

GROUNDWATER PROPOSED PLAN
Pacific Gas and Electric Company
Topock Compressor Station
Needles, California
June 4, 2010



U.S. Department of the Interior

DOI ANNOUNCES PROPOSED PLAN

INTRODUCTION

This Proposed Plan is being issued by the United States Department of the Interior (“DOI”) on behalf of itself and DOI’s Bureau of Land Management (“BLM”), U.S. Fish and Wildlife Service (“FWS”), and Bureau of Reclamation (“Reclamation”). This Proposed Plan identifies the Preferred Alternative among the remedial action alternatives evaluated for cleaning up groundwater contaminated by past waste disposal practices at the Pacific Gas and Electric Company (“PG&E”) Topock Compressor Station (“the Site”) located near Needles, California.

This Proposed Plan is being issued by DOI as the lead agency responsible for activities conducted under the Comprehensive Environmental Response, Compensation and Liability Act (“CERCLA”) addressing areas contaminated by the release of hazardous substances at the Site. DOI is coordinating the selection of a final remedial action alternative with the California Department of Toxic Substances Control (“DTSC”). DTSC will be selecting corrective action to address groundwater contamination pursuant to authority under State Hazardous Waste authorities and the Resource Conservation and Recovery Act (“RCRA”).

DOI is issuing this Proposed Plan as part of its public participation responsibilities under Section 117 of CERCLA and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (“NCP”).

DOI, in consultation with DTSC, may modify the Preferred Alternative or select another remedial alternative presented in the Proposed Plan based on new information or public comments. Therefore, the public is encouraged

to review and comment on all alternatives presented in this Proposed Plan.

PUBLIC COMMENT PERIOD:

June 4, 2010 to July 19, 2010

DOI will accept written comments on the Proposed Plan during the public comment period. You may submit your comments to:

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You are invited to meetings to hear about the Proposed Plan for cleaning up groundwater at the PG&E Topock Site. Written and oral comments will also be accepted at these meetings. The meetings will be held at:

PUBLIC MEETINGS/PUBLIC HEARINGS

June 22, 2010	Parker, AZ
June 23, 2010	Lake Havasu, CA
June 29, 2010	Needles, CA
June 30, 2010	Golden Shores, AZ

For more information, see the Administrative Record at the following location:

Bureau of Land Management
Lake Havasu Field Office
2610 Sweetwater Avenue
Lake Havasu City, AZ
(928) 505-1200
Hours: Monday – Friday
8 a.m. to 4:30 p.m.

Or you may access the DTSC Website at:
<http://www.dtsc-topock.com>
Look under “Document Library”.

Detailed information concerning groundwater contamination at the Site can be found in the RCRA Facility Investigation/Remedial Investigation (“RFI/RI”) Report. The detailed comparative evaluation of remedial alternatives can be found in the Corrective Measures Study/Feasibility Study (“CMS/FS”). These and other documents are contained in the Administrative Record file for the Site. DOI and DTSC encourage the public to review these documents to gain a more comprehensive understanding of the Site and the activities that have been conducted to date at the Site.

COMPRESSOR STATION HISTORY

The PG&E Topock Compressor Station (“the Compressor Station”) is located adjacent to the Colorado River in eastern San Bernardino County, California, approximately 15 miles southeast of Needles, California, south of Interstate 40, in the north end of the Chemehuevi Mountains. The Compressor Station occupies approximately 15 acres of a 65-acre parcel of PG&E-owned land. The PG&E property is surrounded by the Havasu National Wildlife Refuge (“the Refuge”) and lies directly south of land under the jurisdiction of the BLM and Reclamation.

PG&E began operations at the Topock Compressor Station in December 1951 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 property on which the Compressor Station was built was owned by the State of California. From 1951 to 1965, PG&E leased the property from the State. In 1965, PG&E gained ownership of the property.

Operations at the Compressor Station have been fairly consistent since the facility began operations in 1951. The operations consist of six major activities: compression of natural gas; cooling of the compressed natural gas and

compressor lubricating oil; water conditioning; wastewater treatment; facility and equipment maintenance; and miscellaneous operations. The greatest use of chemical products involves treatment of cooling water, and the greatest volume of waste produced consists of “blowdown” from the cooling towers. Blowdown consists of used cooling water that is periodically removed from the operating circuit because it contains too much dissolved solid material generated from repeated evaporation of the cooling water.

