



**Matthew Rodriguez**  
Secretary for  
Environmental Protection



## Department of Toxic Substances Control



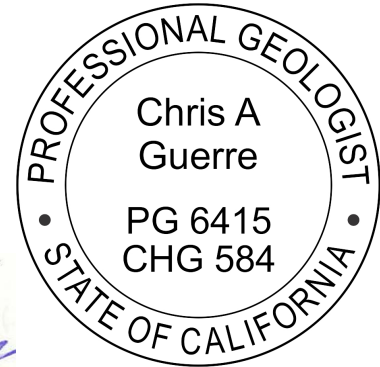
**Edmund G. Brown Jr.**  
Governor

Barbara A. Lee, Director  
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### MEMORANDUM

**TO:** Aaron Yue  
Senior Hazardous Substances Engineer  
Project Manager  
Geological Services Branch

**FROM:** Chris Guerre, PG, CHG  
Senior Engineering Geologist  
Geological Services Unit (GSU)



**DATE:** April 6, 2017

**SUBJECT:** PROPOSAL FOR ALTERNATIVE GROUNDWATER SAMPLING TRIAL  
PACIFIC GAS AND ELECTRIC COMPANY (PG&E)  
TOPOCK COMPRESSOR STATION SITE  
NEEDLES, CALIFORNIA (EPA ID NO. CAT080011729)

PCA 22120 SITE CODE 540015 WP 48

### INTRODUCTION

The GSU has reviewed PG&E's groundwater sampling proposal titled "*Proposed Trial of Alternative Sampling Approaches at Select Monitoring Wells in the Topock GMP and CMP*" (Proposal) and dated August 21, 2015. In 2014, the Department of Toxic Substances Control (DTSC) approved micropurge/minimal drawdown (MD) groundwater sampling in place of traditional three volume (3V) purge methods at many Topock alluvial wells with screen lengths of 20-feet or less as the MD results were generally comparable with the 3V data. Based upon that acceptance, the 2015 Proposal includes a second proposal specifically including bedrock and wells with screens longer than 20-feet that were omitted from the initial sampling study. The Proposal includes collecting samples using MD or HydraSleeve (HS) groundwater grab samples followed by collection of 3V purge samples for comparison. Additionally, a change to MD at some wells is proposed with the resulting MD data being compared to historic 3V data.

## **GSU RECOMMENDATIONS**

The GSU concurs with the alternative sampling proposals described in text and listed in Tables 1, 2, and 3 of the Proposal with the following exceptions/modifications discussed below. GSU comments on individual wells are organized based on the categorization utilized in preparing Tables 2 and 3 of the Proposal.

All wells should have conductivity profiles run prior to sampling trials to ascertain if stagnant water is present in each well. This is of even greater concern with tight formations such as bedrock where representative samples from low flow formations could be overwhelmed by mixing with stagnant waters. Conductivity profiling in open boreholes will confirm current conditions and potentially identify conductivity contrasts that could alter pump depth placement. Additional DTSC concerns with conductivity stratification potentially affecting groundwater sampling data quality are contained in DTSC's March 13, 2017 letter to PG&E.

### **Proposal for GMP Monitoring Wells**

#### **Table 2 - Select Long Screen Bedrock GMP Wells**

**MW-24BR and PGE-07BR:** For these wells with a long screen or open borehole greater than about 50 feet, flow testing is requested to determine if there are zones exhibiting flow that one would want to target for sampling or potentially exclude. The proposed MD/3V trial could begin after flow testing and conductivity profiling are complete so any adjustments to pump placement could occur.

**PGE-08:** Continue sampling this well on the established annual frequency. Conduct a downhole video at this long screen well (~150 foot well screen length) to assess current conditions. Copies of all older downhole videos of the well should be provided to DTSC. PG&E should evaluate different ways to retrofit the well, including removal of the packer (Baker No. 47A4), in hopes of having this well provide more meaningful data for the groundwater remedy. PG&E should conduct borehole flow testing if access to the screen zone is accomplished.

#### **Table 2 - GMP Bedrock Wells With Short Screen Lengths**

**MW-23-60 and MW-23-80:** Prior to MD testing, conduct conductivity as well as pH profiling in these wells due to the unusually high pH readings from grout invasion within these wells. If needed, pump placement could be modified based on the profiling.

**MW-60-125 and MW-74-240:** Add these wells to the trial.

**MW-66BR-270, MW-48, and MW-68BR-280:** The GSU recommends that the current method of purging these wells to dryness be continued as it promotes removal of any stagnant water and ensures that fresh water enters the well/borehole from the tight bedrock formation. There is concern that a stagnant water column could form if low flow

or grab samples are consistently utilized in the future instead of sampling while purging to dryness. Perhaps MD trials should be conducted provided that the boreholes are periodically (e.g., every other sampling event) evacuated and purged completely. This could provide some cost savings to PG&E while maintaining sample quality.

## **Table 2 - GMP Bedrock Wells With Very Long Open Boreholes**

**MW-57-185:** In addition to the proposed MD sampling with the pump set at 171 feet below top of casing (btoc), also conduct MD sampling with the pump set at approximately 150 feet btoc based on flow testing, conductivity, and hexavalent chromium survey data. Conduct conductivity profiling in this borehole and evaluate results prior to sampling.

