



Linda S. Adams  
Secretary for  
Environmental Protection



## Department of Toxic Substances Control

---

Maureen F. Gorsen, Director  
5796 Corporate Avenue  
Cypress, California 90630



Arnold Schwarzenegger  
Governor

Sent Via Email

January 7, 2008

Ms. Yvonne Meeks  
Portfolio Manager – Site Remediation  
Pacific Gas and Electric Company  
4325 South Higuera Street  
San Luis Obispo, CA 93401

**COMMENTS ON THE EAST RAVINE GROUNDWATER INVESTIGATION WORK PLAN, PACIFIC GAS AND ELECTRIC COMPANY (PG&E), TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA (EPA ID NO. CAT080011729)**

Dear Ms. Meeks,

The Department of Toxic Substances Control (DTSC) has completed review of the document *Work Plan for East Ravine Groundwater Investigation, PG&E Topock Compressor Station, Needles, California* (Work Plan) including consideration of comments received from the following stakeholders: an email from Metropolitan Water District of Southern California dated December 21, 2007; a letter with two attachments from the Colorado River Indian Tribes dated December 28, 2007; a letter from Hargis & Associates on behalf of the Fort Mojave Indian Tribe dated December 28, 2007; and draft comments on the Work Plan prepared by the Department of the Interior (DOI) dated January 3, 2008. The Work Plan is dated December 11, 2007 and was prepared by CH2M Hill on behalf of PG&E in response to DTSC's October 29, 2007 letter to PG&E.

DTSC's Geological Services Unit (GSU) has prepared comments on the Work Plan. As per the latest schedule, PG&E shall respond to the GSU and stakeholder comments attached to this letter by January 25, 2008. DTSC anticipates DOI to submit comments under separate letter.

Ms. Yvonne Meeks  
January 7, 2008  
Page 2 of 2

If you have any questions or comments regarding this letter, please contact me at (714) 484-5423.

Sincerely,



Karen Baker, Chief, CEG, CHG  
Geology, Permitting, and Corrective Action Branch

## REFERENCES

DTSC, October 29, 2007. Letter to PG&E. "Workplan for Groundwater Investigation in Area of Concern 10 – East Ravine at Pacific Gas and Electric Company (PG&E), Topock Compressor Station, Needles, California (EPA ID No. CAT080011729).

aky:010801

cc: PG&E Topock Consultative Workgroup Members – Via e-mail

PG&E Topock Technical Workgroup Members – Via e-mail

Native American Tribal Contacts for PG&E Topock project – Via e-mail



Linda S. Adams  
Secretary for  
Environmental Protection



## Department of Toxic Substances Control

Maureen F. Gorsen, Director  
5796 Corporate Avenue  
Cypress, California 90630



Arnold Schwarzenegger  
Governor

TO: Karen Baker, Chief, CEG, CHG  
Geology, Permitting & Corrective Action Branch

FROM: Chris Guerre, CHG   
Senior Engineering Geologist  
Geological Services Unit

DATE: January 7, 2008

SUBJECT: East Ravine Groundwater Investigation Work Plan  
Pacific Gas and Electric Company (PG&E), Topock Compressor Station  
Needles, California  
PCA 22120 WP 540015-48/36 WR 740522

---

### DOCUMENTS REVIEWED

*Work Plan for East Ravine Groundwater Investigation, PG&E Topock Compressor Station, Needles, California* (Work Plan). The Work Plan is dated December 11, 2007 and was prepared by CH2M Hill on behalf of PG&E.

Letters commenting on the Work Plan were received from several stakeholders. These letters are listed below and resulted in the inclusion of several comments contained in the General and Specific Comments sections within this memorandum:

Department of the Interior (DOI), January 3, 2008. Comment Table on the Work Plan for East Ravine Groundwater Investigation (DOI, 2008).

Gregg de Bie, December 28, 2007. Letter with two attachments to DTSC. Comments on Work Plan for East Ravine Groundwater Investigation, PG&E Topock Compressor Station, Needles, California (CRIT, 2007).

Attachment 1: Dr. Michael Tsosie, December 28, 2007. Memorandum to Gregg de Bie. "Comments on East Ravine Study for Topock" (Tsosie, 2007).

Attachment 2: Envirometrix Corporation (EMC), December 27, 2007. Letter to Gregg de Bie. "*Review of Work Plan for East Ravine Groundwater Investigation, PG&E Topock Compressor Station, Needles, California*" (EMC, 2007).

