

CARMICHAEL WATER DISTRICT REPORT ON WATER QUALITY RELATIVE TO PUBLIC HEALTH GOALS - JUNE 2016

BACKGROUND

Provisions of the California Health and Safety Code, Title 22, Section 116470, specify that every three years water utilities larger than 10,000 service connections are required to prepare a special report if their water quality measurements have exceeded any Public Health Goals (PHGs). PHGs are non-enforceable goals established by the California Environmental Protection Agency's (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA). The law also requires that where OEHHA has not adopted a PHG for a constituent, the water suppliers are to use the Maximum Contaminant Level Goals (MCLGs) adopted by the United States Environmental Protection Agency (USEPA). Constituents which have a California primary drinking water standard and for which either a PHG or MCLG has been set are to be addressed.

There are a few constituents that are routinely detected in water systems at levels usually well below the drinking water standards for which no PHG or MCLG has yet been adopted by OEHHA or USEPA including Total Trihalomethanes (TTHM) and Haloacetic Acids (HAA5). These constituents will be addressed in a future required report after a PHG has been adopted.

If a constituent was detected in the Carmichael Water District (District) water supply between 2013 and 2015 at a level exceeding an applicable PHG or MCLG, this report provides the information required by law. Included is the numerical public health risk associated with each constituent, the best treatment technology available that could be used to reduce the constituent level, and an estimate of the cost to install that treatment if it is appropriate and feasible.

WHAT ARE PHGS?

PHGs are non-enforceable goals set by the OEHHA, which is part of CalEPA and are based solely on public health risk considerations. A PHG is the level that poses no significant health risk if consumed for a lifetime. None of the practical risk-management factors that are considered by the USEPA or the State Water Resources Control Board's Division of Drinking Water (DDW) in setting drinking water standards (such as MCLs) are considered in setting the PHGs. This includes analytical detection capability, treatment technology available, and benefits and costs. The PHGs are not enforceable and are not required to be met by any public water system. MCLGs are the federal equivalent to PHGs.

WATER QUALITY DATA CONSIDERED

All of the water quality data collected by our water system in 2013-2015 for purposes of determining compliance with drinking water standards was considered. The 2015 Consumer Confidence Report which was mailed to customers in June of 2016 summarized data collected in 2015. The Consumer Confidence Report also contains useful definitions for PHG, MCLG, MCL, microgram per liter, and milligram per liter.

GUIDELINES FOLLOWED

The Association of California Water Agencies (ACWA) formed a workgroup that prepared guidelines for water utilities to use in preparing this required report. The ACWA guidelines were used in the preparation of our report.

BEST AVAILABLE TREATMENT TECHNOLOGY AND COST ESTIMATES

Both the USEPA and the DDW adopt what are known as Best Available Technologies (BAT), which are the best-known methods of reducing contaminant levels to the Maximum Contaminant Level

(MCL). Cost can be estimated for such technologies. However, since many PHG's and all MCLG's are set much lower than the MCL, it is not always possible or feasible to determine what treatment is needed to further reduce a constituent downward to or near the PHG or MCLG, many of which are set at zero. Estimating the costs to reduce a constituent to zero is difficult. In some cases, installing treatment to try to further reduce very low levels of one constituent may have adverse effects on other aspects of water quality.

Constituents Detected That Exceed a PHG or a MCLG

The following is a discussion of constituents that were detected in one or more of our drinking water sources at levels above the PHG, or if no PHG, above the MCLG:

Note: Winding Way Well was used to supplement water for the drought conditions that occurred in the summers of 2014 and 2015. This well is utilized for supplemental supply.

Tetrachloroethylene (PCE) - The PHG for PCE is 0.06 micrograms per liter (ug/L or parts per billion). The MCL or drinking water standard for PCE is 5 ug/L. The District detected PCE at levels not exceeding the MCL in the discharges from three (3) District Wells. The average of 10 samples taken at La Vista Well and Garfield Well and 2 samples taken at Winding Way Well within the three year period 2013-15 was:

La Vista Well – 1.7 ug/L
Garfield Well – 1.6 ug/L
Winding Way Well – 2.0 ug/L

Note: Less samples were taken at Winding Way Well because the well was not required for production purposes until the beginning of the 2014 drought and subsequent surface water right curtailment.

OEHHA has determined that the health risk associated with PCE is an increased risk of cancer. Numerical health risk data provided by OEHHA determined the health risk associated with the PHG is one (1) excess case of cancer in a million people and the health risk associated with the MCL is eight (8) excess cases of cancer in 100,000 people over a seventy (70) year life of exposure.

The BAT for PCE to reduce the level below the MCL is either Granular Activated Carbon (GAC) or Packed Tower Aeration. Since the PCE levels at the two district wells are already below the MCL, a GAC system would likely be required to reduce the levels below the PHG. It should be pointed out that these are theoretical calculations and rough cost estimates. The estimated cost to install this system on the three affected district wells would be \$4,500,000 with an ongoing annual O & M cost of \$450,000. Additionally, the District would need to purchase land to have enough space for the treatment technology. The cost to purchase the additional land is estimated at \$500,000-\$600,000. Currently the District proactively monitors these wells quarterly to measure any significant changes in PCE levels.

