



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

October 23, 2006

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

REVIEW OF WORKPLAN FOR DECOMMISSIONING WELL PGE-6 AT PACIFIC GAS AND ELECTRIC COMPANY, TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA (EPA ID NO. CAT080011729)

Dear Ms. Meeks,

The Department of Toxic Substances Control (DTSC) has completed the review of the Well PGE-6 Decommissioning Work Plan and the Technical Memorandum: Well PGE-6 Decommissioning Evaluation. Both documents were prepared by CH2M Hill on behalf of Pacific Gas and Electric Company (PG&E) and are dated February 28, 2006.

DTSC concurs that PGE-6 should be decommissioned and recommends that this activity be completed prior to any upland in-situ pilot study; if such a pilot study would be approved. DTSC is concerned with the proposed decommissioning procedure and requests that PG&E follow a more rigorous procedure as recommended by Mr. Chris Guerre in the enclosed comments. Since PG&E will need to document a substantial change to the decommissioning procedure, and provide discussion regarding appropriate staging areas, DTSC, hereby, requests that PG&E submit a revised work plan addressing these issues by November 10, 2006. Please note that PG&E must seek all necessary local, state and/or federal permits and approvals for this activity prior to its commencement.

Ms. Yvonne Meeks  
October 23, 2006  
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If you have any questions regarding this matter, please feel free to contact me at  
(714) 484-5439.

Sincerely,

A handwritten signature in black ink, appearing to read 'Aaron Yue', with a large, sweeping flourish extending to the left.

Aaron Yue  
Senior Hazardous Substances Engineer  
Geology, Permitting and Corrective Action Branch

aky:100601B

Enclosure

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



## Department of Toxic Substances Control

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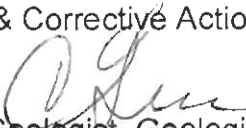
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TO: Aaron Yue  
Project Manager  
Geology, Permitting & Corrective Action Branch, Cypress Office

FROM: Chris Guerre, CHG   
Senior Engineering Geologist, Geological Services Unit  
Geology, Permitting & Corrective Action Branch, Cypress Office

DATE: October 13, 2006

SUBJECT: Well Decommissioning Work Plan for Well PGE-6  
PG&E Topock Compressor Station, Needles, California  
Project No. 22120/540015-48/36-HWMP

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### DOCUMENTS REVIEWED

Well PGE-6 Decommissioning Work Plan, PG&E Topock Compressor Station (Work Plan). The Work Plan is dated February 28, 2006 and was prepared by CH2M Hill.

Technical Memorandum: Well PGE-6 Decommissioning Evaluation, PG&E Topock Compressor Station (Memo). The Memo is dated February 28, 2006 and was prepared by CH2M Hill.

### INTRODUCTION/BACKGROUND

The Geological Services Unit (GSU) of the Department of Toxic Substances Control (DTSC) has reviewed the above-referenced documents regarding decommissioning of well PGE-6. The Work Plan indicates this well was originally installed as a standby industrial water supply well in 1964 with 14-inch diameter steel casing set to a depth of 180 feet below ground surface (bgs). The Work Plan indicates that well PGE-6 has not been in service as a production well since at least 1971, but has been sampled periodically since 1997. Well PGE-6 is currently being sampled on a routine basis as part of the groundwater monitoring program for the Topock Compressor Station. The Work Plan proposes to decommission the well by backfilling. The lower portion of the well below 100 feet bgs would be filled with sand or gravel while the upper portion would be filled with a sand/cement grout. The Work Plan also proposes to remove the top five feet of the well per county requirements. The well screen is reported to occur from 110 to 180 feet bgs and water occurs in the well at approximately 106 feet bgs. A 1998

video log reveals that the steel well casing is significantly corroded at certain areas above the water table. Corroded holes through the casing illustrate that an annular seal does not exist outside the casing in the unsaturated zone. The video log's clarity below the water table makes it difficult to view the screened zone, but the screen appears intact. Sediment was identified filling the well at 162 feet bgs. A 20-inch diameter conductor casing is reported to extend from the surface to 19 feet bgs.

As outlined below, the GSU believes that the Work Plan should be modified to establish a more rigorous decommissioning procedure to prevent mixing of subsurface waters in a highly contaminated portion of the aquifer. If you have questions regarding the following comments, please contact me at (714) 484-5422 or by email at [cguerre@dtsc.ca.gov](mailto:cguerre@dtsc.ca.gov).