From 1951 to 1985, hexavalent chromium-based corrosion inhibitors and biocides were added to the cooling water circuit to protect the piping and equipment in the Compressor Station cooling towers. After 1964, the cooling tower blowdown was treated to remove hexavalent chromium prior to discharge. Until approximately 1970, cooling tower blowdown was discharged directly into Bat Cave Wash, an unlined arroyo immediately west of the Compressor Station and either percolated into the ground or evaporated at the surface. Around 1970, PG&E discontinued blowdown discharge to the wash and began discharging treated blowdown into four single-lined evaporation ponds located west of Bat Cave Wash. From 1970 to 1973, PG&E injected treated blowdown into bedrock beneath the site using an injection well, but that process proved impractical and was discontinued.

In 1985, PG&E replaced the hexavalent chromium-based cooling water treatment products with non-hazardous phosphate-based products, at which time PG&E discontinued operation of the blowdown treatment system. Use of the four, single-lined evaporation ponds continued until 1989, when they were replaced with four new double-lined ponds that are still in use. Closure activities associated with former hazardous waste management facilities and the former oily water treatment system at the

compressor station were performed between 1988 and 1993.

SITE BACKGROUND

Investigation activities at the Compressor Station by PG&E and DTSC date to the 1980s with the identification of solid waste management units and areas of concern through a RCRA facility assessment. In 1996, PG&E and DTSC entered into a Corrective Action Consent Agreement in which PG&E agreed to perform a RCRA Facility Investigation/Corrective Measures Study subject to the oversight and approval of DTSC. In 2005, PG&E and DOI entered into an Administrative Consent Agreement (“Consent Agreement”) in which PG&E agreed to perform a CERCLA Remedial Investigation/Feasibility Study to characterize the nature and extent of contamination and develop and evaluate cleanup alternatives subject to the oversight and approval of DOI.

Since 2005, DTSC and DOI have coordinated in their oversight of PG&E’s work under these agreements and investigative and remedial activities have been performed pursuant to both RCRA corrective action and CERCLA remedial action requirements. The RCRA Facility Investigation has been combined with a CERCLA Remedial Investigation (the “RFI/RI Report”) and the RCRA Corrective Measures Study has been combined with the CERCLA Feasibility Study (the “CMS/FS Report”).

To efficiently manage the large volume of information generated by the investigation of the Site and accelerate cleanup of groundwater, the investigation of the Site has been separated into two components: the first an investigation of groundwater contamination and the second focused on contaminants in surface and subsurface soil. As a result, the RFI/RI Report has been broken down into three volumes. PG&E has completed Volume 1 (Site

Background and History), Volume 2 (Hydrogeologic Characterization and Results of Groundwater and Surface Water Investigations), and a Volume 2 Addendum. Volume 3 is pending and will include final characterization data of soil contamination at the Site.

While the RFI/RI was underway, beginning in 2004, DOI and DTSC directed PG&E to undertake certain measures, known as “Time Critical Removal Actions” or “Interim Measures”, to ensure that hexavalent chromium and other contaminants in the groundwater did not reach the Colorado River. Interim Measures 1, 2, and 3, collectively, involved the construction of treatment facilities and installation of four extraction wells to pump contaminated water out of the aquifer for treatment and disposal and, most importantly, to pull contaminated groundwater away from the Colorado River until a permanent remedy could be selected.

SITE CHARACTERISTICS

Cultural and Environmental Resources

The Site is located within an area considered to be of traditional cultural importance and spiritual significance to federally-recognized Native American tribes with ancestral ties to the region. Nine federally recognized Native American tribes have ancestral ties to the area and have expressed interest in the project: the Chemehuevi Indian Tribe, Cocopah Tribe of Arizona, Colorado River Indian Tribes, Fort Mojave Indian Tribe, Havasupai Indian Tribe, Hualapai Indian Tribe, Quechan Tribe of the Fort Yuma Indian Reservation, Twenty-Nine Palms Band of Mission Indians, and Yavapai-Prescott Tribe, each of which have been consulted on the project. Some of these tribes expressed strong beliefs that the selection of remedial action at the Site must fully consider the significance of cultural resources potentially affected and that adverse effects must be

mitigated to the fullest extent possible. Tribal views regarding the significance of the cultural resources potentially affected and the importance of mitigating adverse effects on those resources have been and will continue to be solicited and incorporated into the decision-making process as the remedy is selected, designed, and implemented.

