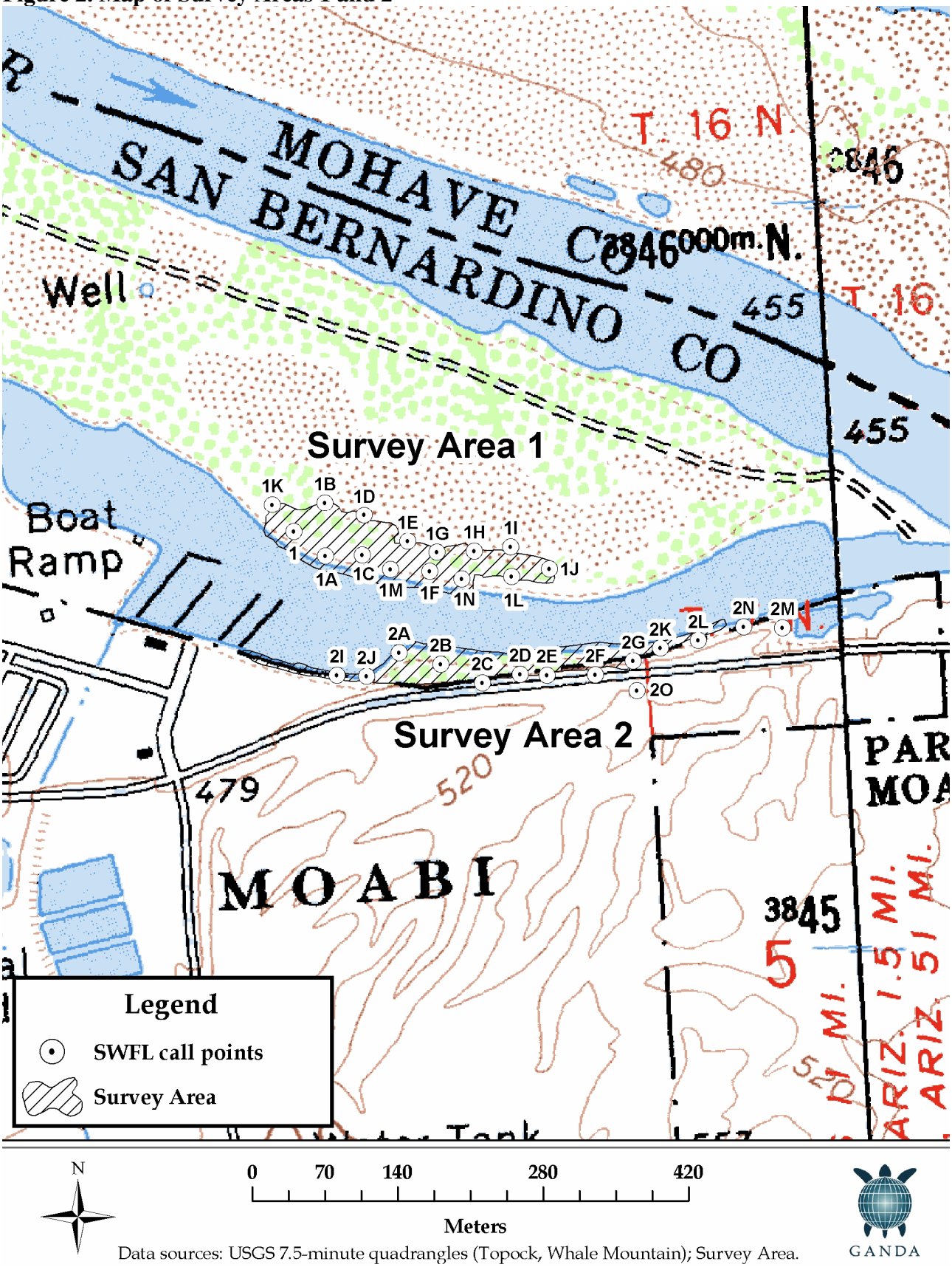


Figure 3. Map of Survey Areas 3, 4 and 6

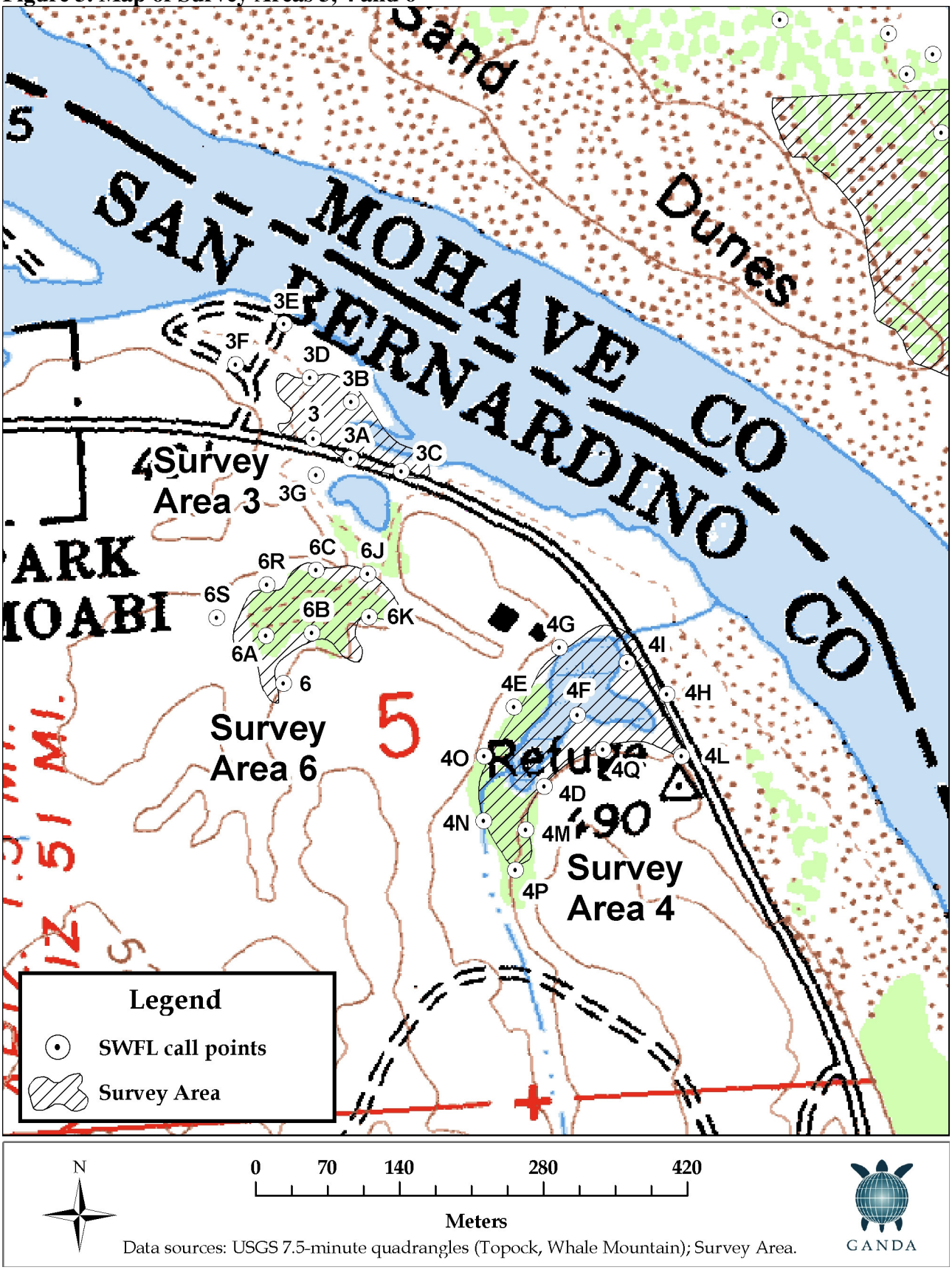


Figure 4. Map of Survey Area 5

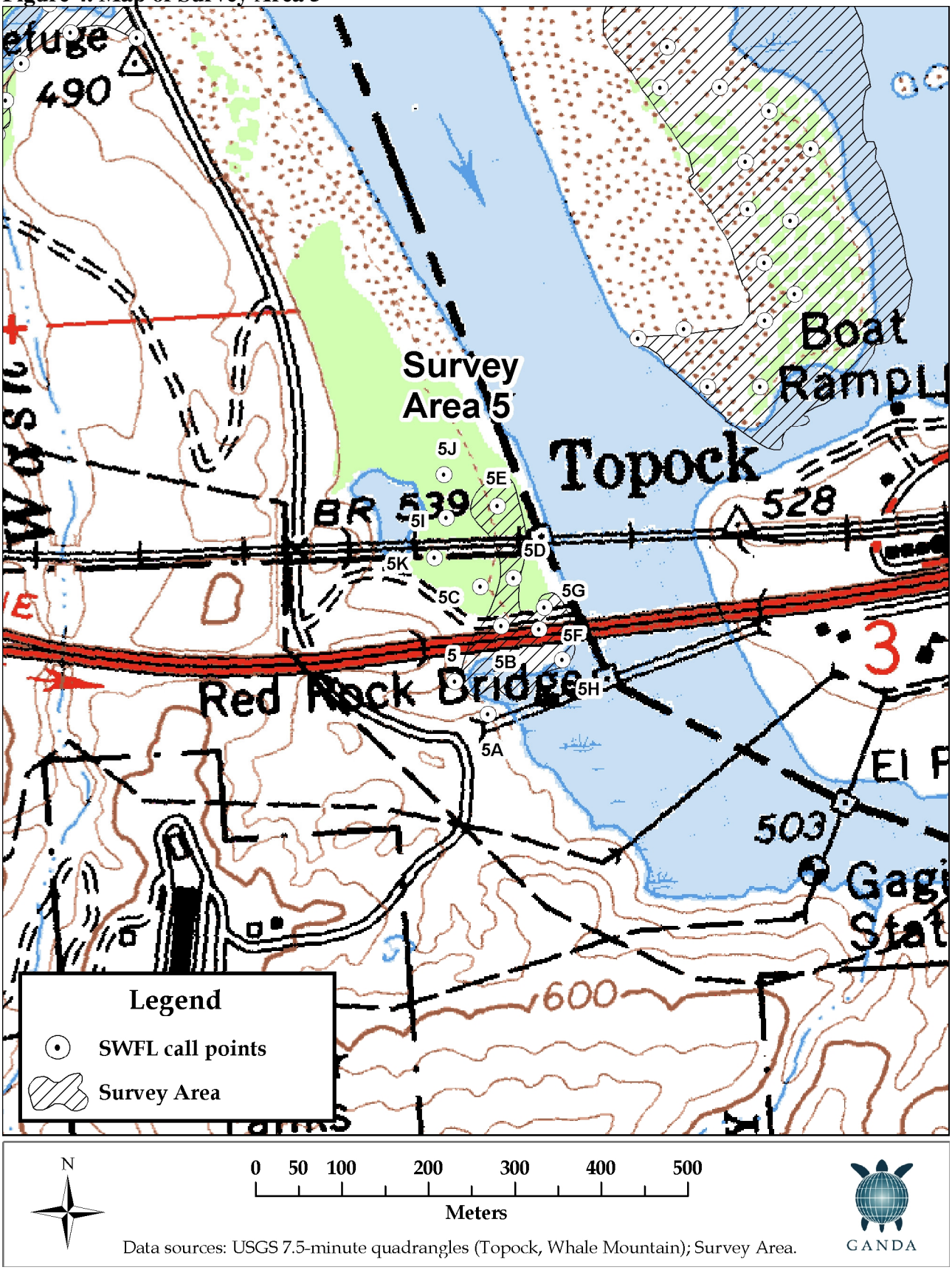
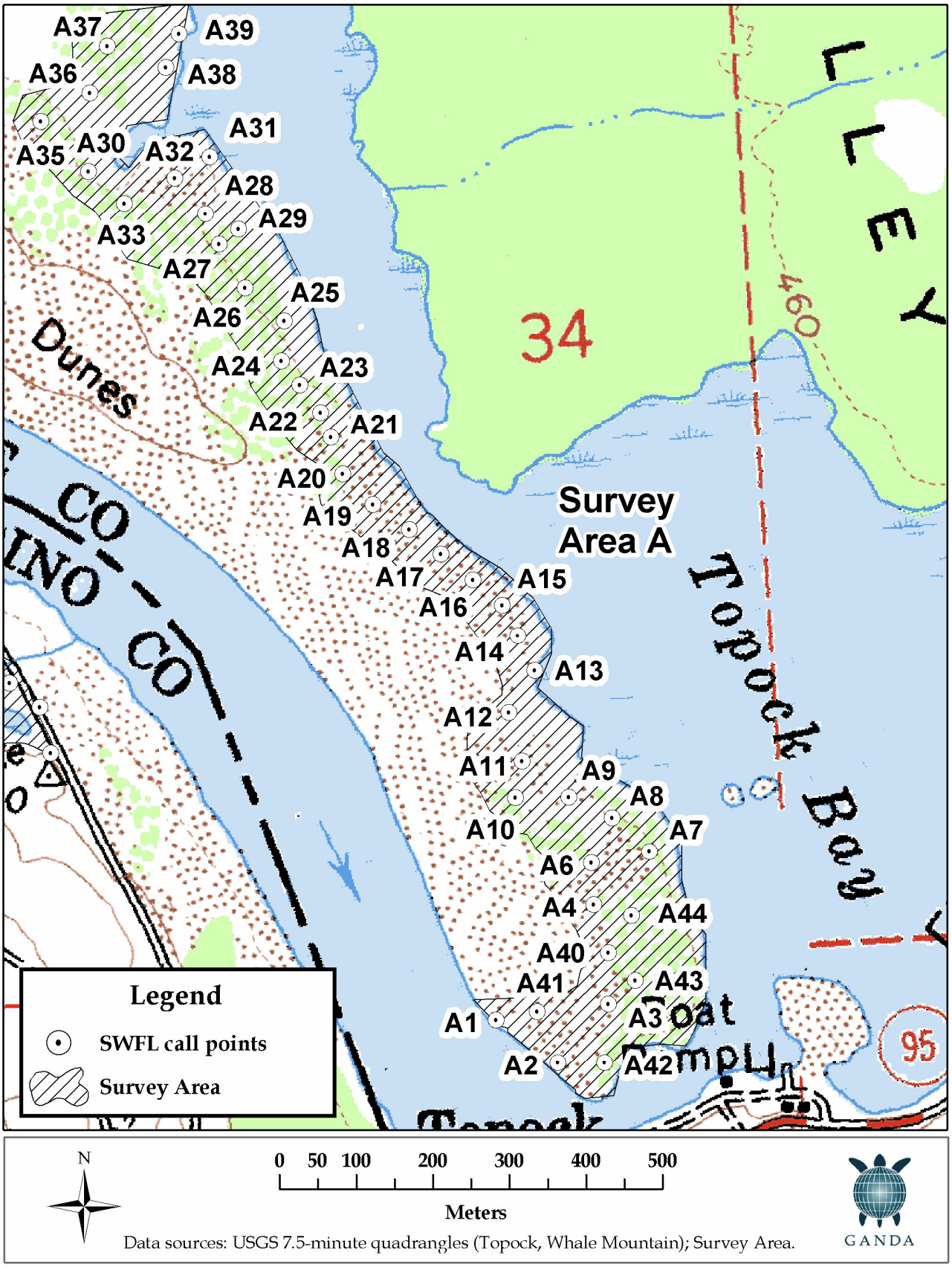


Figure 5. Map of Survey Area A



Habitat Quality

The Colorado River provided the survey sites with two of the characteristics required for suitable SWFL habitat: the presence of standing surface water throughout the breeding season and a suitable vegetation composition. However, two factors that may detract from the overall quality of the habitat were habitat fragmentation and human activity. The California sites (sites 1-6) were small and geographically isolated by the desert, Park Moabi Drive, and the Colorado River. Additionally, their proximity to Park Moabi, Interstate 40, the Burlington Northern Santa Fe Railway, and the PG&E Topock Compressor Station may have resulted in a high level of human activity. The Arizona site (Site A) was located on a large peninsula bordered in part by contiguous riparian habitat and a bulrush-dominated marsh; however, it was also adjacent to the Topock Marina, a community of a dozen houses, and the Colorado River. Watercraft were frequently observed on the Colorado River and may also contribute to human activity. A photo of each survey site is located in Appendix B.

Wildlife