**MW-58BR:** Before disturbing the water column with other procedures, run a conductivity profile in this 140-foot long open borehole to see if anomalous saline zones exist. Assuming no significant data are provided from the profile, reconstruct this well with screened zones similar to when it was separated into upper and lower zones in 2010/2011 when 200 ug/L hexavalent chromium concentrations were detected in the lower zone. Then develop the new configuration before sampling the shallow and lower zones again. The history of the retrofitting of this well is also requested including the reason for removal of the Flute system. Finally, PG&E should discuss how past flooding of this well could have affected well chemistry if surface water entered the well (see photograph at end of this memorandum).

**MW-60BR-245:** A detailed borehole flow assessment was conducted in 2011 at this bedrock borehole open from approximately 136 feet to 245 feet btoc. The 2011 flow testing identified different flow zones at 175 and 238 feet btoc: one low flow zone at 175' with 290 ug/L chromium and a larger flow at 238' with 78 ug/L chromium. Each of these zones should be sampled while hanging the pump at 175 and 238 feet btoc using MD and the modified 3V method as proposed. Note that hexavalent chromium in this well has varied from non-detect to 260 ug/L with lower values in recent years for unknown reasons. As with all wells, conduct a conductivity profile in this borehole prior to sampling. PG&E should indicate what depths the pump has been placed during past sampling events.

**MW-64BR:** Before disturbing the water column with other procedures, run a conductivity profile in this 140-foot long open borehole to see if anomalous saline zones exist. Assuming no significant data are provided from the profile, reconstruct this well with screened zones similar to the MW-64-BR-LOWER/UPPER-150 configuration since hexavalent chromium was routinely detected at those horizons in 2011. The GSU is envisioning a semi-permanent dual screen PVC well inserted into the 3.8-inch diameter borehole. A couple weeks after development, conduct MD and 3V (modified?) sampling with pumps hung at the horizons used in 2011 (unless a more appropriate horizon is identified based on conductivity profiling).

**MW-70BR-225:** A detailed borehole flow assessment was conducted in 2011 at this bedrock borehole open from approximately 130 feet to 229 feet btoc. Note that the screen interval and length reported in Table 1 are not consistent with the well construction diagram and flow test summary figure. The 2011 flow testing identified a flow zone from the bottom of the borehole, so the MD pump should be moved to a depth between 220 and 229 feet btoc. MD and 3V samples should be collected as proposed.

**MW-72BR-200:** A detailed borehole flow assessment was conducted in 2012 at this bedrock borehole open from approximately 107 feet to 200 feet btoc. The 2012 flow testing identified two similar flow zones at 152 and 195 feet btoc so each zone should be sampled by hanging the pump at those specified depths and using the MD and then 3V method as proposed. As with all wells, conduct a conductivity profile in this borehole prior to sampling.

### **Table 2 - GMP Alluvial Monitoring Wells With Long Screens**

**TW-01:** First, perform a detailed borehole flow test at this well (100 foot well screen length) to assess current flow characteristics. The only other flow testing was conducted in 2003 as indicated in Table 2 and no details of the 2003 testing was provided in the Proposal. PG&E should provide Attachment B mentioned in Table 2 for this well as it was not included with the Proposal. Based on the new flow test data, sampling strategies should be explored to have this well provide more meaningful data for the groundwater remedy. For example, perhaps permanently retrofitting this well with inflatable packers or flexible baffles might provide better data to distinguish between shallow and deep aquifer conditions. If new flow testing is similar to the 2003 flow assessment with the highest chromium concentrations in the shallow portion of the well, then the GSU requests samples (grab and/or MD) be collected at approximately 170, 215 and 260 feet btoc. Further plans to sample and retrofit this well should be made after flow testing is conducted. The end goal is to enhance the monitoring capabilities of this existing well for use in the groundwater remedy.

### **Table 3 - Proposal for IM3 CMP Monitoring Wells**

Proposal Item 1: For the seven OW wells with 30-foot or 20-foot screen lengths (i.e., OW-1S/M/D, OW-2S/M/D and OW-5D), a change to MD sampling is proposed with results evaluated against historical trends in each Annual CMP Report. The GSU concurs with this proposal.

Proposal Item 2: For the two OW (i.e., OW-5S and OW-5M) and eight CW wells with 40-foot or 50-foot screen lengths, a trial of MD sampling versus 3V sampling is proposed. An MD sample would be collected first and then a 3V sample. Two annual events would be conducted as well as one MD/3V semi-annual event. The GSU concurs with this proposal, but directs PG&E to conduct borehole flowmeter testing to guide pump placement should MD analytical results not compare well with the three volume purge data.

Note: Table 3 has two errors: Well OW-5S has a well screen length of 40 feet, not 30 feet as listed in the "Screen Length" column and OW-5D has a 20-foot screen length, not the 40 feet reported.

The GSU also requests that a conductivity profile be conducted on all OW and CW wells that lack current profile data.

PG&E should address the requests noted in this memorandum.



October 11, 2012 photograph of flooding in the East Ravine where the well MW-58 cluster is located (see yellow circle).

The GSU notes that the comments and recommendations presented in this memorandum are facility specific and should not be applied to other projects without consultation with the Project Geologist. If you have any questions or comments please telephone me at (714) 484-5422, or e-mail me at [christopher.guerre@dtsc.ca.gov](mailto:christopher.guerre@dtsc.ca.gov).

Peer reviewed by: Wendy Arano, PG

cc: Alfredo Zanoria, CEG, CHG