The area contains sensitive cultural resources that are of religious and cultural significance to some of these tribes, as well as other identified historic areas, such as portions of historic Route 66. These cultural resources are subject to the protections provided by numerous Federal statutes, regulations, and Executive Orders.

Protection of historic properties and cultural resources, in particular those that are listed, or eligible for listing, in the National Register of Historic Places, requires that DOI, in consultation with State Historic Preservation Offices, the Advisory Council on Historic Preservation, the tribes, and other consulting parties, identify adverse effects associated with remedial action at the Site and seek ways to avoid, minimize, or mitigate such effects. The BLM, on behalf of itself, DOI, FWS, and Reclamation, is the lead federal agency for historic and cultural issues at the Site. Substantive mitigation measures adopted by the BLM as a result of consultation will be satisfied during the design and implementation of the remedy at the Site.

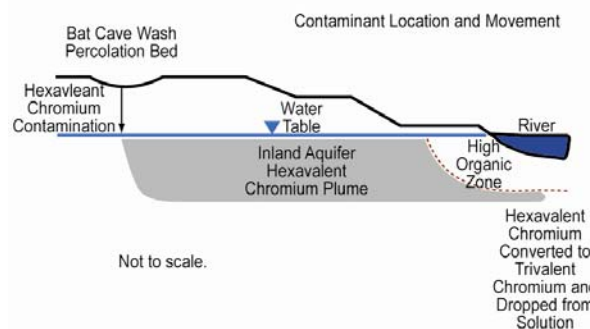
The Site is also located within an environmentally sensitive area that includes the Havasu National Wildlife Refuge, endangered species and migratory bird habitat, and public land formally designated as an Area of Critical Environmental Concern by the BLM. Moreover, much of the Site lies within the floodplain of the Colorado River, a source of drinking water and irrigation for millions of people downstream. Remedial action within this area must comply with the applicable land

management requirements established and implemented by BLM, FWS, and Reclamation.

Hexavalent Chromium Groundwater Plume

The RFI/RI Volume 2 Report for groundwater, completed in February 2009, characterized groundwater and surface water for contamination associated with past operations of the Compressor Station. Groundwater occurs beneath the ground surface in geologic deposits consisting primarily of sands and gravels, with some silts and clays.

The groundwater data indicate that a plume of groundwater contaminated with hexavalent chromium extends from the location of the former area where blowdown was discharged in Bat Cave Wash to the floodplain area adjacent to the Colorado River, north of the railroad tracks. Current data indicate that hexavalent chromium is not discharging to the Colorado River. Within the plume, hexavalent chromium is typically present at all depth intervals of the inland portion of the aquifer but is generally limited to deep wells in portions of the aquifer near the river. Organic-rich, low-oxygen containing soil conditions exist in the aquifer and sediments near and underlying the river that convert hexavalent chromium into an immobile, less toxic form known as trivalent chromium, thereby removing it from the groundwater.



As hexavalent chromium migrates in groundwater from inland and deep river sediments to the organic rich conditions near and beneath the river, it undergoes a chemical

change to trivalent chromium and drops out of the groundwater into the aquifer sediments where it is immobilized.

East Ravine Groundwater Contamination

During the 2009 East Ravine Groundwater Investigation, hexavalent chromium was also found in groundwater within the bedrock formations east and southeast of the Compressor Station. The contamination occurs in discrete fractures in the bedrock which limit the flow and overall quantity of groundwater in the rock. PG&E has estimated that the mass of the hexavalent chromium in bedrock likely represents less than one percent of the total plume mass.

The lateral extent of East Ravine groundwater contamination appears to extend approximately 1,500 feet east southeast of the Compressor Station. However, the investigation of East Ravine groundwater is ongoing and the source of the bedrock contamination has not been identified. Studies of the East Ravine are ongoing.

SUMMARY OF SITE RISKS

As part of the Site investigation, a baseline risk assessment was conducted to determine the current and future risks posed by contaminants in groundwater to humans and ecological receptors. The primary contaminants of potential concern resulting from the evaluation in the risk assessment include hexavalent chromium, selenium, nitrate as nitrogen, and molybdenum.

