



November 13, 2003

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Subject: Summary Workplan for Exploratory Boring and Test Well
Groundwater Pilot Test Evaluation
PG&E Topock Compressor Station

Dear Mr. Yue:

During the November 6, 2003 Consultative Workgroup (CWG) teleconference, the Department of Toxic Substance Control requested that Pacific Gas and Electric Company (PG&E) provide a brief workplan describing the drilling and installation of the planned groundwater exploratory boring/test well. This investigation is being completed to evaluate the feasibility of the proposed groundwater Pilot Study at the Topock site (Plan B test area). Attached for your information is a technical memorandum summarizing the drilling, well construction, and groundwater sampling activities planned for this investigation. Please forward this document to members of the CWG as appropriate.

If you have any questions regarding the technical memorandum and the pilot test evaluation, please call me at (925) 974-4081.

Sincerely,

Linda Gonsalves
Senior Project Manager
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Enclosure

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Summary Workplan Groundwater Exploratory Boring and Test PG&E Topock Compressor Station

Date: November 13, 2003

This technical memorandum summarizes the field investigation and sampling and analysis activities to be conducted by Pacific Gas and Electric Company (PG&E) in November 2003 for the drilling and construction of a groundwater test well at PG&E's Topock Compressor Station. The exploratory boring/test well is being conducted at the direction of the California Department of Toxic Substances Control (DTSC).

In August 2003, PG&E agreed to conduct a pilot study of groundwater extraction and treatment. The purpose of the pilot study is to begin establishing hydraulic control of the chromium plume, evaluate the treatment process effectiveness and conduct aquifer testing. A potential site for the groundwater extraction pilot system is located in the northern portion of the Topock Station. Prior to implementing the pilot study in this area, it is necessary to drill an exploratory boring/test well on PG&E property to assess groundwater conditions and to collect hydrogeologic data.

The intent of this technical memorandum is to outline the objectives, methods, procedures, and laboratory analyses planned for this time-critical exploratory investigation.

1.0 LOCATION AND OBJECTIVES FOR TEST BORING / WELL

The groundwater investigation will involve the drilling, logging, and sampling of one exploratory boring and subsequent installation of a test well. The exploratory boring/test well will be completed on PG&E property in the northern portion of the Topock Compressor Station, identified as the Plan B pilot test area (test area). Figure 1 shows the approximate property boundaries, site features, and the planned location of the groundwater test boring (to be designated GTB-1).

Specific objectives of the exploratory boring/test well are:

- Evaluate the saturated thickness and hydrogeologic characteristics of the unconsolidated alluvial aquifer, and the depth to bedrock at the test area.
- Characterize total chromium [Cr(T)] and hexavalent chromium [Cr(VI)] in the alluvial aquifer at the test area. Characterize groundwater chemistry including total dissolved solids (TDS) concentrations at the test area for treatment process evaluation.
- Assess general aquifer pumping conditions in the test area.

2.0 EXPLORATORY BORING DRILLING AND SAMPLING

The first activity for this investigation involves the drilling, logging, and sampling of an exploratory boring. All drilling and well construction activities will be conducted by a California-licensed drilling subcontractor and supervised by a California Registered Geologist. The drilling and well installation will be performed for CH2M HILL by WDC Exploration and Wells of Montclair, California.

Drilling Method and Depth. The exploratory boring (and test well) will be drilled using mud-rotary drilling methods and equipment. A 6-inch diameter pilot boring will be drilled to an approximate depth of 270 feet below ground surface (bgs). The depth of the water table at the drilling site is estimated to be approximately 165 feet bgs. Figure 2 shows a schematic diagram of the plan for test boring GTB-1. The base of the unconsolidated alluvial aquifer (depth to bedrock) at the test area is not known, but is estimated to be within the range of 220 to 240 feet bgs. The exploratory boring GTB-1 will be drilled for a maximum of 30 feet into bedrock formations (cemented Miocene Funglomerate underlain by metadiorite rocks).

Coring and Borehole Logging. Selected coring using a 94-mm coring system will be conducted as part of the pilot hole drilling. Starting at 160 feet bgs, collection of five-foot length cores will be attempted at 20-foot intervals (i.e., coring intervals at 160-165', 180-185', 200-205', etc.) in the saturated alluvial aquifer and bedrock formation to the maximum drilling depth. Core recovery from the alluvial aquifer and bedrock is subject to the formation conditions encountered. The recovered core and drill cuttings will be used to prepare a drilling/core log for GTB-1. The collected core will be retained for project record and review.

Discrete-Depth Groundwater Sampling and Analysis. Depth-specific groundwater sampling using the SimulProbe® sampling tool may be conducted during pilot hole drilling. Groundwater sample recovery is subject to the formation conditions encountered.