A variety of wildlife species were observed during the SWFL survey. The type and number of wildlife species encountered in the survey areas were influenced by the surrounding habitats of creosote-dominated desert and the Topock Marsh, a large wetland with abundant wildlife and bird species. The most commonly observed non-avian vertebrate species were beaver (*Castor canadensis*), black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans)*, bullfrog (*Rana catesbeiana*), and western side blotched lizard (*Uta stansburiana*). The most commonly observed avian species were great-tailed grackle (*Quiscalus mexicanus*), white-winged dove (*Zenaida asiatica*), lesser nighthawk (*Chordeiles acutipennis*), and black-tailed gnatcatcher (*Polioptila melanura*). Complete lists of the avian and non-avian vertebrate species encountered are included in Appendix A.

Two significant observations were the detections of both the Arizona Bell's vireo (*Vireo bellii arizonae* [AZBV]) and brown-headed cowbird (*Molothrus ater* [BHCO]).

Two detections of AZBV occurred in the Arizona survey area. Although this species has no Arizona or federal protective status, it is an endangered species in California. The first detection occurred in the middle of the survey area on July 9, and the second occurred at its northern end on July 14. This is the second year that AZBV have been detected at these locations.

BHCO were observed at every site in the project area. BHCO are known nest parasites of SWFL and other songbirds, and their presence may be reducing SWFL presence in the area.