Based on the results of the risk assessment, there are no unacceptable risks to human health or the environment from groundwater contamination under current conditions. There is no direct exposure to groundwater and no significant contaminant transport pathway from groundwater to surface water.

Hexavalent chromium is present at concentrations that could pose an unacceptable risk to a future hypothetical groundwater user, if the groundwater were ever to be used as a source of drinking water. Based on the results of the site investigation and risk assessment, hexavalent chromium is the contaminant that was addressed in the detailed alternative analysis in the Corrective Measures Study/ Feasibility Study and carried forward into remedy selection.

Three additional contaminants of potential concern, (selenium, nitrate as nitrogen, and molybdenum), were evaluated in the RFI/RI and groundwater risk assessment. Although the risk assessment concluded that these constituents are not a source of significant risk, their presence will be evaluated further during the soil investigation at the Site. The CMS/FS concluded that institutional controls should be enforced to restrict development of groundwater as a drinking water supply and monitoring of these constituents should continue as part of Site-wide groundwater monitoring activities throughout future actions taken at the Site.

Because there is no significant ecological exposure pathway for contact with impacted site groundwater, there are no ecological receptors currently at risk of adverse effects due to the presence of contaminants of potential concern in the groundwater.

Based on the results of the risk assessment, it is DOI's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active alternatives considered in this Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment and to comply with applicable or relevant and appropriate requirements ("ARARs").

REMEDIAL ACTION OBJECTIVES

The remedial action objectives (“RAOs”) are based on the conclusions of the risk assessment and the requirement that the selected remedy attains ARARs identified for the Site. The RAOs for groundwater are to:

- Prevent ingestion of groundwater through drinking water having hexavalent chromium in excess of the regional background concentration of 32 micrograms per liter.
- Prevent or minimize migration of total chromium and hexavalent chromium in groundwater to ensure concentrations in surface water do not exceed water quality standards that support the designated beneficial uses of the Colorado River (11 micrograms per liter).
- Reduce the mass of total chromium and hexavalent chromium in groundwater at the Site to achieve compliance with ARARs in groundwater. This RAO will be achieved through attainment of a cleanup goal of 32 micrograms per liter of hexavalent chromium.
- Ensure that the current geographic plume boundaries are not permanently expanded following completion of the remedial action.

SUMMARY OF REMEDIAL ALTERNATIVES

The remedial alternatives to address contaminated groundwater at the Site that were evaluated in the CMS/FS are presented below. The alternatives are identified with

letters to correspond with the description of the alternatives within the CMS/FS report.

Generally speaking, Alternatives A and B would not include any active treatment or other measures to remove hexavalent chromium from groundwater. Alternatives C, D, and E would rely primarily on treating the hexavalent chromium underground (also known as “in situ” treatment) by injecting a carbon food source into the aquifer to “feed” the naturally-occurring bacteria thereby accelerating the change of hexavalent chromium to trivalent chromium by enhancing the naturally occurring biological conditions that degrade contaminants. Alternative F would extract contaminated groundwater and treat it above-ground using an industrial treatment plant. Alternatives G and H would combine in situ treatment with above-ground treatment. Alternative I would continue the existing Interim Measure currently in place by which limited volumes of water are extracted and treated using an existing above-ground treatment facility.

Provided below is a more specific description of each alternative. In the Section that follows (Evaluation of Alternatives), the alternatives are compared using the nine remedy selection criteria required by CERCLA. As explained in that Section, Alternative E is the Preferred Alternative presented in this Proposed Plan.

Alternative A: No Action

Regulations governing the Superfund program generally require that the “no action” alternative be evaluated to establish a baseline for comparison. Under the No Action alternative, no active construction or operational activities would occur. There would be no active treatment to reduce chromium concentrations in groundwater. While natural processes converting hexavalent chromium to trivalent chromium would

continue to occur within the river sediments near the Colorado River, for the foreseeable future there would be no government restrictions on the use of groundwater in locations where concentrations exceed cleanup levels. No additional groundwater monitoring facilities would be constructed under this alternative, nor would any ongoing sampling or well maintenance activities be conducted to monitor concentrations of contaminants in groundwater or in the Colorado River.