Arsenic - The PHG for Arsenic is 0.004 micrograms per liter (ug/L or parts per billion). The MCL or drinking water standard for arsenic is 10 ug/L. The District detected arsenic levels not exceeding the MCL in the discharges from one (1) District well. The average of two (2) samples taken in 2013 and 2014 was:

Willow Park Well – 1.4 ug/L

OEHHA has determined that the health risk associated with arsenic is an increased risk of cancer. Numerical health risk data provided by OEHHA determined the health risk associated with the PHG is

one (1) excess case of cancer in a million people and the health risk associated with the MCL is two (2) excess cases of cancer in 1,000 people over a seventy (70) year lifetime of exposure.

The BAT for arsenic is activated alumina, coagulation/filtration, lime softening, ion exchange and reverse osmosis. Of the technologies listed above, all are expensive and would require more extensive consultation beyond the scope of this report, but for purposes of this report, ion exchange will be discussed. Providing ion exchange treatment at one (1) well site would cost \$2,500,000 with an annual O&M cost of \$420,000/year. Since the arsenic level is below the MCL the District will continue monitoring Willow Park Well for any changes in arsenic levels. The cost to purchase additional land required for any of the chosen technologies would be estimated at \$700,000-\$900,000.

Hexavalent Chromium (CrVI) - The PHG for CrVI is 0.02 micrograms ($\mu\text{g}/\text{L}$ or parts per billion). The MCL for CrVI is 10 $\mu\text{g}/\text{L}$. The District detected CrVI not exceeding the MCL in four (4) District wells.

Garfield Well – 1.8 $\mu\text{g}/\text{L}$
La Vista Well – 1.3 $\mu\text{g}/\text{L}$
Willow Park Well – .71 $\mu\text{g}/\text{L}$
Winding Way Well – 3.0 $\mu\text{g}/\text{L}$

The health risk category associated with CrVI is an increased risk of cancer. At the PHG, the theoretical cancer risk for drinking water at the PHG is one (1) excess case of cancer per million people over a seventy (70) year lifetime of exposure. At the MCL of 10 $\mu\text{g}/\text{L}$, the cancer risk is five excess cases per 10,000 people over a seventy (70) year lifetime of exposure.

The DDW has identified coagulation/filtration, ion exchange and reverse osmosis as BAT for reducing CrVI levels in drinking water to levels closer to the CrVI PHG of 0.02 $\mu\text{g}/\text{L}$. Of the technologies listed above, the cost evaluation will be conducted using ion exchange, given that ion exchange is also the BAT for arsenic (also included in this PHG report). All samples that exceeded the CrVI PHG during 2013-2015 were in groundwater wells. All results were below the MCL of 10 $\mu\text{g}/\text{L}$. The total estimated capital cost to provide ion exchange treatment (with the goal of achieving the PHG) at all four (4) wells would be \$9,200,000 with an annual O&M cost of \$1,600,000. Capital and O&M costs were estimated with the goal of achieving the CrVI 0.02 $\mu\text{g}/\text{L}$ PHG.

RADIOMUCLIDES

During 2013 to 2015, one naturally occurring radionuclide was detected in one (1) District well: uranium. The following sections present an evaluation of the health risks and treatment costs for reducing the levels of this constituent.

Uranium - The PHG for uranium is 0.43 picoCuries per liter (pCi/L). The MCL for uranium is 20 pCi/L. Uranium is a naturally occurring radionuclide. CWD detected uranium in one (1) District well. One sample was taken in 2015.

Winding Way Well – 3.9 pCi/L

The health risk associated with uranium is an increased risk of cancer. At the PHG, the theoretical cancer risk is one (1) excess case of cancer per million people over a seventy (70) year lifetime of exposure. At the MCL of 20 pCi/L, the cancer risk is five (5) excess cases per 100,000 people over a seventy (70) year lifetime of exposure.

The DDW has identified the following treatment technologies as BAT's for reducing uranium levels in drinking water to be ion exchange, reverse osmosis, lime softening and coagulation/filtration. Of the technologies listed above, the cost evaluation will be conducted using ion exchange, given that ion exchange is also the BAT for arsenic and CrVI. The estimated cost is \$2,500,000 with an annual O&M cost of \$420,000.

RECOMMENDATIONS FOR FURTHER ACTION

The drinking water quality of the District meets all DDW and USEPA drinking water standards set to protect public health. To further reduce the levels of the constituents identified in this report that are already significantly below the health-based MCLs established to provide "safe drinking water", additional costly treatment processes would be required. The effectiveness of the treatment processes to provide any significant reductions in constituent levels at these already low values is uncertain. The health protection benefits of these further hypothetical reductions are not at all clear and may not be quantifiable; therefore, no action is proposed.