Karen Baker  
January 7, 2008  
Page 2

Leo Leonhart, December 28, 2007. Letter to the Department of Toxic Substances Control (DTSC) and Bureau of Land Management (BLM). "Fort Mojave Indian Tribe Comments on Pacific Gas & Electric Co. December 11, 2007, document titled *Work Plan for East Ravine Groundwater Investigation PG&E Compressor Station, Needles, California.*" (FMIT, 2007).

Metropolitan Water District of Southern California (MWD), December 21, 2007. Email to DTSC and PG&E. "GeoPentech Review – Work Plan for East Ravine Groundwater Investigation (Plan), PG&E Topock Compressor Station, Needles California." (MWD, 2007).

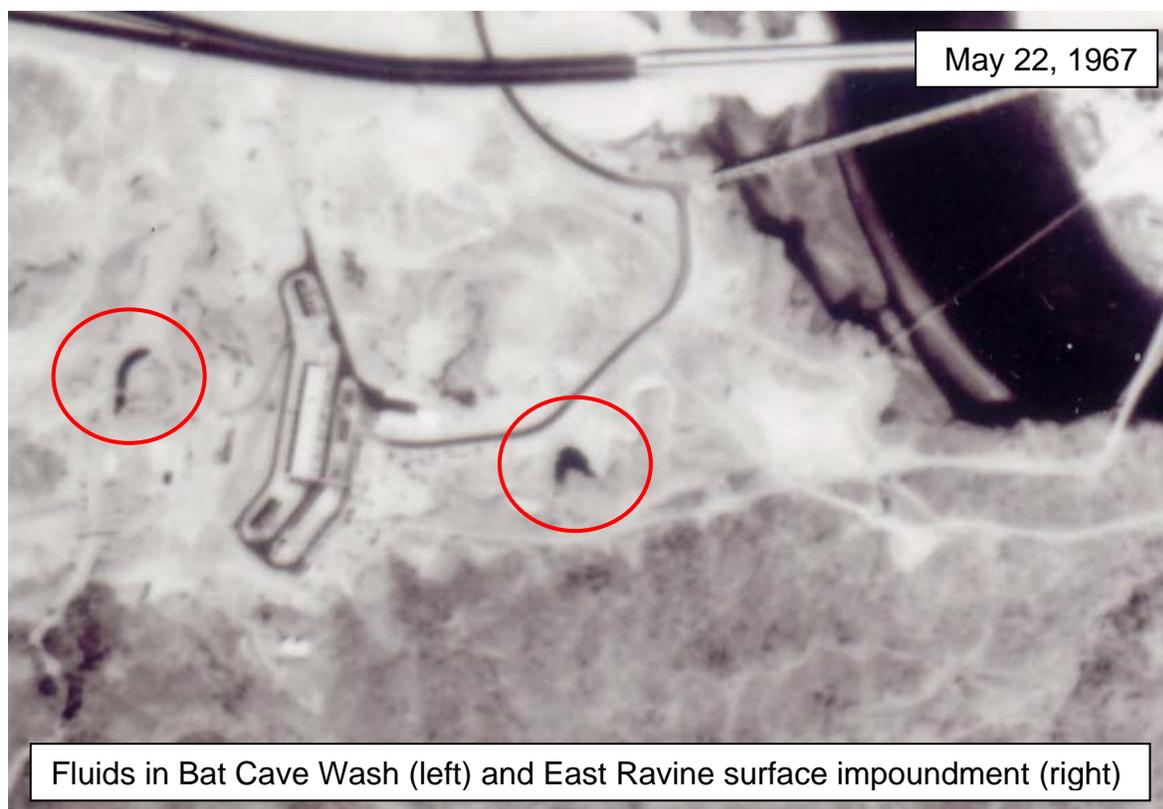
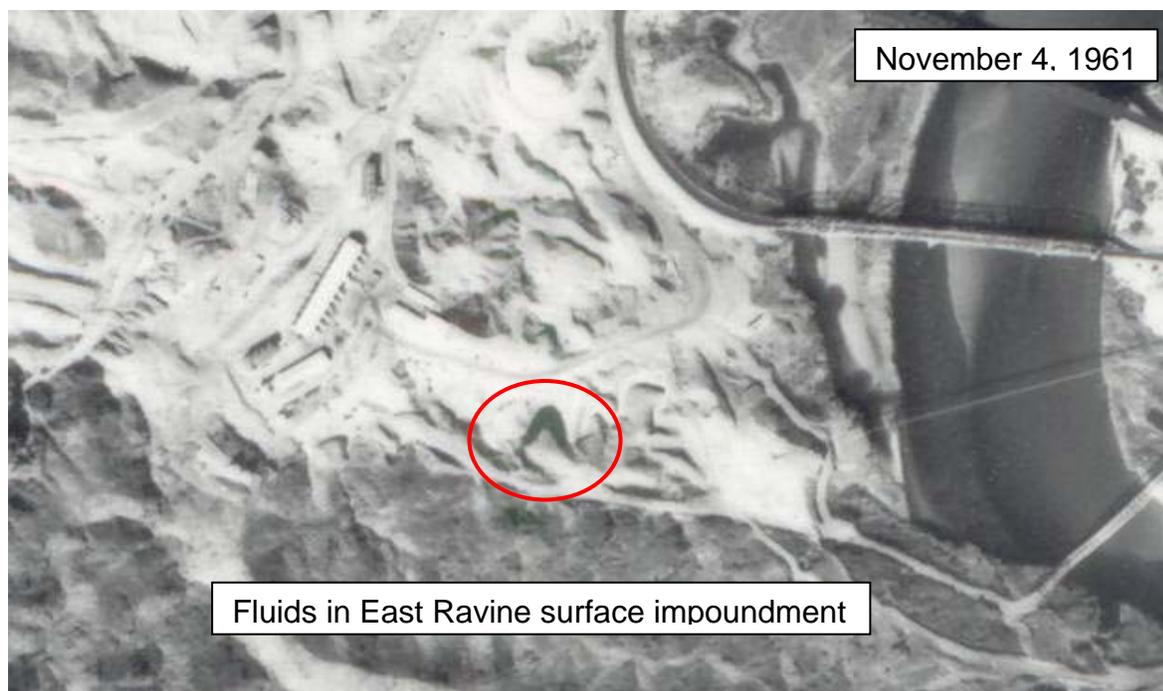
## **INTRODUCTION**