Estimated Capital Cost: \$0

Estimated Time to Achieve RAOs: 220 to 2,200 years

Alternative B – Monitored Natural Attenuation

No active treatment to reduce hexavalent chromium concentrations in groundwater would occur under this alternative. This alternative would rely only on the naturally occurring organic conditions in shallow groundwater areas of the Site near the river to convert and remove hexavalent chromium from groundwater. Restrictions on the use of groundwater in the area of the plume would be maintained during the remediation period. The existing groundwater monitoring network would potentially be enhanced with additional monitoring wells, and the monitoring program of routine sampling, analysis, and reporting would occur until the cleanup goals are attained.

Estimated Net Present Value: \$25,000,000 - \$54,000,000

Estimated Time to Achieve RAOs: 220-2,200 years

Alternative C – High volume In-situ Treatment

Alternative C would involve active in-situ groundwater treatment through distribution of

an organic carbon food source (such as whey) through high volume injection through a minimum number of wells installed primarily in previously disturbed areas. The organic carbon would be injected to enhance natural biological conditions that convert hexavalent chromium to immobile trivalent chromium thereby removing it from groundwater. This alternative would be implemented in two phases; the first to treat the plume edge nearest the river, and the second to treat the interior of the plume with a limited number of constructed wells.

Estimated Net Present Value: \$119,000,000 - \$255,000,000

Estimated Time to Achieve RAOs: 10 to 60 years

Alternative D – Sequential In situ Treatment

Under this alternative, treatment of the plume would be accomplished through injection of carbon using wells within the interior of the plume to convert hexavalent chromium to insoluble trivalent chromium, thereby removing chromium from groundwater. Treatment would be implemented in several phases involving construction of approximately 12 lines of injection and extraction wells to distribute the carbon food source over the entire plume.

Estimated Net Present Value: \$118,000,000 - \$254,000,000

Estimated Time to Achieve RAOs: 10 to 20 years

Alternative E – In-situ Treatment with Fresh Water Flushing

Alternative E involves flushing to push the plume through an In-Situ Reduction Zone (“IRZ”) located along National Trails Highway. Flushing would be accomplished through a combination of fresh water injection

and injection of carbon amended water in wells to the west of the plume. This alternative would also include using extraction wells in the area near the Colorado River to capture the plume, accelerate cleanup of the floodplain, and flush the groundwater with elevated hexavalent chromium through the treatment zone. Additional extraction wells are located in an area northeast of the Compressor Station where the flushing efficiency from injection wells alone is relatively poor. Water extracted from the near-river wells and wells northeast of the Compressor Station would be treated with the carbon food source and the water would be reinjected west of and within the hexavalent chromium plume.

Estimated Net Present Value: \$92,000,000 - \$198,000,000

Estimated Time to Achieve RAOs: 10 to 110 years

Alternative F – Pump and Treat

This alternative would involve pumping groundwater, above-ground treatment to remove chromium from the extracted groundwater, and reinjection of the treated water back to the aquifer.

Estimated Net Present Value: \$187,000,000 - \$401,000,000

Estimated Time to Achieve RAOs: 15 to 150 years

Alternative G – Combined Floodplain In-situ / Pump and Treat

This alternative would combine floodplain cleanup by in-situ treatment, with treatment of the uplands portion of the plume by pumping groundwater, above-ground treatment to remove chromium from the extracted groundwater, and reinjection of the treated water back to the aquifer. The floodplain

cleanup would involve construction of in-situ treatment zones at National Trails Highway and between National Trails Highway and the Colorado River.

Estimated Net Present Value: \$177,000,000 - \$380,000,000

Estimated Time to Achieve RAOs: 10 to 90 years

Alternative H – Combined Upland In-situ / Pump and Treat

This alternative would combine in-situ treatment in the upland portions of the plume, with pump-and-treat technology in the floodplain (consisting of pumping groundwater, above-ground treatment to remove chromium from the extracted groundwater, and reinjection of the treated water back to the aquifer). This alternative differs from Alternative G by relying on an in-situ treatment zone as the dominant feature of the cleanup rather than pump and treat.

Estimated Net Present Value: \$127,000,000 - \$273,000,000

Estimated Time to Achieve RAOs: 10 to 70 years

Alternative I – Continued Operation of Interim Measure Groundwater Treatment

This alternative would involve continued operation of the current Interim Measure Groundwater Treatment Plant as the final remedial action at the site. The plant includes a pump and treat system that removes groundwater and utilizes chemical reduction, precipitation and filtration to remove hexavalent chromium. The Interim Measure system would operate with the existing equipment with existing procedures using the existing process at the existing flow rate until RAOs are attained.