## COMMENTS

1. DTSC guidance (Cal EPA, 1995) recommends that improperly constructed water wells like well PGE-6 be completely overdrilled (or casing completely pulled) and then grouted or, alternatively, ripped and perforated along portions of the well screen and casing and then grouted. Water Well Section 23 of the Department of Water Resources' Bulletin 74-90/74-81 provides minimum standards for decommissioning water wells. Section 23 requires that: 1) the well should be cleaned of all undesirable materials that could interfere with decommissioning, and 2) if necessary, the well casing should be perforated/punctured to ensure annular spaces are appropriately sealed. Monitoring Well Section 19 of the Department of Water Resources' Bulletin 74-90 provides minimum standards for decommissioning monitoring wells. Section 19 requires that improperly constructed monitoring wells shall be destroyed by removing all well materials from the borehole followed by grouting. Section 19 further states that well materials may be left in place if the enforcing agency agrees they cannot or should not be removed. If not removed, the casing may require perforation or puncturing to allow proper placement of sealing materials. Collectively, the guidance and standards identified above require that well PGE-6 be decommissioned to higher standards than those identified in the Work Plan.
2. The GSU has identified the following technical concerns that support decommissioning well PGE-6 by either overdrilling or perforating/puncturing the well casing and screen and then grouting:
  - The 1998 video log indicates that the 14-inch well casing has no annular seal between the casing and the original borehole. The void space created is a potential conduit for contaminant migration from the surface to groundwater.

- Within the saturated zone of well PGE-6 (approximately 75 feet saturated thickness), the unsealed annular space allows groundwater contamination to move vertically to other portions of the aquifer along the borehole wall. Data from neighboring wells MW-24A and MW-24B contained in the Arcadis 2006 Upland In Situ Pilot Test Workplan (Arcadis 2006) indicate that the lower portion of the aquifer intersected by well PGE-6 contains higher Total Dissolved Solids and hexavalent chromium concentrations than the shallow portion of the aquifer. An upward vertical gradient exists in the area based on data from shallow well MW-24A and lower well MW-24B. The anisotropic nature of the relatively horizontal geologic layers in the immediate vicinity of well PGE-6 is acknowledged by Arcadis (2006) in that a 10:1 horizontal to vertical anisotropy is used in modeling the groundwater layers. The unsealed PGE-6 borehole disrupts natural bedding and enhances hydraulic communication vertically within the borehole.
3. Grout Requirements: Elevated sulfate in soil and groundwater are reported to attack and degrade certain cement types (Day, 1999). Therefore, the ability for grout to act as a permanent sealant could be compromised due to elevated sulfate. Elevated sulfate is reported in groundwater within the immediate vicinity of well PGE-6 (Arcadis, 2006) at concentrations ranging from 300 to 1,450 parts per million. The higher sulfate concentrations have been detected in well MW-24B screened near the base of the Alluvial Aquifer. Based on these concentrations, Type I Portland cement should not be used for grout mixtures within this area. (see link <http://www.corrosion-doctors.org/Concrete/Portland.htm>). Type II or V Portland cement will be required. Without additional research, the GSU would recommend Type V Portland cement be used to ensure that grout seals are not degraded by sulfate over time. Grout should be emplaced using a tremie pipe beginning at the bottom of the borehole and continue until grout occurs near the surface. The grout must be under sufficient pressure if the grout is intended to invade the annular space through perforated casing.
  4. If possible, the 20-inch diameter conductor casing should be completely removed from the borehole as it is assumed to also not have an annular seal. The condition of the conductor casing should be observed in the field after decommissioning activities begin (e.g., after removal of the cement pad around well PGE-6). Based on these observations, PG&E should obtain DTSC's direction on how to proceed with decommissioning the conductor casing.
  5. Attempts must be made to remove the sediment accumulated at the bottom of well PGE-6 to allow for appropriate grout placement.

6. The Arcadis 2006 Upland In Situ Pilot Test Workplan (Arcadis 2006) indicates that two recirculation wells will be installed in the immediate vicinity of PGE-6 to evaluate the ability of the recirculation wells to distribute reductant within the aquifer. Well PGE-6 should be decommissioned prior to initiating pumping within the recirculation wells as the unsealed PGE-6 borehole might adversely affect the pilot test by enhancing hydraulic communication vertically within the PGE-6 borehole.
7. If staging areas are needed to support decommissioning activities, the GSU recommends that staging areas identified for the Upland In Situ Pilot Test Workplan (Arcadis 2006) be utilized.

## REFERENCES

Arcadis, September 29, 2006. In Situ Hexavalent Chromium Reduction Pilot Test Work Plan – Upland Plume Treatment.

California Department of Water Resources, June 1991. California Well Standards Bulletin 74-90 (Supplement to Bulletin 74-81).

Day, Robert W., 1999. Geotechnical and Foundation Engineering, Design and Construction. McGraw-Hill.

The California Environmental Protection Agency, July 1995. Monitoring Well Design and Construction for Hydrogeologic Characterization. Guidance Manual for Groundwater Investigations.

Peer Reviewed By: Alfredo Zanoria, CHG, CEG