Geophysical Logging. Following the pilot hole drilling, geophysical logging will be conducted in boring GTB-1 to obtain a hydrostratigraphic record of the aquifer materials at the drilling site. The geophysical logs planned to be collected include spontaneous potential, natural gamma ray, fluid resistivity (for TDS vertical profiling), and resistivity logs (either dual induction or short & long normal resistivity).

3.0 TEST WELL INSTALLATION

After exploratory drilling, sampling, and logging, the pilot boring will be enlarged to install a groundwater test well for water quality characterization and potential aquifer testing at the Plan B area. Figure 2 shows a schematic diagram of the generalized well installation and completion plan for the new test well GTW-1.

Well Construction. Prior to well installation, the pilot borehole will be enlarged to the final well depth using the mud-rotary drilling equipment. The well depth and screen interval for the test well will be based on the aquifer thickness encountered and the geophysical logs

from the exploratory boring. It is anticipated the GTW-1 will be a "fully-penetrating" test well screened across the saturated alluvial aquifer. The monitoring well will be constructed using 5-inch diameter Schedule 80 PVC casing with well screen set from approximately 175 feet bgs to the base of the alluvial aquifer (estimated range of 220 to 240 feet bgs; see Figure 2).

Well Development. Within 48-hours following well construction, the test well will be developed using a surge block, bailer, and submersible pump. Well development will continue until turbidity is reduced and field parameters stabilize. During the purging during well development, the drawdown and purge rate will be monitored to assess general aquifer pumping capacity from the test well.

Well Completion. Following construction and development, the test well will be completed with a flush-mount surface wellhead completion (see Figure 2). A dedicated sampling submersible pump will be installed in GTW-1 for well purging/sampling for chemical characterization.

4.0 TEST WELL SAMPLING AND ANALYSIS

Following well development, the new test well GTW-1 will be sampled for chemical characterization of the saturated alluvial aquifer at the test area. The general plan for the initial well sampling and analyses is summarized below.

Well Sampling. Well GTW-1 will be purged and sampled using the new dedicated submersible sampling pump installed for this investigation. The pump installation and sampling is planned to be performed a minimum of two days after well development. The well will be purged to remove casing/borehole water to obtain representative samples of the saturated aquifer at the test location. During purging, a water quality meter (with flow-through cell) will be used to measure dissolved oxygen, oxidation-reduction potential, pH, temperature, electrical conductivity, and other field parameters. Samples will be collected from the pump discharge line after a minimum of four-casing volumes (approximately 350 to 400 gallons, depending on well depth) have been purged and water quality parameters have stabilized.

Chemical Analyses. Groundwater samples from the test well will be submitted for Cr(T), Cr(VI), TDS, major anions/cations, and other general chemistry parameters for water quality characterization. Table 1 lists the parameters, analytical methods, and minimum reporting limits for the chemical analyses planned for the initial sampling of test well GTW-1. The following laboratories will be used: CH2M HILL Applied Sciences Laboratory located in Corvallis, Oregon and Truesdail Laboratories, Inc. located in Tustin, California for the chromium and microbiological testing. The laboratories will provide certified analytical results and U.S. Environmental Protection Agency Level 3 data packages for quality control review and validation.

5.0 ENVIRONMENTAL MANAGEMENT AND HEALTH & SAFETY

Investigation Derived Waste

The investigation-derived waste (IDW) from the exploratory boring and test well field activities include drill cuttings, drilling mud, purge water from well development and sampling, and wastewater from decontamination activities. The drill cuttings and drilling mud will be contained in lined steel containers temporarily staged on PG&E property near the drilling site. The wastewater produced from well development, sampling, and equipment decontamination will be transferred to storage tanks and secondarily contained in a lined staging area on PG&E property. The IDW soil, mud, and water will be sampled for waste characterization. Pending results of waste characterization, the IDW will be arranged for permitted disposal or treatment by PG&E, as appropriate.

Health & Safety

A Health and Safety Plan (HSP) has been prepared for the field activities and will be kept on site during drilling and construction. The practices described in the HSP are to be implemented by CH2M Hill and subcontractors to remain aware of the hazards affecting them. Health and safety related communications are documented in the daily reports.

6.0 SCHEDULE AND REPORTING

With concurrence from DTSC, PG&E initiated the planning and permitting for the exploratory boring/test well during October 2003. A well drilling permit from San Bernardino County was issued October 27, 2003. The drilling and well installation field work is scheduled to commence during the week of November 10, 2003.

The anticipated duration for the investigation activities are as follows:

Exploratory boring drilling/coring, sampling, logging	6 working days
Test well drilling, construction, development, completion	6 working days
Test well pump installation and sampling	2 working days
Test well sample analyses, final laboratory data reports	15 days from sampling

This investigation will be performed with the intent of presenting the sampling and testing results to DTSC and project stakeholders by late December 2003.