The Geological Services Unit (GSU) with DTSC conducted a review of the above-referenced document regarding groundwater investigation of the East Ravine area. The East Ravine area has been designated as Area of Concern 10 (AOC 10) as part of site soils and groundwater characterization (CH2M Hill, 2007a). In 2006, PG&E recommended soil and groundwater characterization activities for AOC 10 (PG&E, 2006) as part of PG&E's responses to DTSC comments on the draft version of the 2005 RCRA Facility Investigation (RFI)/Remedial Investigation (RI) Report. The Work Plan was prepared in response to DTSC's October 29, 2007 letter to PG&E.

The East Ravine formerly contained a surface impoundment in the subarea designated AOC 10c area (Work Plan, Figure 2; CH2M Hill, 2006/2007a) that has historically yielded some of the highest chromium concentrations in site soils (3,360 mg/kg<sup>1</sup>). A white powdery material similar to the white material in Bat Cave Wash has also been documented as having occurred within area AOC 10c (CH2M Hill, 2006). On October 18, 2007, DTSC staff observed a thin white powdery layer within AOC 10d during a field visit. Aerial photographs of the fluids retained by the former impoundment have been included in this memorandum as pictures of the impoundment have not been provided in existing documents. Review of existing aerial photographs indicate that fluids were present in the AOC 10c area from 1961 to 1967. Additionally, chromium has recently been detected in groundwater in bedrock well MW-23 in 2006 and 2007 at concentrations greater than 1,000 ug/L (CH2M Hill, 2007b, 2007c, and 2007d).

---

<sup>1</sup> Milligrams per kilogram



The Work Plan proposes to install a shallow alluvial well and deeper bedrock well at two primary locations (Sites A and B). If elevated chromium (50 or 100 ug/L<sup>2</sup>) is detected at Sites A or B, then a second phase of drilling would be conducted with step out borings and associated deep bedrock wells to the north, east and west at three locations (Sites C, D, and E).

Based on the GSU review, it is recommended that PG&E address the following General and Specific Comments contained in this memorandum and provide responses to DTSC for review and consideration.

