



California Regional Water Quality Control Board

Lahontan Region



Linda S. Adams
Secretary for
Environmental Protection

2501 Lake Tahoe Boulevard, South Lake Tahoe, California 96150
(530) 542-5400 • Fax (530) 544-2271
www.waterboards.ca.gov/lahontan

Arnold Schwarzenegger
Governor

MEMORANDUM

TO: Lahontan Water Board Members

FROM: 
Lauri Kemper
Assistant Executive Officer

LAHONTAN REGIONAL WATER QUALITY CONTROL BOARD

DATE: November 16, 2010

SUBJECT: REPLACEMENT WATER FOR THOSE AFFECTED BY PACIFIC GAS AND ELECTRIC COMPANY'S HINKLEY CHROMIUM DISCHARGES

Introduction

Pacific Gas and Electric Company's (PG&E) chromium discharges have adversely affected groundwater in an area more than two miles long and one mile wide in the Hinkley area. The complete extent of groundwater affected by PG&E's discharge is not fully known. Because chromium exists naturally in groundwater in the area, in 2008 the Lahontan Water Board set a background limit of 3.1 micrograms per liter or parts per billion (hereafter, $\mu\text{g/L}$) for hexavalent chromium and 3.2 $\mu\text{g/L}$ for total chromium, which has implications to final cleanup standards and to what may be determined to be "affected" as discussed later in this memorandum.

At the October 13, 2010 workshop on the PG&E Hinkley chromium cleanup project, certain Water Board members requested Lahontan Water Board staff to require PG&E to supply replacement water for those residents whose domestic wells were degraded by chromium from PG&E's chromium discharges. Lahontan Water Board staff has evaluated the request and provide the following discussion of the issue.

Where levels of hexavalent chromium and total chromium in wells have exceeded the background levels established by the Water Board, the Water Board has relied upon the maximum contaminant levels (MCLs) set out in Title 22 for total chromium as the threshold for determining whether PG&E must supply replacement drinking water. There is no MCL for hexavalent chromium, however, and the drinking water standard for total chromium (50 $\mu\text{g/L}$) is much greater than the proposed Public Health Goal

California Environmental Protection Agency

(PHG) for hexavalent chromium (0.06 µg/L).¹ No drinking water wells exceed the current MCLs for total chromium, but some may be affected by PG&E's discharge at levels above a proposed Public Health Goal (PHG) for hexavalent chromium.

Basis for Requiring Replacement Water

Water Code section 13304, addressing the cleanup and abatement of waste discharges, authorizes the Water Boards to require the person(s) responsible for the discharge of waste to provide or pay for "uninterrupted replacement water service, which may include wellhead treatment, to each affected public water supplier or private well owner." [emphasis added] Replacement water provided "shall meet all federal, state, and local drinking water standards and shall have comparable quality to that pumped by the public water system or private well owner prior to the discharge of waste." (*Id.*) The Water Code does not define what constitutes an "affected" well. The State Water Resources Control Board has indicated that "affected" by a discharge of waste includes those wells in which water does not meet the federal, state, or local drinking water standards, or where no standards yet exist, above the goals developed by agencies with expertise for public health determinations. (SWRCB Order WQ 2005-0007.)

Water Quality Standards for Chromium

There currently is no established state or federal drinking water standard for *hexavalent chromium* (also referred to as chromium 6). In California, drinking water standards are set forth as maximum contaminant levels (MCLs) in title 22 of the California Code of Regulations. The California Department of Health Services (now the Department of Public Health (DPH)) established an MCL for total chromium of 50 µg/L in 1977. That standard was proposed to be protective of hexavalent chromium in drinking water based on the information available at the time of its promulgation. Total chromium consists almost entirely of hexavalent chromium and trivalent chromium, or chromium 3. Hexavalent chromium is recognized as the most toxic form of chromium. Since the MCL for total chromium was promulgated, additional information has become available regarding the toxicity of hexavalent chromium in drinking water, including a 2007 National Toxicology Program study that found significant numbers of gastrointestinal tumors in male and female rats and mice that consumed drinking water with hexavalent chromium. In addition, the Office of Environmental Health Hazard Assessment's (OEHHA) analysis of data collected from China found increased rates of stomach

¹ Although there currently is no established drinking water standard for hexavalent chromium, and PHGs are not enforceable standards, it is likely that a MCL for hexavalent chromium would be lower than the 50 µg/L MCL for total chromium. Cal Health & Safety Code § 116365(a) states that primary drinking water standard "shall be set at a level that is as close to feasible to the corresponding public health goal placing primary emphasis on the protection of public health" (See also SWRCB WQ Order 2005-0007, p. 5, stating that although PHG is not enforceable standard, OEHHA's expertise and conclusions are clearly key to later development of safe drinking water standards by DHS.) OEHHA and DHS are prohibited from imposing any mandate that requires a public water system to comply with a public health goal. (Health & Safety. Code 116365(c); SWRCB Order WQ 2005-0007, p. 5.)

cancer in people exposed to high levels (20,000 µg/L) of hexavalent chromium from drinking water.