Survey Methods

GANDA wildlife biologist Jeff Steinman (USFWS permit #TE-085026 and Arizona Game and Fish Department Permit #SP-716513) conducted the SWFL surveys, following the protocol outlined by Sogge (1997) and protocol revision prepared by the USFWS (USFWS 2000). This protocol revision for project-related surveys recommends that five

surveys be conducted during three survey periods, with three of the surveys occurring during the last survey period. These three periods are from May 15 to 31, June 1 to 21, and June 22 to July 17. Mr. Steinman conducted the SWFL surveys from May 15 to 18, June 1 to 4, June 26 to 28, July 6 to 9, and July 14 to 16. All surveys were conducted between 4:30 a.m. and 10:00 a.m. hours.

The survey area was the same as surveyed in the 2005, with the exception of call points 2 and 2H in the northern portion of Survey Area 2 that were eliminated due to the vegetation in the area having been removed. Although not observed, it is assumed that the vegetation removal was performed by Park Moabi staff.

The SWFL survey area extended beyond the northeastern Area of Potential Effects (APE) boundary. This is due to suitable habitat being contiguous beyond the APE and meriting an increased survey area (Figure 5).

The survey method consisted of using a portable tape player to broadcast SWFL calls from call points established during the 2005 survey. To establish a standardized methodology, call points were originally established in the field using aerial photographs, topographic maps, and global positioning system (GPS) units to ensure that the same call points were used for each survey year and that call points were not placed greater than 30 to 50 meters apart. The placement and distance between call points varied depending on the quality of the habitat, thickness of vegetation and accessibility. The call points were located in 2006 using a GPS unit containing their UTM coordinates See Appendix C for a complete list of call points and UTM coordinates, and see Figure 1 for a map of all survey sites.

At each survey area, the surveyor spent ten minutes listening for the presence of any singing males. After this initial listening period, SWFL “fitz-bew” calls were broadcasted at each call point for a 30-second period that was immediately followed by a 60-second listening period. The broadcasting and listening intervals were repeated for three to five minutes at each call point before proceeding to the next point. The start time of each survey area and order in which the call points were surveyed were intentionally varied from one visit to the next to reduce bias.

Results

No SWFL were detected in the survey area during the 2006 protocol survey.

Conclusions

In the event that this species is found to be occupying the APE in the future, protective measures should be implemented to avoid or minimize potential impacts to the SWFL. These include, but are not limited to, an education program for all personnel working within the survey area boundaries, continued surveying of the project area during the breeding season, and contacting a qualified biologist should a potential SWFL be suspected.

References

Smith, A.B., P.E.T. Dockens, A.A. Tudor, H.C. English, B.L. Allen. 2004. *Southwestern Willow Flycatcher 2003 Survey and Nest Monitoring Report.* Arizona Game and Fish Department, Phoenix.

Sogge, M.K., R.M. Marshall, S.J. Sferra, and T.J. Tibbits. 1997. *A Southwestern Willow Flycatcher Natural History Summary And Survey Protocol.* National Park Service Cooperative Studies Unit. USGS Colorado Plateau Research Station- Northern Arizona University, Flagstaff, Arizona.

SWCA Environmental Consultants. 2004. Southwestern Willow Flycatcher Surveys, Demography, and Ecology Along the Lower Colorado River and Tributaries. Annual Report. February 2004.

United States Fish and Wildlife Service (USFWS). 2000. *Southwestern Willow Flycatcher Protocol Revision 2000.* July 11, 2000

Appendix A

Photographs

Site 1

Site 2

Site 3

Site 4

Site 5

Site 6

Site A

Appendix B

Incidental Plant and Vertebrate Species

Incidental Plant Species

Common Name	Latin Name
Arrowweed	*Plucha sericea*
Cheesebush	*Hymenoclea salsola*
Prickly Lettuce	*Lactuca serriola*
Buckhorn Cholla	*Cylindropuntia* c.f. *achanthocarpa*
Silver Cholla	*Cylindropuntia echinocarpa*
Pencil Cholla	*Cylindropuntia ramosissima*
California Barrel Cactus	*Ferocactus cylindraceus* var *cylindraceus*
Beavertail	*Opuntia basilaris* var. *basilaris*
Fish-Hook Cactus	*Mammillaria dioica*
Russian Thistle	*Salsola tragus*
Catclaw Acacia	*Acacia greggii*
Palo Verde	*Cercidium microphyllum*
Honey Mesquite	*Prosopis glandulosa* var *torreyana*
Desert-Lavender	*Hyptis emoryi*
Anderson Wolfberry	*Lycium andersonii*
Cooper's Wolfberry	*Lycium cooperi*
Desert Tobacco	*Nicotiana obtusifolia*
Thick-Leaf Ground Cherry	*Physalis crassifolia*
Salt Cedar	*Tamarix ramosissima*
Cottonwood	*Populus deltoides*
Coyote Willow	*Salix exigua*
Gooding's Willow	*Salix gooddingii*
Cattail	*Typha angustifolia*
Ironwood	*Olneya tesota*

Incidental Mammals and Reptiles

Common Name	Scientific Name
Kit Fox	*Vulpes macrotis*
Coyote	*Canis latrans*
Desert Cottontail	*Sylvilagus audubonii*
Black-tailed Jackrabbit	*Lepus californicus*
Beaver	*Castor canadensis*
Desert Iguana	*Dipsosaurus dorsalis*
Side-blotched Lizard	*Uta stanburiana*
Western Whiptail	*Cnemidophorus tigris*

Incidental Bird Species

Common Names	Scientific Names
Canada Goose	*Branta canadensis*
Mallard	*Anas platyrhynchos*
Ruddy Duck	*Oxyura jamaicensis*
Gambel's Quail	*Callipepla gambelii*
Clark's Grebe	*Aechmophorus clarkia*
Double-Crested Cormorant	*Phalacrocorax auritus*
Least Bittern	*Ixobrychus exilis*
Great Blue Heron	*Ardea herodias*
Green Heron	*Butorides virescens*
Great Egret	*Ardea alba*
White-Faced Ibis	*Plegadis chihi*
Turkey Vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
American Kestrel	*Falco sparverius*
American Coot	*Fulica americana*
Killdeer	*Charadrius vociferous*
Caspian Tern	*Sterna caspia*
Rock Pigeon	*Columba livia*
Common-Ground Dove	*Columbina passerina*
White-Winged Dove	*Zenaida asiatica*
Mourning Dove	*Zenaida macroura*
Inca Dove	*Columbina inca*
Greater Roadrunner	*Geococcyx californianus*
Lesser Nighthawk	*Chordeiles acutipennis*
Black-Chinned Hummingbird	*Archilochus alexandri*
Anna's Hummingbird	*Calypte anna*
Ladder-Backed Woodpecker	*Picoides scalaris*
Black Phoebe	*Sayornis nigricans*
Say's Phoebe	*Sayornis saya*
Ash-Throated Flycatcher	*Myiarchus cinerascens*
Western Kingbird	*Tyrannus verticalis*
Loggerhead Shrike	*Lanius ludovicianus*
Bell's Vireo	*Vireo bellii*
Common Raven	*Corvus corax*
Northern Rough-Winged Swallow	*Stelgidopteryx serripennis*
Cliff Swallow	*Petrochelidon pyrrhonota*
Verdin	*Auriparus flaviceps*
Bewick's Wren	*Thryomanes bewickii*
Marsh Wren	*Cistothorus palustris*
Black-Tailed Gnatcatcher	*Polioptila melanura*
Crissal Thrasher	*Toxostoma crissale*
European Starling	*Sturnus vulgaris*
Wilson’s Warbler	*Wilsonia pusilla*
Orange-Crowned Warbler	*Vermivora celata*
Lucy's Warbler	*Vermivora luciae*
Yellow Warbler	*Dendroica petechia*
Common Yellowthroat	*Geothlypis trichas*
Yellow-Breasted Chat	*Icteria virens*
Bushtit	*Psaltriparus minimus*
Summer Tanager	*Piranga rubra*
Abert's Towhee	*Pipilo aberti*
Song Sparrow	*Melospiza melodia*
Rose Breasted Grosbeak	*Pheucticus ludovicianus*
Blue Grosbeak	*Passerina caerulea*
Lazuli Bunting	*Passerina amoena*
Red-Winged Blackbird	*Agelaius phoeniceus*
Yellow-Headed Blackbird	*Xanthocephalus xanthocephalus*
Great-Tailed Grackle	*Quiscalus mexicanus*
Brown-Headed Cowbird	*Molothrus ater*
Purple Finch	*Carpodacus purpureus*
Lesser Goldfinch	*Carduelis psaltria*