## GENERAL COMMENTS

**General Comment 1 – Section 2.1, Investigation Overview:** An alluvial monitoring well at Site A may be unwarranted if bedrock is encountered at shallow depths above the base of the former impoundment/AOC 10c area. Conceptually, the alluvial wells are designed to determine if perched water or transient subflow along the top of the bedrock/base of the alluvium occurs away from suspected source areas (e.g., AOC 10c). PG&E should consult with DTSC after the deeper Site A exploration borehole is drilled and logged to determine if the Site A alluvial well should be installed. A similar strategy should be applied to the proposed alluvial wells at contingent Sites C and D.

**General Comment 2 – Section 2.1, Investigation Overview:** EMC believes that more initial drilling locations, including drilling immediately next to the impoundment, are required (EMC, 2007). The GSU understands that drilling adjacent to the impoundment was not considered by PG&E due to physical constraints posed by the ravine topography. However, PG&E should further evaluate completing wells within or immediately adjacent to the former impoundment as installing wells adjacent to potential source areas is generally beneficial in evaluating if a former unit has impacted the environment. If it is feasible to install a well in or adjacent to the former impoundment, it is recommended that the well be included in the Work Plan as an initial well.

**General Comment 3 – Section 2.1.3, Contingency Drilling Sites:** An additional drilling site, Site F, is recommended in the event elevated chromium is detected at contingent Sites D or C. The purpose of Site F would be to bound contamination, if detected, to the south. It is desired that Site F be located along the existing east-west pipeline road pictured at the base of Figure 2 in the Work Plan and somewhere south of the AOC 10d area.

**General Comment 4 – Section 2.1.3, Contingency Drilling Sites:** Both DOI and EMC identified concerns with the rationale for the 50 and 100 ug/L chromium

---

<sup>2</sup> Micro gram per liter.

concentration levels from Site A and Site B groundwater wells that would trigger installation of the contingency wells (DOI, 2008; EMC, 2007). DTSC understood that the contingency trigger levels would be used to identify the majority of the plume extent, if a plume exists, in the East Ravine area. Characterization would not necessarily be complete, but a general understanding of plume configuration would be provided through implementation of the Work Plan. As there are circumstances in which installation of contingency wells might be warranted below the proposed trigger levels, it is recommended that further evaluation of contingent well locations be conducted by the PG&E Topock Technical Workgroup (TWG) for wells that yield trigger values below those proposed in the Work Plan. The TWG could meet via conference call and discuss the well data and potential contingent well installation in a manner similar to that conducted for screen calls during previous well installations. The Work Plan should also accommodate installing additional contingent wells at an alternate Site C and/or Site E location if warranted by groundwater results from initial Site C and E wells.

**General Comment 5 – Section 2.1.3, Contingency Drilling Sites:** The second paragraph on page 2-3 of the Work Plan indicates that the decision to proceed with contingent well locations would occur after two rounds of sampling data had been completed at Sites A and B per the schedule discussed in Section 5 of the Work Plan. It is also conceivable that field data (e.g., discolored groundwater, significantly elevated hexavalent chromium in groundwater samples) would negate the necessity to obtain two rounds of data from Sites A and B. Therefore, it is recommended that DTSC reserve the right to direct PG&E to proceed with the contingent well installations on an expedited schedule if warranted.

Hexavalent chromium concentrations greater than 1,000 ug/L were only detected in December 2006 and March 2007 in bedrock well MW-23 during low river stage. Therefore, as seasonal effects and/or low river stage might affect groundwater sampling results in the area, the time needed to assess data from Site A and B wells might need to be extended from that proposed in the Work Plan depending on when the Work Plan is actually implemented. In the event that hexavalent chromium concentrations are not detected above contingency trigger levels in Site A and B wells, data collected between December and March from Site A and B wells should also be evaluated before a final decision is made to not install contingency wells. Reporting should follow that as outlined in the Work Plan with the understanding that the December to March data might invoke the contingency well installation.

**General Comment 6 – Section 2.6, Groundwater Sample Collection:** It is anticipated that the bedrock aquifer encountered will result in monitoring wells with low yield. Therefore, it is recommended that additional purge and sample events be conducted in addition to that described in the Work Plan. The additional purging events are requested to ensure that any introduced fluids or mixed aquifer waters are removed

from the low yield wells in an expedited manner. The additional purging and sampling events may utilize a modified analyte list consisting of, at a minimum, chromium (and related analyses such as specific conductance) utilizing the Interim Measures 3 laboratory and the standard field parameter measurements.

