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## California Regional Water Quality Control Board Lahontan Region

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December 16, 2011

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### **COMMENTS ON PILOT TESTING OF WHOLE HOUSE WATER TREATMENT SYSTEMS, PACIFIC GAS AND ELECTRIC COMPANY (PG&E), HINKLEY COMPRESSOR STATION, SAN BERNARDINO COUNTY**

Water Board staff is providing comments on the September 27, 2011 document, *Pilot Testing of Whole House Water Treatment Systems (Pilot Test)*, for chromium contaminated groundwater from the PG&E Hinkley Compressor Station. We apologize for the delay in getting these comments to you but we waited so as to also include comments from the California Department of Public Health (DPH).

While the Pilot Test document was submitted prior to issuance of Cleanup and Abatement Order (CAO) R6V-2011-0005A1, Water Board staff believes the document may be incorporated into a workplan for a feasibility study required in Order No. 2a, provided it includes the comments below.

#### **Background**

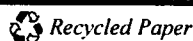
The Pilot Test describes procedures for evaluating commercially available whole house treatment systems for removing chromium from domestic well water in Hinkley. Three systems have been selected to be pilot tested: a strongly base anion exchange resin filter, a two-pass reverse osmosis system, and a hybrid of the resin filter and reverse osmosis. Pilot testing will be performed using upper-aquifer water from one of the agricultural wells (Gorman 1R) on the former Gorman field property. The test will run using continuous flow for three months to allow collection of system information, such as chromium efficiency removal and breakthrough performance. A report containing data and results of the pilot test will be submitted to the Water Board.

#### **COMMENTS**

##### **Selection of Proposed Systems**

The Pilot Test document states that ARCADIS, PG&E's consultant, is recommending pilot testing of the above-mentioned three proposed systems based upon literature review, desktop assessment, and discussions with vendors on product availability and

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applicability. The document, however, does not discuss the specific selection criteria used for the three proposed systems. Nor does the document state why other systems known to remove chromium from water were not included in the pilot test. For instance, according to the Water Quality Association, other technologies, such as distillation and weakly based anion resin filters, can be used as point-of-use to whole house treatment. PG&E should state why such technologies will not be included in pilot testing.

### **CA DPH Comments**

The DPH advises that the Pilot Test document follow ANSI/NSF standards for home use. Such standards differ from standards established for public water systems and point-of-use, some of which are cited in PG&E's Pilot Test document. Refer to specific comments by DPH staff in the enclosed electronic message.

### **Gorman 1R Well**

As mentioned in the Pilot Test, Water Board staff has expressed concern about using the Gorman 1R well in the pilot test. One concern is for the poor water quality from the well. Table 1 in the Pilot Test shows that water from Gorman 1R exceeds drinking water standards for chloride, sulfate, uranium, gross alpha activity, specific conductance, and total dissolved solids (TDS). The well represents the "worst case scenario" of water quality within the chromium plume area. Our concern is that this water quality does not represent an average water quality scenario of domestic wells potentially affected by PG&E's waste chromium and likely to receive whole house replacement water. Thus, Water Board staff is recommending that the pilot test be simultaneously conducted on a second supply well that represents an average water quality scenario for all constituents other than hexavalent chromium.

The other concern expressed by Board staff is that the high pumping rate at Gorman 1R of 50 gallons per minute (gpm), which is also not consistent with that of residential domestic wells, may affect pilot test results. Pumping of typical domestic wells is generally between 5 to 10 gpm. The Pilot Test states that water from Gorman 1R will be split for the different pilot test systems and each test will range from 1 to 10 gpm. Board staff recommends that a flow meter be installed for each pilot test system so that flow is monitored to verify the rate is consistent with that of typical residential domestic wells.

### **Reverse Osmosis**

Board staff has a number of concerns about the proposed testing using reverse osmosis. The first concern is that in domestic home settings, reverse osmosis is typically reserved for one faucet, often in the kitchen. Commercially available reverse osmosis systems are generally not considered an acceptable treatment system for the entire house due to corrosive issues of pipes. If reverse osmosis pilot testing is for consideration in a whole-house setting, testing must include collecting samples at end of pipe in a house-like setting and account for both hot and cold water. Be sure that laboratory analyses include metals that could potentially leach from pipes.

The second concern is that the Pilot Test should specify the type of membrane to be used in the pilot test, such as TFC or CTA. Because filters can concentrate chemicals and compounds and lead to breakthrough, laboratory analyses of treated water must include constituents identified in well water. The third concern is that, in addition to the flow meter at the start of the reverse osmosis process, Board staff recommends that a flow meter be also installed at the end of the process to determine the amount of treated water being produced. Our last concern relates to the description of the reverse osmosis process following treatment. The Pilot Test states treated water and brine stream will be sampled, blended, monitored, and disposed. It is believed that combined water streams should end up having similar water quality to the water initially pumped from the well.

Please note that combined water intended for discharge must be sampled beforehand and placed in a storage facility until the results of water samples are known. Due to water from Gorman 1R exceeding drinking water standards for many constituents, the disposed water should not be done in a manner that forms standing water, such pools and puddles, that could attract wildlife or lead to exposure to humans. In the event that combined water reflects water quality having concentrations exceeding that of the initial well water, the Water Board may consider the water to contain wastes and require it be removed off site to a facility licensed to receive such waste.