Appendix C

Call Points and UTM coordinates

Call Points and UTM coordinates

Call Point	Northing	Easting
Site 1		
1	34.7287023	114.5086978
1A	34.7283877	114.5082587
1B	34.7290362	114.5082202
1C	34.7283767	114.5077127
1D	34.7288573	114.5076507
1E	34.7285071	114.5070372
1F	34.7281293	114.5067438
1G	34.7283547	114.5066217
1H	34.7283437	114.5060757
1I	34.7283693	114.5055359
1J	34.7280777	114.5049927
1K	34.7290484	114.5089878
1L	34.7280077	114.5055517
1M	34.7281790	114.5073177
1N	34.7280152	114.5062765
Site 2		
2A	34.7271701	114.5072564
2B	34.7270027	114.5066627
2C	34.7267487	114.5060653
2D	34.7268256	114.5055053
2E	34.7267972	114.5051156
2F	34.7267690	114.5044044
2G	34.7269073	114.5038429
2I	34.7269448	114.5081916
2J	34.7269087	114.5077567
2K	34.7270438	114.5034344
2L	34.7271090	114.5028740
2M	34.7272046	114.5016267
2N	34.7272409	114.5021941
2O	34.7265482	114.5038114
Site 3		
3	34.7266066	114.4968334
3A	34.7264137	114.4964485
3B	34.7269123	114.4964092
3C	34.7262786	114.4959193
3D	34.7271437	114.4968306
3E	34.7276294	114.4970733
3F	34.7272984	114.4976113
3G	34.7262869	114.4968244
Site 4		
4D	34.7234366	114.4945918
4E	34.7241494	114.4948672
4F	34.7240427	114.4941947
4G	34.7246473	114.4943451
4H	34.7241802	114.4932324
4I	34.7244817	114.4936357
4L	34.7236327	114.4931157
4M	34.7230606	114.4948162
4N	34.7231627	114.4952587
4O	34.7237292	114.4952113
4P	34.7227150	114.4949501
4Q	34.7237269	114.4939468

Call Point	Northing	Easting
Site 5		
5	34.7167161	114.4895676
5A	34.7163575	114.4891762
5B	34.7172730	114.4889426
5C	34.7176950	114.4891746
5D	34.7177678	114.4887486
5E	34.7185247	114.4889027
5F	34.7172167	114.4884643
5G	34.7174399	114.4883834
5H	34.7168767	114.4881948
5I	34.7184326	114.4895547
5J	34.7188832	114.4895511
5K	34.7180249	114.4897361
Site 6		
6	34.7244710	114.4973025
6A	34.7249002	114.4974595
6B	34.7249037	114.4969708
6C	34.7254506	114.4968827
6J	34.7253937	114.4963377
6K	34.7250157	114.4963497
6R	34.7253507	114.4974186
6S	34.7250823	114.4979739
Site A		
A1	34.7201930	114.4869984
A10	34.7227959	114.4865362
A11	34.7232189	114.4864155
A12	34.7237988	114.4865631
A13	34.7242722	114.4861577
A14	34.7246916	114.4863712
A15	34.7250658	114.4865683
A16	34.7253807	114.4869605
A17	34.7257065	114.4873952
A18	34.7260185	114.4878299
A19	34.7263354	114.4883260
A2	34.7196456	114.4861564
A20	34.7267180	114.4887242
A21	34.7271551	114.4888669
A22	34.7274569	114.4889890
A23	34.7277959	114.4892613
A24	34.7280890	114.4895070
A25	34.7285576	114.4894346
A26	34.7289766	114.4899624
A27	34.7295078	114.4902939
A28	34.7298750	114.4904642
A29	34.7296709	114.4900060
A3	34.7203015	114.4853867
A30	34.7304525	114.4920946
A31	34.7305431	114.4903565
A32	34.7303194	114.4908694
A33	34.7300530	114.4916106
A35	34.7310743	114.4927285
A36	34.7313701	114.4920116
A37	34.7319069	114.4917183
A38	34.7316184	114.4909052
A39	34.7320004	114.4906932

Call Point	Northing	Easting
A4	34.7214798	114.4855149
A40	34.7209055	114.4853451
A41	34.7202607	114.4864104
A42	34.7196133	114.4854915
A43	34.7205603	114.4849893
A44	34.7213290	114.4849859
A6	34.7219756	114.4855115
A7	34.7220680	114.4846749
A8	34.7224913	114.4851773
A9	34.7227674	114.4857807

Appendix D

Survey Forms

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Steinman Phone # 415 850 2692
Affiliation Garcia and Associates E-mail jsteinman@garciaandassociates.com
Site Name Topock Compressor Station AZ1 Date Report Completed 8/1/06

Did you verify that this site name is consistent with that used in previous years? (Yes) No (circle one)
If name is different, what name(s) was used in the past? _____
If site was surveyed last year, did you survey the same general area this year? (Yes) / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) No If no, summarize in comments below.

Management Authority for Survey Area (circle one): Federal Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) Havasu National Wildlife Refuge

Length of area surveyed: 3600 Ft. (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☒ Mixed native and exotic plants (mostly exotic)

☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima, Acacia greggii, Salix exigua

Average height of canopy (Do not put a range): 20 Ft (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) / No (circle one)
Distance from the site to surface water or saturated soil: 0 (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes / (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name Topock Compressor Station AZ1 State AZ County Mohave
USGS Quad Name Topock Elevation 440 (feet) meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 46 178 E 11 07 29 655 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 44 888 E 11 07 30 259 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledgers seen; potential threats)
1 Jeff Steinman	Date 5/17 0942-0943 Start 5/18 0550-0854 Stop Total hrs 5.05	0	0	0	N	Y	N	
2	Date 6/1 Start 0530 Stop 1000 Total hrs 4.30	0	0	0	N	Y	N	
3	Date 6/27 0737-0903 Start 6/28 0521-0907 Stop Total hrs 5.12	0	0	0	N	Y	N	
4	Date 7/7 0540-0909 Start 7/9 0547-0841 Stop Total hrs 6.83	0	0	0	N	Y	N	
5	Date 7/14 Start 0541 Stop 0922 Total hrs 3.41	0	0	0	N	Y	N	

Overall Site Summary (Total resident WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Total survey hrs 24.51	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Reporting Individual Jeff Steinman Date Report Completed 8/1/06
US Fish and Wildlife Service Permit # TE-085086 AZ Game and Fish Department (or other state) Permit # SP716513

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Steinman Phone # 415 350 2672
Affiliation Garcia and Associates E-mail jsteinman@garciaandassociates.com
Site Name Topock Compressor Station CA-A Date Report Completed 8/1/06

Did you verify that this site name is consistent with that used in previous years? (Yes) No (circle one)
If name is different, what name(s) was used in the past? _____
If site was surveyed last year, did you survey the same general area this year? (Yes) / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) / No If no, summarize in comments below.

Management Authority for Survey Area (circle one): Federal (Municipal/County) State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) Moabm Regional Park

Length of area surveyed: 1500 Ft. (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☐ Mixed native and exotic plants (mostly exotic)

☒ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima, Cercidium microphyllum

Average height of canopy (Do not put a range): 10 Ft. (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) No (circle one)
Distance from the site to surface water or saturated soil: 0 (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name Topock Compressor Station CA1 State CA County San Bernadino
USGS Quad Name Whale Mountain Elevation 440 feet / meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 45 801 E 11 07 28 081 UTM
Stop: N 38 45 722 E 11 07 28 449 UTM
Datum NADS3 (NAD27 preferred)
Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Steinman	Date 5/16 Start 0541 Stop 0652 Total hrs 1.11	0	0	0	N	Y	N	
2 Jeff Steinman	Date 6/2 Start 0600 Stop 0715 Total hrs 1.15	0	0	0	N	Y	N	
3 Jeff Steinman	Date 6/26 Start 0510 Stop 0550 Total hrs 40	0	0	0	N	N	N	
4 Jeff Steinman	Date 7/8 Start 0634 Stop 0734 Total hrs 1	0	0	0	N	N	N	
5 Jeff Steinman	Date 7/15 Start 0550 Stop 0648 Total hrs .58	0	0	0	N	Y	N	

Overall Site Summary (Total **resident** WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Total survey hrs 5.064	0	0	0	N	If yes, report color combination(s) in the comments section on back of form

Reporting Individual Jeff Steinman Date Report Completed 8/1/06
US Fish and Wildlife Service Permit # TE-035036 AZ Game and Fish Department (or other state) Permit # SP 716513

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Stevenson Phone # 415 250 2692
Affiliation Garcia and Associates E-mail jstevenson@garciaandassociates.com
Site Name Topock Compressor Station CA-2 Date Report Completed 8/1/06

Did you verify that this site name is consistent with that used in previous years? (Yes) No (circle one)
If name is different, what name(s) was used in the past? _____
If site was surveyed last year, did you survey the same general area this year? (Yes) No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) No If no, summarize in comments below.