Estimated Net Present Value: \$186,000,000 - \$398,000,000

Estimated Time to Achieve RAOs: 100 to 960 years

Addressing Chromium in Bedrock in East Ravine

The development of a hydraulic containment and treatment system for groundwater in the bedrock is proposed for alternatives C, D, E, F, G, and H instead of developing and evaluating a range of remedial alternatives to attain RAOs in bedrock. East Ravine bedrock groundwater would be addressed through natural attenuation in alternatives A and B.

For alternatives C through H, hydraulic containment would involve pumping from a group of wells near the eastern end of the East Ravine. The assumed location for these wells from a hydraulic and infrastructure perspective would be along the former National Trails Highway. For alternative I, hydraulic containment would be through the existing Interim Measure pump and treat system. The approach for management and treatment of groundwater extracted from the bedrock would vary depending on the alternative. The quantity of extracted bedrock groundwater would be minor relative to alluvial groundwater. For Alternatives C, D, and E, bedrock groundwater would be amended with a carbon food source and reinjected in the alluvial aquifer along with amended alluvial groundwater. For alternatives F, G, H, and I, extracted bedrock groundwater would undergo above ground treatment with extracted alluvial groundwater. For alternative B, bedrock groundwater would be monitored to assure that the hexavalent chromium is changed by natural conditions and that there is no adverse effect to the Colorado River.

If it is determined that additional measures are needed to achieve RAOs in the East Ravine bedrock, other technologies could be applied to supplement the pumping wells. In addition to pumping for hydraulic control, technologies that may be applicable to East Ravine bedrock would include, but are not limited to, freshwater injection for flushing and injection of carbon amendments for in place treatment of hexavalent chromium.

EVALUATION OF ALTERNATIVES

CERCLA specifies that nine criteria be used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed below. The “Detailed Analysis of Alternatives” can be found in the CMS/FS.

Overall Protection of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

<p>Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.</p>
<p>State/Support Agency Acceptance considers whether the State agrees with the analyses and recommendations, as described in the Proposed Plan.</p>
<p>Community Acceptance considers whether the local community agrees with DOI's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.</p>

As described below, two of these criteria, Overall Protection of Human Health and the Environment and Compliance with ARARs, are known as “threshold criteria” that must be satisfied by any Alternative for it to be selected. The next five criteria are known as “balancing criteria” and the last two criteria, State Acceptance and Community Acceptance are known as “modifying criteria.”

1. Overall Protection of Human Health and the Environment

Alternative A does not meet the threshold criteria for protecting human health and the environment because there would be no institutional controls imposed to restrict use of groundwater in locations where hexavalent chromium concentrations exceed the cleanup goals, and there would be no monitoring to evaluate whether geochemical conditions near the river required to reach the cleanup goals remain in place over the long period necessary to achieve these goals. The remaining Alternatives (B through I) all were found to meet the threshold criteria of protecting human health and the environment. Alternatives C, D, E, F, G, and H were ranked high for this criterion while Alternatives B and I ranked medium for this criterion primarily because of the long time required to attain cleanup goals, as well as the uncertainty about the

robustness of the natural geochemical conditions near the river and the high level of operation and maintenance.

2. Compliance with ARARs

Applicable or Relevant and Appropriate Requirements (ARARs) are those cleanup standards, standards of control, and other substantive federal or more stringent State requirements that have been determined to be legally applicable to, or well suited to (“relevant and appropriate”), addressing hazardous substances, remedial actions, or other circumstances presented at a site. ARARs generally are classified as chemical-specific, location-specific, or action-specific. The ARARs for the Topock Site are identified in Appendix B of the CMS/FS.

Based on the specific circumstances presented at the Topock Site and as described in the CMS/FS, Alternatives A, B, and I do not satisfy the requirement established by the California State Water Resources Control Board Resolution 92-49 that cleanup goals be achieved within a “reasonable time frame.” For this reason, Alternatives A, B, and I have been eliminated from further consideration.