In August 2009, OEHHA released for public comment a draft Public Health Goal (PHG) for hexavalent chromium in drinking water; that public comment period has closed. OEHHA's PHG must be based upon a risk assessment that identifies a level of exposure at which no known or anticipated adverse effects on health will occur, with an adequate margin of safety. (California Safe Drinking Water Act of 1996 (Health and Safety Code, Section 116365) PHG's are used by the DPH in establishing drinking water standards or MCLs. (SWRCB Order WQ 2005-0007, p. 5.) The proposed PHG for hexavalent chromium is 0.06 µg/L. OEHHA initiated an external peer review of its draft PHG. In September 2010, OEHHA released the results of that peer review, which is generally supportive of the draft PHG. OEHHA has indicated it will revise the draft PHG document as appropriate in response to the peer review and public comments, and release the revised draft for a 30-day public comment period. A final response to all comments received, including peer review comments, will be published at a later date when the PHG is finalized. The schedule for release of a revised draft and PHG finalization has not been made public.

Where OEHHA has established a PHG but where DPH has not established an MCL, the State Water Resources Control Board (State Water Board) has determined that it is appropriate for a regional water board to require replacement water for wells affected at levels exceeding the PHG. (SWRCB Order WQ 2005-0007, p. 5.) In that case, the Central Coast Regional Water Quality Control Board had set the trigger level for requiring replacement water for potassium perchlorate contamination at 4 µg/L, which had been the PHG. The PHG was later changed to 6 µg/L and the entities supplying the replacement water requested approval from the Central Coast Water Board to raise the level of contamination requiring replacement water to 6 µg/L to match the PHG. The Central Coast Water Board declined the request. The State Water Board concluded that "Where no federal, state, or local standard yet exists, it is appropriate to use goals developed by agencies with expertise for public health determinations in deciding whether replacement water was necessary." The State Water Board stated, "Where new water replacement orders are considered, ..., regional water boards should defer to OEHHA and DHS [now DPH] in determining safe drinking water levels."

As indicated above, neither OEHHA nor DPH have established PHGs or MCLs for hexavalent chromium. The most restrictive applicable drinking water standard is the 50 µg/L MCL for total chromium, but it is recognized that this level does not take into consideration the more recent information that has been developed regarding the toxicity of hexavalent chromium in drinking water. OEHHA has drafted a proposed PHG of 0.06 µg/L for hexavalent chromium in drinking water based on sound scientific evidence, including an external peer review of its draft PHG, which was generally supportive of the proposed limit. Although that limit is not final, there may be a stronger basis for relying on the PHG of 0.06 µg/L, rather than the MCL for total chromium,

which does not appear to provide sufficient protection based upon more recent information regarding the toxicity of hexavalent chromium.

Prior Application of the Authority to Require Replacement Drinking Water

The Water Board staff has relied upon the maximum contaminant levels (MCLs) set out in Title 22 for total chromium as the threshold for determining whether PG&E must supply replacement drinking water. There is no MCL for hexavalent chromium, however, and the MCL or drinking water standard for total chromium is 50 µg/L. Based on this standard and the fact that no wells have exceeded the MCL, the Water Board has not previously required PG&E to provide replacement water.

Issues Regarding Requiring Replacement Drinking Water

At the Water Board's October 13, 2010 workshop on PG&E's Hinkley chromium cleanup project, some members of the Hinkley community indicated that they are concerned about their health due to rising concentrations of chromium in their well water, considering the levels of hexavalent chromium in their wells exceed the draft PHG. Requiring replacement drinking water for affected well owners was discussed. Currently, there are no wells that have levels above the total chromium MCL. If, however, the Water Board wants to require replacement drinking water for wells that are showing levels above the PHG of 0.06 µg/L for hexavalent chromium, it would need to address how to determine what wells were affected by PG&E's discharge, as opposed to having levels that are consistent with the natural background of 3.1 µg/L for hexavalent chromium and 3.2 µg/L for total chromium established by the Water Board.

