



HINKLEY GROUNDWATER MANGANESE WORKING GROUP
FINDINGS FOR HINKLEY WELL WATER
AND RECOMMENDATIONS
March 2013

Problem Statement

During the summer of 2012, some Hinkley residents complained about black water coming from domestic wells. There was a concern that black water was a result of remediation actions being conducted by PG&E for chromium contamination. Water samples collected by citizens and the Water Board showed that manganese was found at unusually high concentrations in certain water supply wells.

Manganese Properties

Manganese is the twelfth most abundant element on earth and is a naturally occurring metal that is found in many types of rocks. Because of this, manganese is routinely dissolved in groundwater and found in drinking water at low levels. Sometimes higher than normal levels of manganese occur when groundwater becomes reducing, meaning the oxygen is removed, from either natural or man-made conditions. If groundwater with dissolved manganese is aerated, such as in a shower, plumbing fixture, or from a pump in a well, a rapid reaction can cause manganese to precipitate out as small suspended solids, causing a black color and staining. Drinking water containing manganese or swimming or bathing in water containing manganese may expose people to this chemical. The nervous system has been determined to be the primary target organ of manganese, with neurological effects generally observed in association with high concentrations of the metal.

Drinking Water Standards

Neither the U.S. Environmental Protection Agency (U.S. EPA) nor the State of California has established a *primary* drinking water standard for manganese based upon health effects of the chemical. The U.S. EPA, however, has established a *secondary* drinking water standard of **50 ppb** based upon taste and staining. It has also set a Lifetime Exposure level of **300 ppb** based upon the neurotoxin effects from manganese. California has set a health-based notification level of **500 ppb** in which municipal and community water suppliers must report to the State Department of Public Health—this does not apply to owners of domestic wells. Of the three numbers given, only the 50 ppb secondary drinking water standard is an enforceable limit; the other two numbers are considered guidance to communities.

Working Group Findings

A Manganese Working Group was formed to investigate the manganese detected in some domestic wells in the Hinkley area. The Group consists of staff from the Water Board, the U.S. Geological Survey, PG&E, a subcommittee of the Community Advisory Committee and its Independent Review Panel (IRP) Manager, Project Navigator. Group meetings took place in December 2012, and January and February 2013.

The Group compiled a table of laboratory results of manganese in water samples collected from the different affected residences. This information was presented on a map (see Attachment) along with

the locations of PG&E's In-situ Remediation Zone (IRZ) areas. The Group also compiled historical manganese data collected prior to late-2004 when IRZ operations began.

The Group discussed how manganese is a common element in desert environments and can occur naturally at low levels in groundwater. USGS data shows past manganese detections in groundwater in the Hinkley area ranged from non-detect to 75 ppb. At PG&E's IRZ areas, manganese was detected up to 210 ppb just prior to the first IRZ injection to groundwater. PG&E has demonstrated that manganese formation in the IRZ area, for the most part, was reasonably monitored. The recent manganese findings in some residents' water supply may be due to other causes not related to the PG&E cleanup actions. Additional investigation is still needed to determine the cause of high manganese concentrations in other residential wells.

The Group's preliminary conclusions are:

1. Black water at the former community well located more than one mile from or on the west side of the Lockhart Fault of the IRZ areas, is likely due to stagnant well water. Often times, small capacity pumps in large wells, such as former agricultural and community wells, may lead to stagnant and reducing conditions, resulting in high levels of manganese. As the water is aerated, it turns a black color from manganese precipitating out of solution. Pumping the well for several or more minutes will usually clear out the black water until fresh water is pulled in from the surrounding aquifer.
2. Black water at four residences located less than one mile from the IRZ areas and on the same side of the Lockhart Fault, is still under investigation. PG&E, under orders from the Water Board, is implementing manganese sampling in monitoring wells. PG&E has also submitted a workplan to install additional monitoring wells in the IRZ areas to reduce monitoring gaps and to conduct tracer tests to see if IRZ products could potentially reach nearby domestic wells. Initial results of these investigations should be known within seven months or October 2013 and the information will be relayed to the public.

Steps You Can Take to Reduce Your Risk of Exposure to High Levels of Manganese After its Presence is Confirmed in Well Water :

1. Drink and cook with bottled water.
2. Take one or more of the following actions in consultation with a qualified pump contractor or well driller:
 - Sanitize well to remove bacteria,
 - Clean or change out indoor faucets,
 - Change pump depth,
 - Redevelop well,
 - Wellhead water treatment with manganese-specific filter,
 - Install new well with screen at different depth.

Attachment: Map of Manganese Detections in Hinkley