Management Authority for Survey Area (circle one): (Federal) Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) Mohave Regional Park

Length of area surveyed: 2000 ft. (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☐ Mixed native and exotic plants (mostly exotic)

☒ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima, Acacia greggii

Average height of canopy (Do not put a range): 15 ft. (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) No (circle one)
Distance from the site to surface water or saturated soil: 0 (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name Topock Compressor Station CA 2 State CA County San Bernadino
USGS Quad Name Whale Mountain Elevation 480 feet / meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 45 617 E 11 07 28 053 UTM
Stop: N 38 45 633 E 11 07 28 760 UTM
Datum WGS83 (NAD27 preferred) Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Steinman	Date 5/17 Start 0530 Stop 0647 Total hrs 1.17	0	0	0	N	N	N	
2 Jeff Steinman	Date 6/2 Start 0729 Stop 0909 Total hrs 1.40	0	0	0	N	Y	N	
3 Jeff Steinman	Date 6/27 Start 0601 Stop 0704 Total hrs 1.03	0	0	0	N	Y	N	
4 Jeff Steinman	Date 7/8 Start 0535 Stop 0631 Total hrs .54	0	0	0	N	N	N	
5 Jeff Steinman	Date 7/16 Start 0558 Stop 0645 Total hrs .47	0	0	0	N	Y	N	

Overall Site Summary (Total **resident** WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Total survey hrs 5.41	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Reporting Individual Jeff Steinman Date Report Completed 8/1/06
US Fish and Wildlife Service Permit #TE-085086 AZ Game and Fish Department (or other state) Permit # SP 716513

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Steinman Phone # 415 250 2692
Affiliation Garcia and Associates E-mail jsteinman@garciaandassociates.com
Site Name Tejak Compressor Station CA3 Date Report Completed 8/1/06

Did you verify that this site name is consistent with that used in previous years? (Yes) No (circle one)
If name is different, what name(s) was used in the past? _____
If site was surveyed last year, did you survey the same general area this year? (Yes) No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) No If no, summarize in comments below.

Management Authority for Survey Area (circle one): (Federal) Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) Bureau of Land Management

Length of area surveyed: 500 ft. (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☒ Mixed native and exotic plants (mostly exotic)

☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima, Acnoin greggii

Average height of canopy (Do not put a range): 10 feet (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) No (circle one)
Distance from the site to surface water or saturated soil: Ø (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name Topock Compressor Station CA-3 State CA County San Bernadino
USGS Quad Name Topock Elevation 440 (feet) meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☑ *Yes* ☐ *No*

Site Coordinates: Start: N 38 45 653 E 11 07 29 128 UTM
Stop: N 38 45 544 E 11 07 29 285 UTM
Datum NAD83 (NAD27 preferred)
Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Steinman	Date 5/16 Start 0735 Stop 0835 Total hrs .50	0	0	0	N	N	N	
2	Date 6/8 Start 0917 Stop 1000 Total hrs .43	0	0	0	N	Y	N	
3	Date 6/27 Start 0501 Stop 0554 Total hrs .53	0	0	0	N	N	N	
4	Date 7/6 Start 0831-0903 Stop 7/8 0741-0802 Total hrs .53	0	0	0	N	Y	N	
5	Date 7/15 Start 0843 Stop 0923 Total hrs .40	0	0	0	N	N	N	

Overall Site Summary (Total **resident** WIFLs only) Total survey hrs _____	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No If yes, report color combination(s) in the comments section on back of form
	0	0	0	0	

Reporting Individual Jeff Steinman Date Report Completed 8/1/06
US Fish and Wildlife Service Permit # TE-085026 AZ Game and Fish Department (or other state) Permit # SP 716513

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Steinman Phone # 415 250 2692
Affiliation Garcia and Associates E-mail jsteinman@garciaandassociates.com
Site Name Tapeck Compressor Station CA 4 Date Report Completed 8/1/06

Did you verify that this site name is consistent with that used in previous years? (Yes) No (circle one)
If name is different, what name(s) was used in the past? _____
If site was surveyed last year, did you survey the same general area this year? (Yes) No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) No If no, summarize in comments below.

Management Authority for Survey Area (circle one): (Federal) Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) Bureau of Land Management

Length of area surveyed: 300 ft. (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☒ Mixed native and exotic plants (mostly exotic)

☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima, Acacia greggii, Cercidium microphyllum

Average height of canopy (Do not put a range): 15 ft. (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) No (circle one)
Distance from the site to surface water or saturated soil: 0 (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name Topock Compressor Station CA-4 State CA County San Bernardino
USGS Quad Name Topock Elevation 500 (feet) meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 45 150 E 11 07 89 384 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 45 317 E 11 07 89 537 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Steinman	Date 5/15 Start 0600 Stop 0805 Total hrs 2.05	0	0	0	N	N	N	
2	Date 6/3 0783-0823 Start 6/4 0945-0610 Stop Total hrs 1.45	0	0	0	N	N	N	
3	Date 6/26 Start 0701 Stop 0754 Total hrs .53	0	0	0	N	Y	N	
4	Date 7/6 Start 0744 Stop 0830 Total hrs .46	0	0	0	N	N	N	
5	Date 7/15 Start 0650 Stop 0754 Total hrs 1.04	0	0	0	N	Y	N	

Overall Site Summary (Total **resident** WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Total survey hrs 6.13	0	0	0	N	If yes, report color combination(s) in the comments section on back of form

Reporting Individual Jeff Steinman Date Report Completed 8/1/06
US Fish and Wildlife Service Permit # TE-085026 AZ Game and Fish Department (or other state) Permit # SP716513

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Steinman Phone # 415 250 2692
Affiliation Garcia and Associates E-mail jsteinman@garcia and associates.com
Site Name Topock Compressor Station CA5 Date Report Completed 8/1/06

Did you verify that this site name is consistent with that used in previous years? (Yes) No (circle one)
If name is different, what name(s) was used in the past? _____
If site was surveyed last year, did you survey the same general area this year? (Yes) No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) No If no, summarize in comments below.

Management Authority for Survey Area (circle one): (Federal) Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) USFWS Havasu National Wildlife Refuge

Length of area surveyed: 900ft. (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☐ Mixed native and exotic plants (mostly exotic)

☒ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima, Acacia greggii, Salix exigua

Average height of canopy (Do not put a range): 10ft. (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) No (circle one)
Distance from the site to surface water or saturated soil: 0 (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name Topock Compressor Station CA-5 State CA County San Bernadino
USGS Quad Name Topock Elevation 500 (feet) / meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 44 738 E 11 07 29 889 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 44 458 E 11 07 29 930 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Stanman	Date 5/15 Start 0810 Stop 0945 Total hrs 1.35	0	0	0	N	Y	N	
2	Date 6/4 Start 0605 Stop 0721 Total hrs .56	0	0	0	N	Y	N	
3	Date 6/26 Start 0758 Stop 0842 Total hrs .44	0	0	0	N	N	N	
4	Date 7/6 Start 0642 Stop 0740 Total hrs .58	0	0	0	N	N	N	
5	Date 7/16 Start 0647 Stop 0803 Total hrs 1.16	0	0	0	N	N	N	

Overall Site Summary (Total **resident** WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Total survey hrs 5.29	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Reporting Individual Jeff Stanman Date Report Completed 8/1/06
US Fish and Wildlife Service Permit #TE-085026 AZ Game and Fish Department (or other state) Permit #SP 716513

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Jeff Stainman Phone # 415 250 2692
Affiliation Garcia and Associates. E-mail jstainman@garciaandassociates.com
Site Name Topock Compressor Station CA 6 Date Report Completed 8/1/06

Did you verify that this site name is consistent with that used in previous years? (Yes) / No (circle one)
If name is different, what name(s) was used in the past? _____
If site was surveyed last year, did you survey the same general area this year? (Yes) / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) / No If no, summarize in comments below.

Management Authority for Survey Area (circle one): (Federal) Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) BLM

Length of area surveyed: 500 Ft. (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☒ Mixed native and exotic plants (mostly exotic)

☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Tamarix ramosissima, Acacia greggii, Cercidium microphyllum

Average height of canopy (Do not put a range): 15 Ft. (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) / No (circle one)
Distance from the site to surface water or saturated soil: 20 Ft. (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes (No) (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name Topock Compressor Station CA-6 State CA County San Bernadino
USGS Quad Name Topock Elevation 480 (feet) meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 38 45 406 E 11 07 29 101 UTM Datum NAD83 (NAD27 preferred)
Stop: N 38 45444 E 11 07 29 850 UTM Zone 11

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Jeff Steinman	Date 5/16 Start 0807 Stop 0930 Total hrs 1.02	0	0	0	N	N	N	
2	Date 6/3 Start 0550 Stop 0705 Total hrs 1.15	0	0	0	N	Y	N	
3	Date 6/26 Start 0758 Stop 0812 Total hrs .44	0	0	0	N	N	N	
4	Date 7/6 Start 0546 Stop 0640 Total hrs .54	0	0	0	N	N	N	
5	Date 7/15 Start 0802 Stop 0840 Total hrs .38	0	0	0	N	N	N	

Overall Site Summary (Total resident WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Total survey hrs 4.33	0	0	0	N	If yes, report color combination(s) in the comments section on back of form

Reporting Individual Jeff Steinman Date Report Completed 8/1/06
US Fish and Wildlife Service Permit # TE-085026 AZ Game and Fish Department (or other state) Permit # SP 716513

Submit original form by August 1st. Retain a copy for your records.