Because of the importance of the area to the certain Native American tribes with ancestral ties to the region, and the presence of cultural resources of religious and cultural significance, as well as other sensitive cultural resources, several cultural resource protection statutes, regulations, and Executives Orders have been identified as ARARs for the Topock Site. As described in the CMS/FS, none of the alternatives under consideration were eliminated from further consideration based on its failure to satisfy cultural resource ARARs. In order to ensure that

the remedy selected attains the substantive requirements established by these ARARs, however, as a remedy is selected, designed, and implemented, the federal agencies will continue to engage in consultation with tribes, State Historic Preservation Officers, and others to identify potential effects on cultural resources and to seek ways to avoid, minimize, or mitigate any adverse effects.

With respect to any remedial action to be undertaken within the Havasu National Wildlife Refuge, the National Wildlife System Administration Act has been identified as an ARAR. As described in the CMS/FS, none of the alternatives under consideration were eliminated from further consideration based on its failure to satisfy this ARAR. After a remedy is selected, the Fish and Wildlife Service will identify, during remedial design and implementation, those measures necessary to ensure that the selected remedy satisfies this ARAR.

3. Long-term Effectiveness and Permanence

Alternative A (No Action) ranked the lowest of all alternatives because this alternative does not include monitoring to verify the effectiveness of natural recovery processes and to determine when the RAOs have been achieved.

Alternative B ranked medium because it would include monitoring and institutional controls; however, this alternative relies on natural attenuation to convert hexavalent chromium to trivalent chromium, and while the reducing conditions have been shown to be robust, there is no way to prove that these conditions exist everywhere or would persist into the future hundreds to thousands of years from now.

Alternatives F, G, H, and I all ranked medium for long-term effectiveness, permanence, and reliability. These alternatives include ex-situ treatment; the resulting waste generation requiring land disposal of treatment residuals at an offsite, permitted landfill requiring long-term containment, management, and monitoring that are not required by the alternatives that include in-situ treatment.

Alternatives C, D, and E ranked medium-high for this criterion. While there is uncertainty regarding the ability to distribute the carbon food source across the targeted area, and Alternative E relies on flushing to remove contaminants from the upland portion of the aquifer, comparatively few long-term controls are expected for these alternatives following attainment of cleanup goals.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Alternatives C, D, E, F, G, H, and I are ranked high because the toxicity, mobility, and volume of hexavalent chromium is reduced throughout the plume. Byproducts from in-situ treatment are expected to be localized and within the range of naturally occurring concentrations found at the site but could remain temporarily elevated above baseline and background concentrations in some portions of the aquifer. If monitoring indicates that byproducts remain elevated for an extended period of time, appropriate actions will be taken.

5. Short-term Effectiveness

Alternative B was ranked medium because of the minimal footprint but relatively long time to cleanup.

Alternatives C and E were ranked medium-low because of the comparatively shorter remediation period and relatively limited construction and operational activities that would occur primarily in previously disturbed areas. Alternatives A, D, F, G, H, and I received a low ranking for short-term effectiveness. Alternative A was ranked low primarily because of the extensive time to cleanup with no controls during the remedial period. Alternatives F, G, H, and I were ranked low as a result of construction and operation of an aboveground treatment plant and the greater amount of construction, aboveground visual impact, worker/operator presence onsite, electrical power requirements, and trucking requirements for chemical delivery and waste transportation and disposal. Alternative D ranked low primarily because the location of remedial facilities would not be limited to previously disturbed areas and because of the need for subsequent additional disturbance from grading, road construction, facility construction, and operation and maintenance.

6. Implementability

Alternatives A and B are ranked high for implementability because Alternative A involves no remedial action, and the only remedial activities associated with Alternative B are monitoring well construction and maintenance and administration of an institutional control. Alternative I also ranked high because the system has been shown to be technically implementable over the years it has operated. Alternatives D, E, F, G, and H were ranked medium because while these alternatives are administratively implementable, there will be technical challenges associated with the active treatment processes. Alternative E requires additional approvals from landowners and associated water agencies for the water

supply well and pipeline. Alternative C was ranked low for this criterion because of the relatively more complex technical challenges associated with balancing carbon delivery and hydraulic containment of the plume, as well as construction within Bat Cave Wash.

7. Cost

The costs for Alternatives A and B are the lowest; therefore, these alternatives are ranked high in cost-effectiveness. Alternatives C, D, E, and H are the next most costly; therefore, these alternatives are ranked medium in cost-effectiveness. Alternatives F, G, and I are the most expensive of the alternatives and are therefore ranked low in cost effectiveness.