**General Comment 7 – Miocene Conglomerate Orientation Data:** MWD's comments (MWD, 2007 - Eric Fordham Comments 1 and 3) recommended that data regarding the orientation and character of the Miocene Conglomerate and its discontinuities be provided to adequately evaluate whether the proposed borings are optimally positioned. Information regarding characteristics of the Chemehuevi Detachment Fault was also requested. Therefore, it is recommended that PG&E obtain the necessary information to address this concern. Available data should be utilized. If not already conducted, mapping of Miocene Conglomerate bedding and structures (e.g., fracture analysis) in the immediate area is suggested. Based on the information amassed, the proposed borings should be evaluated to ensure appropriate locations, angles, and depths have been selected.

**General Comment 8:** Soil sampling should be conducted during Site B drilling activities for the shallow alluvial monitoring well. DTSC had previously requested that soil samples of the dam be collected since potential exists for the dams to contain contaminated materials or have buried contaminated soils or wastes (See page 24 of the July 2007 GSU memorandum attached to DTSC's August 10, 2007 letter to PG&E). This will require that the monitoring well borehole be drilled through the dam and completed beneath the East Ravine wash. Three soils samples are recommended: two from within the dam materials and one from the alluvium at the contact between the dam and the wash. The soil samples should be analyzed for the constituents of potential concern identified for AOC 10 in the Part A Work Plan (CH2M Hill, 2006). This will eliminate redundant activity and reduce the number of incursions into the area.

## SPECIFIC COMMENTS

**Specific Comment 1 - Section 1.2.2 Chromium Sampling Results at Well MW-23:** It is significant to also note that the oxidation reduction potential (ORP) for bedrock well MW-23 has changed over time from more reducing to oxidizing conditions providing a geochemical environment where hexavalent chromium can better persist. During sampling events in 2002 and 2003 ORP measurements were consistently negative and averaged -152 mV<sup>3</sup>. Since 2005, positive ORP values up to 199 mV have been documented in the site wide groundwater monitoring data base. Additionally, hexavalent chromium concentrations were not detected above 10 ug/L in well MW-23 from 1998 through 2005 except during one sampling event in 2004 in which the

---

<sup>3</sup> millivolts

reported value was 10.1 ug/L. Since March 2006, hexavalent chromium has consistently exceeded 10 ug/L (CH2M Hill, 2007c and 2007d) and has resulted in DTSC's heightened attention to data from this well.

**Specific Comment 2 - Section 2.1.1 Primary Drilling Site A:** EMC commented that there was too close a margin of error between the proposed maximum drilling depth of 200 feet for Site A and the anticipated depth of 180 feet to reach the detachment fault (EMC, 2007). Therefore, it is recommended that the maximum depth be extended to 225 feet (a 25 percent margin of error). Information obtained in response to General Comment 7 could also modify the maximum depth.

**Specific Comment 3 - Section 2.3.1 Drilling Methods:** MWD recommended that a PQ-size, triple tube core barrel be considered for the diamond-bit core drilling proposed for the site (MWD, 2007). This size core barrel should be considered for the initial drilling as should larger or smaller diameters depending on the drilling conditions encountered at the site.

**Specific Comment 4 - Section 2.3.2 Core Logging:** In addition to the items listed under Rock Core Logging the following features, at a minimum, should also be documented and reported: lithologic description, alteration/weathering, structures and orientation, texture, foliation/bedding, grain size, hardness/strength, moisture conditions, percent core recovery, and photographs.

**Specific Comment 5 - Section 2.4.1 Borehole Development and Geophysical Logging:** ORP field measurements should also be measured during development purging.

**Specific Comment 6 - Section 2.4.1 Borehole Development and Geophysical Logging:** Mechanical surging of the borehole may eventually be necessary especially if drilling mud is used during drilling of the bedrock boreholes.

**Specific Comment 7 – Section 2.4.2, Permeability Testing:** The section indicates that permeability testing may be conducted in each bedrock borehole. The GSU anticipates that flow testing will be conducted on at least some of the new wells and that the method(s) ultimately proposed by PG&E for the site conditions encountered will require DTSC approval.