Pacific Gas and Electric Company®

Yvonne J. Meeks
Site Remediation - Portfolio Manager
Environmental Affairs

6588 Ontario Road
San Luis Obispo, CA 93405

Mailing Address
4325 South Higuera Street
San Luis Obispo, CA 93401

805.546.5243
Internal: 664.5243
Fax: 805.546.5232
E-Mail: YJM1@pge.com

July 13, 2006

Ms. Cathy Wolff-White
U.S. Department of the Interior
Bureau of Land Management
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406

Subject: Desert Tortoise Presence/Absence Surveys for the PG&E Compressor Station Expanded Groundwater Extraction and Treatment System
Pacific Gas and Electric Company, Topock Project

Dear Ms. Wolff-White:

This letter transmits the *Desert Tortoise Presence/Absence Surveys for the PG&E Compressor Station Expanded Groundwater Extraction and Treatment System.* This report was prepared in conformance with the BLM Action Memo signed September 17, 2004, and includes information on the annual (Spring 2006) field survey for the desert tortoise on lands surrounding the PG&E Topock Compressor Station. The survey was conducted by Garcia and Associates (GANDA), and followed the guidelines published in the *United States Fish and Wildlife Service Field Survey Protocol for Any Federal Action that May Occur in the Range of the Desert Tortoise* (USFWS 1992).

If you have any questions, please do not hesitate to contact me at (805) 546-5243.

Sincerely,

Terri Henson
for Yvonne Meeks

Cc: Jim Priest/BLM
Karen Baker/DTSC
John Earle/USFWS
Rob Knutson/PG&E

July 2006

DESERT TORTOISE PRESENCE/ABSENCE SURVEYS FOR THE PG&E TOPOCK COMPRESSOR STATION EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

Prepared By:

Garcia and Associates

1 Saunders Avenue

San Anselmo, CA 94960

GARCIA and ASSOCIATES

NATURAL & CULTURAL RESOURCE CONSULTANTS

GANDA

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Appendices

Appendix A: Photo Log
Appendix B: Incidentally Observed Plant Species
Appendix C: Incidentally Observed Wildlife Species

Introduction

Garcia and Associates (GANDA) conducted a spring field survey for desert tortoise (*Gopherus agassizii*) on the lands surrounding Pacific Gas and Electric Company's (PG&E's) Topock Compressor Station along its natural gas pipeline near Needles, California. The purpose was to determine the presence or absence of the federally and state-threatened desert tortoise. The survey followed the guidelines published in the United States Fish and Wildlife Service (USFWS) *Field Survey Protocol for any Federal Action that May Occur Within the Range of the Desert Tortoise* (protocol) (USFWS 1992).

No live desert tortoises were found within the survey area. However, a desert tortoise carcass and two possible desert tortoise burrows were observed (Figure 1; Appendix A, photos 1-4). This report describes the survey methods, findings, and conclusions of the survey.

Site Description

The survey area comprises approximately 960 acres surrounding the Topock Compressor Station, which is in the Mojave Desert approximately 24 kilometers (km) southeast of Needles, California in San Bernardino County. The Colorado River flows adjacent to the site and to the north and east. The majority of the northern and eastern boundaries are defined by Park Moabi Road and National Trails Highway, and the majority of the southern boundary is defined by the foothills of the Chemehuevi Mountains. Interstate 40 passes through the survey area in an east-west direction, dividing the survey area into a northern and a southern section (Figure 1). The Burlington Northern Santa Fe (BNSF) Railroad also passes through the survey area. The elevation within the survey area ranges from approximately 61 to 305 meters above sea level. The terrain includes sparsely vegetated desert, unvegetated desert pavement, numerous shallow to deep washes, gently rolling hills, and the base of the Chemehuevi Mountains in the southeastern portion of the survey area (Appendix A, photos 5 and 6). Manmade facilities within the survey area include the compressor station, IM3 Treatment Plant, paved and unpaved access roads, a set of four existing evaporation ponds, a rock quarry, two water tanks, historic Route 66, numerous groundwater wells, and six natural gas pipelines that run partially above and partially below ground (Appendix A, Photo 7). A set of four previously closed, former evaporation ponds are located southeast of the existing evaporation ponds.

The majority of the survey area is on land managed by the Bureau of Land Management (BLM); however, other portions are owned by PG&E, or are part of the Havasu National Wildlife Refuge, managed by the USFWS.

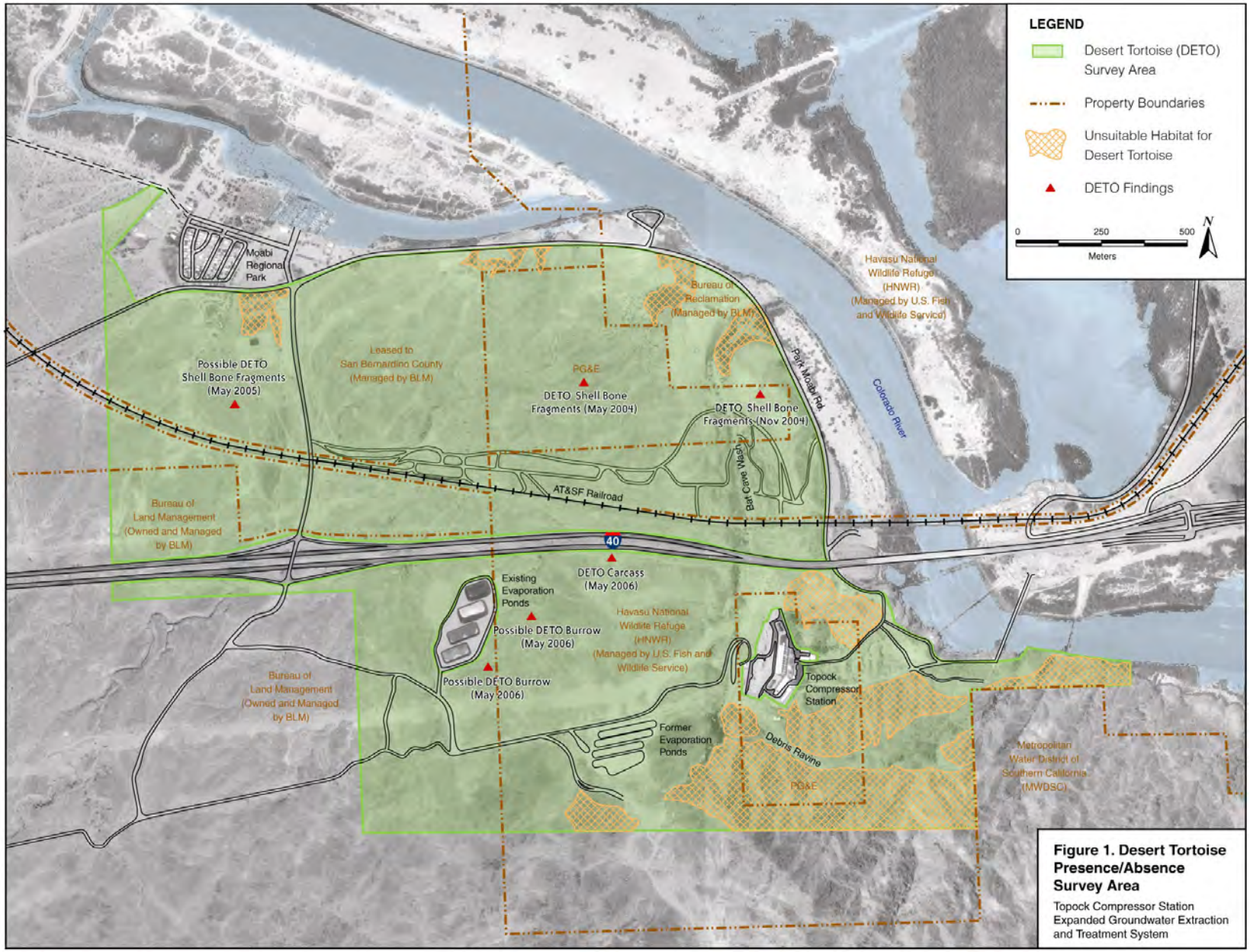

Figure 1. Desert Tortoise Presence/Absence Survey Area

Topock Compressor Station
Expanded Groundwater Extraction and Treatment System

Vegetation and Wildlife Habitat

There are two distinct habitat types within the survey area. They are the creosote bush (*Larrea tridentata*)-dominated areas and dry washes. Creosote bushes dominate the upland and alluvial areas. Other perennial shrubs in these areas include bursage (*Ambrosia dumosa*), white ratany (*Krameria grayi*) and brittlebush (*Encelia farinosa*). Annuals included desert indianwheat (*Plantago ovata*) interspersed with little desert buckwheat (*Eriogonum trichopes*) and Arabian schismus (*Schismus arabicus*) covered the ground in the majority of these areas (Appendix A, Photo 8). A list of plant species that were incidentally observed during the desert tortoise survey is presented in Appendix B.

The dry washes were predominantly vegetated with desert lavender (*Hyptis emoryi*), sweetbush (*Bebbia juncea*), cat-claw acacia (*Acacia greggii*), palo verde (*Cercidium microphyllum*), and tamarisk (*Tamarix ramosissima*) (Appendix A, Photo 9).