8. State/Support Agency Acceptance

DOI and DTSC have worked together in closely coordinating each agency's respective authorities and overseeing PG&E's performance of work under the federal CERCLA Consent Agreement and the State Corrective Action Consent Agreement by which the CMS/FS has been prepared. Through this coordination, both DOI and DTSC approved the CMS/FS in December 2009, and DOI has developed this Proposed Plan in conjunction with DTSC. Based on this coordinated approach, DOI and DTSC, while considering the action independently, have reached agreement on the Preferred Alternative to submit for public review and comment.

9. Community Acceptance

Community acceptance of the Preferred Alternative will be evaluated after the public comment period ends and will be described in the Record of Decision (ROD) for the site.

SUMMARY OF THE PREFERRED ALTERNATIVE

DOI's recommendation for the Preferred Alternative, based on the analysis and conclusions presented in the CMS/FS is Alternative E - *In-situ* Treatment with Fresh Water Flushing (See Attached Figure). Alternative E is recommended because it will achieve the RAOs while substantially reducing, through treatment, the amount of hexavalent chromium in the groundwater [which is the principal threat at the site], and will do so in a reasonable time frame, and will do so with fewer adverse effects to cultural resources and biological resources than other alternatives considered.

Because DOI recognizes that the variable nature of the geologic materials beneath the site may result in some localized areas being resistant to *in situ* treatment and flushing DOI's preferred alternative includes monitored natural attenuation as a long term component to address residual hexavalent chromium that may remain in portions of the aquifer formation after a majority has been treated by *In-situ* Treatment with Fresh Water Flushing. Monitored natural attenuation relies on the naturally occurring degradation and dilution properties of the groundwater system to change hexavalent chromium to trivalent chromium in groundwater.

Institutional controls are measures undertaken to limit or prohibit activities that may interfere with the integrity of a cleanup action or result in unacceptable human exposure to hazardous substances remaining at a site. Such measures are adopted to assure the continued protection of human health. The institutional controls proposed for the Site are defined in the *BLM Lake Havasu Field Office Resource Management Plan* issued in May 2007 and in the *1994 Lower Colorado River National Wildlife Refuges Comprehensive Management Plan*. These plans restrict surface uses and use

of the groundwater. It is anticipated that these management plans will be in place beyond the time needed to achieve cleanup goals for the groundwater.

Based on the information currently available, DOI believes the Preferred Alternative (Alternative E with the addition of monitored natural attenuation) meets the threshold criteria and best addresses the balancing and modifying criteria. DOI expects the Preferred Alternative to satisfy the following requirements of CERCLA § 121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; (4) utilize permanent solutions and treatment technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principle element of the remedy.

COMMUNITY PARTICIPATION

DOI, in conjunction with DTSC, provides information regarding the cleanup of the PG&E Topock Site to the public through public meetings, the Administrative Record file for the Site, and announcements published in the [*Several Named Arizona and California*] Newspapers. DOI and DTSC encourage the public to gain a more comprehensive understanding of the Site and the investigation and cleanup activities that have been and will be conducted at the Site. DOI, in consultation with DTSC, may modify the Preferred Alternative or select another remedial alternative presented in this Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all alternatives presented in this Proposed Plan.

The dates for the public comment period, the date, location, and time of the public meeting, and the locations of the Administrative Record file, are provided on the front page of this Proposed Plan.

For Further Information on the PG&E
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Information Repositories

A copy of the Proposed Plan and other project documents are available for review at the following locations:

Chemehuevi Indian Reservation
Environmental Protection Office
2000 Chemehuevi Trail
Havasú Lake, CA 92363
Contact: Dave Todd, (760) 858-1140

Colorado River Indian Tribes Library
Second Avenue and Mohave Road
Parker, AZ 85344
Contact: Amelia Flores, (928) 669-1285

Golden Shores/Topock Station Library
13136 S. Golden Shores Parkway
Topock, AZ 86436
Contact: Avis McKinnon, (928) 768-2235

Lake Havasu City Library
1770 McCulloch Boulevard
Lake Havasu City, AZ 86403
Contact: Sharon Lane, (928) 453-0718

Alternative E - In-situ Treatment with Fresh Water Flushing – Conceptual Illustration