**Specific Comment 8 – Section 2.4.4, Initial Bedrock Groundwater Characterization:** Depth discrete groundwater sampling is recommended regardless of the reasons cited in the Work Plan as the potential for chemical stratification within the bedrock aquifer will still exist.

**Specific Comment 9 – Section 2.5.1.2, Borehole Completion Materials:** The volume of any potable water added to the borehole should be documented.

**Specific Comment 10 – Section 2.5.2, Bedrock Monitoring Well Design and Specifications:** The type of well completion ultimately proposed by PG&E for the site conditions encountered will require DTSC approval. DTSC would accept other well designs not identified in the Work Plan (e.g., Barcad® type sampling systems) if the need arises. Please note that the well design proposed should be able to accommodate transducers and data loggers.

**Specific Comment 11 – Section 2.5.2.2, Multiple-Completion Bedrock Monitoring Well:** The section discusses volatile organic compound (VOC) sampling and suggests that VOC sampling data could be compromised when using the Solinst® Continuous Multilevel Tubing (CMT). The section concludes that VOCs are not a concern in the East Ravine. The GSU recommends that VOCs be added to the sampling list in Table 2 of the Work Plan for the initial wells for the two sampling rounds. This is requested since: PG&E documents in the Work Plan that the impoundment in the East Ravine contained liquids of unknown composition during several years in the 1960s; VOCs have been used at the compressor station; and VOC data are lacking in the East Ravine area. The GSU does not believe that the CMT well design will necessarily adversely affect VOC data since the CMT channel port will be purged prior to sampling, dense nonaqueous phase liquids are not anticipated, and the CMT technique has been used successfully at other VOC sites.

**Specific Comment 12 – Section 2.5.5, Well Survey and Completion Diagram:** The well completion diagrams should also include the diameter of the well and borehole in addition to the other items identified in the section.

**Specific Comment 13 – Section 2.6, Groundwater Sample Collection:** MWD wanted to know what would happen if pumping at Site A and B did not yield water (MWD, 2007). DTSC does not anticipate that the bedrock wells will not yield water as based on known production from all the other bedrock monitoring wells installed at the site. However, if such an occurrence was to occur, PG&E and DTSC would consider such actions as more aggressive well development, modifying the well design, reaming the borehole, or drilling a new borehole at the same site area or possibly at a contingent location.

**Specific Comment 14 – Table 1:** Target boring depths for contingent sites may need to be modified pending the results of the initial investigations. Site C investigations should be implemented if contamination is confirmed at neighboring Site B, not Site A.

Karen Baker  
January 7, 2008  
Page 9

Questions regarding this memorandum should be directed to Chris Guerre at (714) 484-5422 or by email at [cguerre@dtsc.ca.gov](mailto:cguerre@dtsc.ca.gov).

## REFERENCES

CH2M Hill, August 10, 2007a. RCRA Facility Investigation/Remedial Investigation Report, PG&E Topock Compressor Station, Needles, California. Volume 1 - Site Background and History.

CH2M Hill, 2007b. Evaluation of Recent Anomalous Sampling Results at Well MW-23, TWG Meeting 8/2/07.

CH2M Hill, August 31, 2007c. Groundwater and Surface Water Monitoring Report, Second Quarter 2007, PG&E Topock Compressor Station, Needles, California.

CH2M Hill, April 2, 2007d. Groundwater and Surface Water Monitoring Report, Fourth Quarter 2006, Annual Summary, PG&E Topock Compressor Station, Needles, California.

CH2M Hill, November 16, 2006. RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan, Part A, PG&E Topock Compressor Station, Needles, California.

DTSC, October 29, 2007. Letter to PG&E. "Workplan for Groundwater Investigation in Area of Concern 10 – East Ravine at Pacific Gas and Electric Company (PG&E), Topock Compressor Station, Needles, California (EPA ID No. CAT080011729)."

DTSC, August 10, 2007. Letter to PG&E. "Comments and Conditional Approval of the RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan, Part A, Pacific Gas and Electric Company (PG&E), Topock Compressor Station, Needles, California (EPA ID No. CAT080011729)."

PG&E, December 5, 2006. Letter to DTSC. "Responses to DTSC Comments on Hydrogeology and Groundwater Sections February 2005 Draft RFI/RI Report, PG&E Topock Compressor Station, Needles, California.

Peer Reviewed By: Alfredo Zanoia, CHG, CEG