The survey area provides habitat for a variety of arid-adapted wildlife species. Common vertebrates found in this community include the desert iguana (*Dipsosaurus dorsalis*), western whiptail (*Cnemidophorus tigris*), zebra-tailed lizard (*Callisaurus draconoides*), desert horned lizard (*Phrynosoma platyrhinos*), western diamond-backed rattlesnake (*Crotalus atrox*), sidewinder (*Crotalus cerastes*), turkey vulture (*Cathartes aura*), common raven (*Corvus corax*), black-throated sparrow (*Amphispiza bilineata*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), desert kangaroo rat (*Dipodomys deserti*), antelope ground squirrel (*Ammospermophilus leucurus*), and coyote (*Canis latrans*).

Survey Methods

GANDA wildlife biologists Rob Gilman, Chloe Scott, Jason Brooks, and Charlie Jones conducted desert tortoise presence/absence surveys from May 15 to 19 and May 22 to 25, 2006, which is during the active season for this species, in accordance with the protocol. The weather during the survey was hot and sunny with calm winds in the afternoons, ranging from five to ten miles per hour. Air temperatures ranged from approximately 21 to 43° C (70 to 110° F). The surveys were performed between 0600 and 1400 hours.

Linear transects were walked systematically to search for desert tortoises, desert tortoise burrows, and sign (scat, tracks, burrows, shells, bones, etc.). Particular emphasis was placed on searching around the bases of creosote bushes and along the banks of the numerous washes. The survey area was surveyed at 100 percent coverage by spacing transects 10 meters apart. A zone of influence around the survey area was not surveyed due to the natural and artificial barriers that surround the majority of the survey area. These barriers constitute unsuitable habitat for desert tortoise and would likely prevent individuals from entering the survey area. The boundaries of the survey area are described further in the site description section of this report.

Aerial photographs, topographic maps, and global positioning system (GPS) units were used to navigate and assist in determining the boundaries of the survey area, suitable desert

tortoise habitat, and the extent and location of the natural and artificial barriers. A majority of the upland habitat was considered suitable habitat for the desert tortoise (Figure 1). The Colorado River floodplain was considered unsuitable habitat. A Trimble GeoExplorer 3 GPS unit was used in conjunction with flagging, a Garmin V GPS unit, and a compass to ensure that the entire survey area was covered and to maintain proper orientation and spacing between transects. On relatively level terrain, the group of four surveyors walked parallel transects aligned east-west or north-south in the UTM coordinate system. A surveyor at one end of the group served as the navigator and used the UTM readout of the GPS unit to maintain a constant northing or easting for the transects. At the end of each transect, the transect starting point was shifted 40 meters (10 meters x 4 surveyors) using the UTM readout. In areas where obstacles such as mountains, compressor station facilities, and canyons prevented the surveyors from walking linear transects, the 10-meter spacing was maintained by using the navigation feature on the map-screen of the Garmin V GPS unit. This feature plotted the survey transect curves as the surveyors walked and allowed the navigator to determine which areas had already been surveyed and to maintain the appropriate ten-meter spacing between transect centerlines. Due to safety concerns and a lack of desert tortoise habitat, the steep slopes of the Chemehuevi Mountains that surround the Debris Ravine in the southeast corner of the survey area were excluded from the survey (Figure 1; Appendix A, Photo 6). The heavily disturbed fenced area immediately northeast and adjacent to the compressor station was also not surveyed (Figure 1) because it had almost no vegetation and consisted of loose spoil piles and compressor station facilities. Portions of the survey area containing drainages that were densely vegetated with tamarisk were also not surveyed (Figure 1).

During the surveys, any burrows with a large enough entrance to accommodate a desert tortoise were inspected using a mirror to reflect sunlight into their far ends. An Olympus fiber optic scope was used instead of the mirror when the far end was not visible from the entrance. The locations of the carcass and possible desert tortoise burrows were recorded using a GPS unit. Associated data such as the burrow class, dimensions, and additional field notes were recorded on a data form.

Results

No live desert tortoises were detected within the survey area. However, a desert tortoise carcass and two potential desert tortoise burrows were found within the survey area.

The desert tortoise carcass consisted of 14 scattered plastron and carapace bone fragments (Figure 1; Appendix A, Photo 1). The largest intact portions of this carcass consisted of the marginals around the carapace and the anterior and posterior portions of the plastron. The size and shape of these bones indicated that the individual was an adult male tortoise with a midline carapace length (MCL) of at least 180 millimeters (mm). The edges of these pieces were serrated and the coloration was white. The external scutes had peeled off and were not present. The *Keys and Figures for Estimating Time Since Death for Shell-skeletal Remains of Desert Tortoises* (Berry and Woodman 1984) was consulted to determine an approximate time since death. However, these keys could only confirm that the individual died at least four years prior to the survey, due to the bone shell fragments

being completely ossified and the absence of external scutes. Due to the condition of the carcass, it is likely that the time since death is much longer than four years. The information index for desert tortoise sign provided in the protocol (USFWS 1992) defines disarticulated and scattered remains of this kind as Class 5 shell remains (Table 1).

Two burrows with entrances large enough to accommodate a desert tortoise were found during the survey (Appendix A, photos 3 and 4). Both were categorized as Class 6 burrows (possible desert tortoise burrows in good condition) using the index for desert tortoise sign provided in the protocol (USFWS 1992). However, due to the absence of scats and any other sign in and around these burrows, it is unlikely that they have recently (if ever) been used by desert tortoises.

Table 1. Summary of Desert Tortoise Survey Results

ID #	Type of Find	Class[1,2]	Size: (centimeters)	End visible? Depth (D) (centimeters)	Entrance Direction	Latitude (UTM N)[3]	Longitude (UTM E)	Photo #	Comments
S-1	Shell Remains	5	W = 2.5 – 15	Not Applicable	Not Applicable	3844533	729001	1	This adult male DETO carcass consisted of 14 scattered plastron and carapace bone fragments. The edges of these pieces were serrated and the coloration was white. The external scutes had peeled off and were not present.
B-1	Burrow	6	H = 30 W = 58	Yes; D = 79	NW	3844178	728603	3	No sign of desert tortoise in or around burrow.
B-2	Burrow	6	H = 20 W = 41	Yes; D = 178	NW	3844342	728741	4	No sign of desert tortoise in or around burrow.

1. Burrow Class:
   1 = currently active, with tortoise or recent tortoise sign
   2 = good condition, definitely tortoise, no evidence of recent use
   3 = fair condition, definitely tortoise
   4 = deteriorated, definitely tortoise
   5 = deteriorated, possibly tortoise
   6 = good condition, possibly tortoise

2. Shell Remains Class:
   1 = fresh or putrid
   2 = normal color; scutes adhere to bone
   3 = scutes peeling off bone
   4 = shell bone is falling apart; growth rings on scutes are peeling
   5 = disarticulated and scattered

3. UTM Zone 11, NAD 83

Incidental Plant and Wildlife Observations

A variety of plant and wildlife species was incidentally observed during the desert tortoise survey. A list of the common plant species observed during the survey is provided in Appendix B and the complete list of animals is provided in Appendix C. Wildlife species included numerous birds, reptiles, such as a desert iguana (Appendix A, Photo 10), and small burrowing mammals, including desert cottontail, black-tailed jackrabbit, kit fox, and antelope ground squirrel. Signs of wildlife species observed included lesser nighthawk (*Chordeiles acutipennis*) eggs (Appendix A, Photo 11) and bat guano and insect remains in Bat Cave Wash (Appendix A, Photo 12).

Conclusions

Similar to those of the 2005 survey, the results of the 2006 survey indicate desert tortoises are absent in the survey area, which was surveyed to protocol at 100 percent coverage. The desert tortoise carcass and three previously discovered sets of highly deteriorated bone shell fragments (Figure 1) may indicate historical use of the survey area; however, no desert tortoise scats, tracks, or other evidence of live tortoises or recent tortoise use was observed anywhere within the survey area.

The overall habitat within the survey area was relatively poor for desert tortoise. The BNSF railroad, Interstate 40, Topock Compressor Station, and steep Chemehuevi Mountains and associated deep drainages are unsuitable habitat for desert tortoise and act as barriers to desert tortoise migration (Figure 1). The survey area contained very few burrows, only two of which had accessible entrances large enough to accommodate a desert tortoise. The burrows had no desert tortoise sign within or surrounding them and were more likely created by a fox or one of the other small burrowing mammal species that were observed during the survey (Appendix C). The non-friable (rocky) soils found throughout the site are non-conducive for desert tortoise burrow construction. The drainages and alluvial plains periodically carry large volumes of water to the adjacent Colorado River, which would prevent the long-term establishment of burrows. The isolated carcass that was found this year was located in a shallow drainage near a large culvert that passes under I-40, and it is possible that it washed in from outside the survey area during a rainstorm.