### **Testing Protocol**

The testing protocol of the proposed pilot tests call for the in-home systems to be tested under continuous operation mode. While this may be a typical protocol for public water systems, it is not acceptable for in-home use testing, due to high variability in use patterns (i.e, high usage during morning and evening periods, with extended rest periods between those times). Current ANSI/NSF standards for home use require sampling following rest periods to ensure that treated water quality remains acceptable.

### **Implementation Schedule**

We understand that PG&E implemented the pilot test in November 2011 and plans to comply with the feasibility study reporting deadline of April 9, 2012, specified in R6V-2011-0005A1.

As previously stated, Water Board staff has no objection to the proposed schedule, so long as technical reports incorporate the comments included in this letter. Since pilot testing has already been underway, revised testing shall be conducted for no less than one month.

### **REQUIREMENTS**

Water Board staff will anticipate reviewing and evaluating the following information for determining compliance of CAO R6V-2011-0005A1:

- Description of specific selection criteria used to determine systems to be used or not used in the pilot test.
- Water quality information from Gorman 1R well. A sample must be collected within 30 days if implementing the pilot test using water from the well or another well.
- Description of supply well having average water quality concentrations of domestic wells potentially affected by PG&E's waste chromium.
- Flow rate going to each system being tested.
- Type of reverse osmosis membrane being used in testing.
- Volume of treated water produced from reverse osmosis pilot test.
- Revised testing protocol from continuous operation testing to testing following rest periods, to account for typical household usage patterns
- Water quality results of treated water from each pilot test system, including end-of-pipe testing in a whole-house setting.
- Water quality results for combined water streams from reverse osmosis process.
- Description of storage container used while awaiting laboratory results of treated water.
- Disposal description of all wastes created or generated from pilot testing.
- Any unexpected or unplanned findings or results.
- Map(s) showing all locations involved in pilot testing, storage, and disposal.
- Summary and conclusions of testing results.
- The stamp and signature of a state licensed civil engineer.

Please contact me at 542-5436 or Lisa Dernbach at (530) 542-5424 or [ldernbach@waterboards.ca.gov](mailto:ldernbach@waterboards.ca.gov), if you should have any questions.

for: LAURI KEMPER  
ASSISTANT EXECUTIVE OFFICER

Enclosure: Department of Public Health December 9, 2011 Email

cc: PG&E Technical Mail List and lyris list (and web posting)

LSD/chT: PG& whole house pilot test 12-11  
file: WDID No. 6B369107001 (VVL)

## CDPH initial comments

From: "Bartson, Mark (CDPH-DDWEM)" <Mark.Bartson@cdph.ca.gov>  
To: <LKemper@waterboards.ca.gov>  
CC: "Wilhelm, Kim (CDPH-PS-DDWEM)" <Kim.Wilhelm@cdph.ca.gov>  
Date: Friday - December 9, 2011 11:04 AM  
Subject: CDPH initial comments  
Attachments: Mime.822

Here are our comments in rough format, for now.

\* CDPH / ANSI/NSF standards do not currently certify Cr+6 for removal to the PHG level.

\* Since there is no MCL for Cr+6 at this time, there is no health claim that can be made. Thus, CDPH regulations do not apply.

\* For the test protocol, the proposed systems are tested under continuous operation mode. This is typical of PWS but not for in-home use.

\* For in-home use, the typical use pattern is high usage during mornings and evenings with extended period of rest periods. Current ANSI/NSF standards for home use require sampling following rest periods to ensure that the treated water quality remains acceptable. (TDS creep for RO systems.)

Plus previous comments:

#### Technical Feasibility

1. Point-of-Entry RO treatment is not a practical solution due to corrosion problems for plumbing inside the house. However, Point-of-Use RO treatment or combination RO/IX treatment will likely be the best option.

2. Point-of-Entry Anion Exchange treatment with lead-lag configuration may be possible as a whole house treatment solution for homes with nitrate concentration below the MCL. However, testing frequency at the mid-point will need to be sufficiently high to prevent breakthrough. Due to high variability of source water quality, additional pilot/commissioning testing will need to be done (at least monthly samples).
3. For homes with nitrate > MCL or other source water quality problems, POE Anion Exchange for Cr+6 may be an incomplete solution. It may reduce Cr+6 but there could be high nitrate or other contaminants in the treated water. Most IX media tested to date are quite ion-selective.

#### Issues with Memo

1. Section 64417 that is referenced in the memo is for POU devices.
2. ANSI/NSF 58 Standard is only applicable for POU devices. The proposed POE devices can't be tested to the standard.
3. ANSI/NSF 53 Standard is applicable for both POU/POE entry devices. However, the current versions of ANSI/NSF 53 and 58 standards do not certify products to below 0.1 mg/L (100 ug/L) of Cr+6. (See Table 8 below.)
4. Both standards have specific testing requirements and the proposed pilot tests do not meet the requirements for device certification. (Due to specific requirements for challenge water conditions.)