To determine whether the chromium found in a particular well is the result of PG&E's discharge, or is the result of natural background concentrations, the Water Board will have to: (1) evaluate the well's location relative to the known location of elevated chromium from PG&E's discharge and other facts concerning the well, and (2) analyze historical chromium concentrations in the well. The first step is necessary to discard from consideration those wells that have no possibility of being affected by PG&E's discharge due to their location or other conditions. Once it is established that a well is located within an area that may be affected by PG&E's plume, it will be necessary to assess whether the chromium in the well is related to natural background or whether it is caused by PG&E's discharge. For wells that contain chromium at concentrations above the established background concentrations and are in areas proximate to the plume created by PG&E's discharge, it will be clearer that they have been affected by PG&E's discharge, as the background level established by the Water Board is the maximum background concentration for the entire Hinkley area, not just for a given well.

The real challenge of identifying whether PG&E is the source of the chromium levels, and therefore, should be required to supply replacement drinking water for those wells with chromium levels above the draft PHG for hexavalent chromium, will be the wells that are above the PHG but below the background concentrations established by the

Water Board for the cleanup of the site. For those wells where there exists sufficient information regarding historical hexavalent chromium concentrations, assessment of whether the chromium levels are natural or caused by PG&E's discharge will be possible. For example, where the wells have consistently tested non-detect for chromium, and are now showing increased levels, the Water Board may feel justified in determining that PG&E is the cause of the increased chromium levels, and should therefore supply replacement drinking water if the levels exceed the PHG. There may not, however, be sufficient background data for every well, and in those cases where insufficient background data exists, it will be difficult to determine with a reasonable likelihood or statistically significant confidence level whether a particular well is affected by PG&E's discharge when it shows levels that are below the established natural background, but above the PHG.

Summary and Next Steps

PG&E's discharges have affected groundwater with chromium. Water Code section 13304 allows the Water Board to require a discharger to provide replacement water to "each affected public water supplier or private well owner." The State Water Board has interpreted this to mean that a regional water board can require replacement drinking water when the level of impact exceeds federal, state and local drinking water standards. Where no standard yet exists, it is appropriate to use goals established by agencies with expertise for public health determinations. Here, an MCL for total chromium has been established at 50 µg/L. No drinking water wells in the Hinkley area exceed the MCL. A PHG for hexavalent chromium, the most toxic form of chromium, has been proposed at 0.06 µg/L, but has yet to be established by OEHHA. The draft PHG is based on sound scientific evidence as a level that will not cause adverse health effects. Because the PHG is not yet approved, one may argue that it cannot be relied upon in making a decision for when to require replacement drinking water. Because of the amount of study that has gone into the development of the PHG, including the additional peer review, and the importance of protecting public health from contaminated drinking water, a good argument exists that reliance on the draft PHG is appropriate, at this time, despite the fact that it has not yet been formally promulgated. If a PHG is eventually promulgated at a level different from that proposed, the Water Board should consider revising any mandate to provide replacement drinking water to be consistent with the promulgated PHG.

Water Board staff will begin the process to determine which wells have been affected by PG&E. For wells with levels above the background concentrations of 3.1 µg/L for hexavalent chromium and 3.2 µg/L for total chromium, it may be assumed that PG&E's discharge affected the well, and requiring the provision of replacement drinking water is more easily supported. If, however, the levels are below the maximum background concentrations, but above the proposed PHG for hexavalent chromium, a more rigorous evaluation will be needed to demonstrate that PG&E's discharge affected the well.

Water Board staff has told PG&E that it intends to require PG&E to implement this strategy through issuance of two formal orders: 1) requiring replacement drinking water where maximum background concentrations are exceeded, and 2) requiring replacement drinking water for wells with trends of increasing chromium concentrations, but where concentrations are below the maximum background concentrations. PG&E has informed the Water Board staff that they will provide replacement drinking water to any Hinkley resident living near the plume with hexavalent chromium levels above 3.1 ppb in their domestic well. In fact, PG&E has informed the Water Board that PG&E has already offered replacement drinking water to six individual well owners. Also, PG&E has requested no formal order be imposed by the Water Board since they have voluntarily offered replacement drinking water. They have also requested review of the orders, especially the order related to scenario 2) above.

By November 30, 2010, Water Board staff will issue a cleanup and abatement order requiring PG&E provide replacement drinking water for those well owners where water samples contain concentrations that exceed maximum background concentrations of 3.1 µg/L for hexavalent chromium and the wells are located in proximity to the plume created by PG&E's discharge. Water Board staff will develop an additional order in early January to require replacement drinking water for those affected by PG&E's discharge, but hexavalent chromium concentrations are below the maximum background concentrations.