Despite the absence of live tortoise observations during our survey, there is a possibility that desert tortoises could pass through the survey area. Desert tortoises spend approximately 80 percent of their lives dormant in their burrows; however, in the spring (approximately March through May) and late summer (approximately August through October), when temperatures are not extreme, desert tortoises become active and emerge to mate, forage and drink before returning to their burrows. During these periods, they are more likely to be out in the open and will occasionally migrate up to 15 km or more. While it is possible that desert tortoises could migrate into the survey area through the drainages or from the less rocky and steep terrain west of the survey area, the presence of steep mountains and drainages make permanent occupation of the survey area unlikely. In addition, the habitat within the survey area has been disturbed and fragmented by pipeline corridors, roads, Interstate 40, the BNSF railroad, Topock Compressor Station, evaporation ponds and other manmade facilities.

In the unlikely event that this species is encountered, protective measures should be implemented to avoid or minimize potential impacts to desert tortoise. These include, but are not limited to, a tortoise education program for all personnel working within the survey area boundaries, checking for tortoises in open trenches and under vehicles prior to moving them, using only existing routes of travel to and from the maintenance and inspection sites, and contacting a qualified biologist should a tortoise be found. Desert tortoises should be handled only by personnel authorized by the USFWS, except in circumstances in which the life of the tortoise is in immediate danger.

References

Berry, K. H. and A. P. Woodman. 1984. Keys and Figures for Estimating Time Since Death for Shell-skeletal Remains of Desert Tortoises.

USFWS (United States Fish and Wildlife Service). 1992. Field Survey Protocol for any Federal Action that May Occur Within the Range of the Desert Tortoise. January 1992.

Appendix A

Photographs

Photo 1. Desert tortoise carcass remains found in the Topock Maze.

Photo 2. The wash containing the desert tortoise carcass remains.

Photo 3. Possible (although unlikely) desert tortoise burrow (B-1).

Photo 4. Inspection of a possible desert tortoise burrow (B-2) using a fiber optic scope.

Photo 5. Gently rolling hills west of the compressor station. Note the Chemehuevi Mountains in the background.

Photo 6. The steep slopes of the Chemehuevi Mountains and drainages.

Photo 7. An above-ground portion of the natural gas pipeline over Bat Cave Wash.

Photo 8. *Plantago ovata*, interspersed with *Eriogonum trichopes* and *Schismus arabicus* covered the ground in the majority of the creosote bush-dominated areas.

Photo 9. One of numerous dry washes in the southeastern portion of the survey area.

Photo 10. A desert iguana that was incidentally observed during the desert tortoise survey.

Photo 11. A lesser nighthawk egg was observed near a creosote bush in the eastern portion of the survey area.

Photo 12. Bat sign observed in Bat Cave Wash.

Appendix B

Incidentally Observed Plant Species

Latin Name	Common Name
Dicots	
AMARANTHACEAE	**amaranth family**
Amaranthus sp.	Pigweed
Tidestromia oblongifolia	Honeysweet
ASCLEPIADACEAE	**milkweed family**
Asclepias subulata	rush milkweed
Sarcostemma cynanchoides ssp. *hartwegii*	climbing milkweed
ASTERACEAE	**sunflower family**
Ambrosia dumosa	Bursage
Atrichoseris platyphylla	gravel-ghost
Bebbia juncea	Sweetbush
Chaenactis carphoclinia	pebble pincushion
Geraea cansescens	desert sunflower
Hymenoclea salsola	Cheesebush
Lactuca serriola	prickly lettuce
Palafoxia arida	Spanish needle
Perityle emoryi	emory rock daisy
Peucephyllum schottii	pygmy-cedar
Psathyrotes ramosissima	velvet turtleback
Stephanomeria sp.	Skeletonweed
Trichoptilium incisum	Yellowhead
BORAGINACEAE	**borage family**
Cryptantha circumscissa	cushion cryptantha
Tiquilia plicata	fanleaf crinklemat
BRASSICACEAE	**mustard family**
Descurrania pinnata	tansy mustard
Lepidium sp.	Pepperweed
Sisymbrium altissimum	tumble mustard
CACTACEAE	**cactus family**
Cylindropuntia c.f. *achanthocarpa*	buckhorn cholla
Cylindropuntia echinocarpa	silver cholla
Cylindropuntia ramosissima	pencil cholla
Ferocactus cylindraceus var *cylindraceus*	California barrel cactus
Opuntia basilaris var. *basilaris*	beavertail
Mammillaria dioica	fish-hook cactus
CHENOPODIACEAE	**goosefoot family**
Atriplex spinifera	Spinescale
Salsola tragus	Russian thistle
CUCURBITACEAE	**gourd family**
Cucurbita palmata	coyote gourd

Latin Name	Common Name
Dicots	
EUPHORBIACEAE	**spurge family**
Chamaesyce micromera	desert spurge
FABACEAE	**legume family**
Acacia greggii	catclaw acacia
Cercidium microphyllum	palo verde
Dalea mollis	silk dalea
Prosopis glandulosa var *torreyana*	honey mesquite
FOUQUIERIACEAE	**ocotillo family**
*Fouquieria splendens*ssp *splendens*	Ocotillo
HYDROPHYLLACEAE	**waterleaf family**
Phacelia crenulata ssp *crenulata*	notch-leaved phacelia
KRAMERIACEAE	**rhatany family**
Krameria grayi	white ratany
LAMIACEAE	**mint family**
Hyptis emoryi	desert-lavender
MALVACEAE	**mallow family**
Sphaeralcea ambigua var *ambigua*	apricot mallow
ONAGRACEAE	**evening primrose family**
Camissonia breivipes	yellow cups
Camissonia cardiophylla var *cardiophylla*	heartleaf sun-cup
PLANTAGINACEAE	**plantain family**
Plantago ovata	desert indianwheat
POLEMONIACEAE	**phlox family**
Langloisia setosissima ssp *setosissima*	bristly langloisia
POLYGONACEAE	**buckwheat family**
Chorizanthe brevicornu var *brevicornu*	brittle spineflower
Chorizanthe corrugata	wrinkled spineflower
Chorizanthe rigida	spiney rigid herb
Eriogonum deflexum var *deflexum*	flatcrown buckwheat
Eriogonum inflatum	desert trumpet
Eriogonum trichopes	little desert buckwheat
SCROPHULARIACEAE	**Figwort family**
Mimulus bigelovii	Bigelow's monkeyflower

Latin Name	Common Name
Dicots	
SOLONACEAE	**Nightshade family**
Lycium andersonii	Anderson wolfberry
Lycium cooperi	Cooper's wolfberry
Nicotiana obtusifolia	desert tobacco
Physalis crassifolia	thick-leaf ground cherry
TAMARICACEAE	**Tamarisk family**
Tamarix ramosissima	Tamarisk
Monocots	
LILIACEAE	**Lily family**
Hesperocallis undulata	desert lily
POACEAE	**Grass family**
Avena barbata	slender wildoat
Bromus arizonicus	Arizona brome
Bromus sp	Brome
Cynodon dactylon	bermuda grass
Elytrigia repens	Quackgrass
Erioneuron pulchellum	fluff grass
Phalaris arundinacea	reed canary grass
Schismus arabicus	Arabian schismus
Vulpia microstachys var *microstachys*	desert fescue
Vulpia octoflora	six weeks fescue

Appendix C

Incidentally Observed Wildlife Species

Latin Name	Common Name
Reptiles	
Masticophis flagellum	Coachwhip
Dipsosaurus dorsalis	desert iguana
Uta stansburiana	common side-blotched lizard
Cnemidophorus tigris	western whiptail
Salvadora hexalepis	western patch-nosed snake
Crotalus atrox	Western diamond-backed
Crotalus scutulatus	Mojave rattlesnake
Birds	
Cathartes aura	turkey vulture
Buteo jamaicensis	red-tailed hawk
Falco sparverius	American kestrel
Callipepla californica	California quail
Callipepla gambelii	Gambel's quail
Charadrius vociferus	killdeer
Columba livia	rock pigeon
Zenaida asiatica	white-winged dove
Zenaida macroura	mourning dove
Geococcyx californianus	greater roadrunner
Chordeiles acutipennis	lesser nighthawk
Archilochus alexandri	black-chinned hummingbird
Calypte costae	Costa’s hummingbird
Sayornis saya	Say's phoebe
Myiarchus cinerascens	ash-throated flycatcher
Tyrannus verticalis	western kingbird
Lanius ludovicianus	loggerhead shrike
Corvus corax	common raven
Stelgidopteryx serripennis	northern rough-winged swallow
Riparia riparia	bank swallow
Auriparus flaviceps	verdin
Catherpes mexicanus	canyon wren
Polioptila melanura	black-tailed gnatcatcher
Dendroica petechia	yellow warbler
Geothlypis trichas	common yellowthroat
Wilsonia pusilla	Wilson’s warbler
Pipilo aberti	Abert’s towhee
Amphispiza bilineata	black-throated sparrow
Agelaius phoeniceus	red-winged blackbird
Quiscalus mexicanus	great-tailed grackle
Passer domesticus	house sparrow
Mammals	
Sylvilagus audubonii	desert cottontail
Lepus californicus	black-tailed jackrabbit
Ammospermophilus leucurus	antelope ground squirrel
Vulpes macrotis	kit fox