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DATE: July 24, 2008

SUBJECT: Revised Work Plan for East Ravine Groundwater Investigation
Pacific Gas and Electric Company (PG&E),
Topock Compressor Station, Needles, California
PCA 22120 WP 540015-48/36 WR 840058

Introduction

The Geological Services Unit (GSU) with the Department of Toxic Substances Control (DTSC) conducted a review of the following document regarding groundwater investigation of the East Ravine area: *Revised Work Plan for East Ravine Groundwater Investigation, PG&E Topock Compressor Station, Needles, California* (Revised Work Plan). The Revised Work Plan is dated July 11, 2008 and was prepared by CH2M Hill on behalf of PG&E. The Revised Work Plan incorporates responses to several stakeholder comments (PG&E, 2008) and was modified based on direction from DTSC (DTSC, 2008) and the United States Department of Interior (DOI, 2008). The original East Ravine Groundwater Investigation Work Plan (CH2M Hill, 2007a) was prepared on December 11, 2007 as directed by DTSC on October 29, 2007.

The East Ravine area has been designated as Area of Concern 10 (AOC 10) for the purpose of the site soils and groundwater characterization (CH2M Hill, 2007b). 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 East Ravine formerly contained a surface impoundment in the subarea designated AOC 10c area (Revised Work Plan, Figure 2 and Appendix A) that has historically yielded some of the highest chromium concentrations (3,360 milligrams per kilogram) in site soils (CH2M Hill, 2006, 2007b). 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, January 18, 2008 and May 21, 2008 DTSC

staff observed white powdery material at the surface of the East Ravine wash within AOC 10d and between AOC 10d and AOC10c. Sampling results of the white powdery material are documented in the attached GSU memorandum (GSU, 2008). Chromium has also been detected in groundwater in bedrock well MW-23 in 2006 and 2007 at concentrations greater than 1,000 ug/L (CH2M Hill, 2007c, 2007d, and 2007e).

The Revised Work Plan proposes to install a shallow alluvial well and deeper bedrock well at two primary locations (Sites A and B). If elevated chromium is detected at Sites A or B above trigger levels of 50 or 100 micrograms per liter (ug/L), then a second phase of drilling would be conducted at up to five contingent locals to the north, east and south (i.e., Sites C, D, E, and F). Well installations at contingent sites may also be conducted at the direction of DTSC or DOI if chromium concentrations are below trigger levels.

Recommendations

Based on the GSU review, it is recommended that the Revised Work Plan be approved provided the following items are incorporated as conditions of document approval:

Page 1-5, Section 1.2.2, Conceptual Model of East Ravine Groundwater Conditions: As part of the site conceptual model for the alluvial / bedrock contact, page 1-3 of the Revised Work Plan discusses a fine grained clayey silt that may occur as a weathered zone in the uppermost section of the Miocene Conglomerate. It is requested that several existing core illustrating this fine grained unit be made available for viewing to allow interested stakeholders an opportunity to observe the unit in anticipation that it could be encountered during East Ravine drilling.

Page 1-5, Section 1.2.3, Chromium Sampling Results at Well MW-23: Based on review of historic data, the chromium concentration of 43.7 ug/L cited for well MW-23 is not typical or representative of elevated chromium in the area. As with the other bedrock wells at the site, it is not anticipated that Well MW-23 should detect chromium (also see Specific Comment 1, DTSC 2008). This comment is provided for clarification and is not needed as a condition of approval. However, it may have bearing on the need for installing contingent wells described in the Revised Work Plan.

Page 2-3, Section 2.1.2, Contingency Drilling Sites: As previously mentioned by DTSC (DTSC, 2008), DTSC reserves the right to direct PG&E to proceed with the contingent well installations on an expedited schedule if warranted (e.g., discolored groundwater, significantly elevated hexavalent chromium in groundwater samples).

Page 2-4, Section 2.2, Site Preparation, Access, and Equipment Staging: This section links access issues for Site A with the Part A soil sampling investigation that has yet to be conducted. Activities associated with access to Site A should be considered part of Revised Work Plan if the Part A soil investigation is delayed.

Page 2-7, Section 2.3.3, Soil Sample Collection for Laboratory Analysis: Soil/rock samples should be collected throughout the unsaturated zone for the Site A location during drilling to assist information gathering of the soil sampling investigation. One sample approximately every ten feet should be collected for the analyses specified within the section. This soil data will aid in assessing if residual soil contamination, if present, is a threat to groundwater resources.

Page 2-14, Section 2.5.1, Paragraph 3, Perched/Shallow Groundwater Monitoring Well Design and Specifications: The section states that the objective will be to screen the most permeable zone in the interval *near the bedrock interface* (emphasis added) should the top of bedrock occur below the water table. As it may be more appropriate to screen alluvium near the water table in this case, it is requested that PG&E seek approval from DTSC regarding screen locations prior to well installation.

Page 2-14, Section 2.5.1.1, Well Casing and Screen: PG&E shall include, as an option to this section, to use an alternate shallow well design (e.g., Solinst[®] Continuous Multilevel Tubing System) that would allow monitoring of multiple zones. This option would be useful if the geology of the bedrock / alluvial contact necessitate monitoring more than one zone.

Page 3-1, Section 3.2 Equipment Decontamination: Access to Site A may require special decontamination, staging, and soil handling issues since the surface of the wash contains elevated chromium (GSU, 2008) above site comparison values. PG&E will need to meet with involved agencies if this issue is not addressed through the Part A soils investigation.

Figure 3: The apparent dip of the inferred detachment fault appears to have been inappropriately plotted. A shallower apparent dip is expected. Reports generated from the investigation should include accurate plots that best represent site conditions.

Figure 3: Based on site specific field information for Site A, the borehole may be deepened to increase the total saturated thickness capable of being monitored. A decision to increase the depth of the borehole (e.g., additional 50 feet) would be made in consultation with PG&E and involved agencies.

Figure 5: To meet minimum standards, a 2-inch annular space should be maintained for conventional well construction including the conductor casing. The 8-inch diameter borehole pictured would have to be enlarged to at least 9 inches to accommodate the 5-inch conductor casing. A hollow stem auger or other drilling method could accomplish this task as could modifications to the well design.

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

References

CH2M Hill, December 11, 2007a. Work Plan for East Ravine Groundwater Investigation, PG&E Topock Compressor Station, Needles, California.

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

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

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

CH2M Hill, April 2, 2007e. 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.

GSU, June 18, 2008. Field Report: White Powder Occurrences in the East Ravine - Area of Concern (AOC) 10, Pacific Gas and Electric (PG&E) Company, Topock Compressor Station, Needles, California.

DOI, June 6, 2008. Letter to PG&E. "PG&E Topock Compressor Station Remediation Site – DOI Final Comments on the *East Ravine Groundwater Investigation Work Plan*, December 11, 2007."

DTSC, May 9, 2008. Letter to PG&E. "Directions on the Responses to Comments, East Ravine Groundwater Investigation for Pacific Gas and Electric Company (PG&E), Topock Compressor Station, Needles, California (EPA ID No. CAT080011729)."

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)."

PG&E, February 1, 2008. Responses to Comments on the Work Plan for East Ravine Groundwater Investigation, PG&E Topock Compressor Station, Needles, California.

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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 Zanoria, CHG, CEG