Public Utilities

2019

Public Health Goals

Report

Table of Contents

Background

Provisions of the California Health and Safety Code specify that the City of San Diego Public Utilities Department, and other water utilities with more than 10,000 service connections, prepare a report every three years if their water quality measurements have exceeded any Public Health Goals (PHGs). PHGs are non-enforceable goals established by the Cal-EPA's Office of Environmental Health Hazard Assessment (OEHHA). The regulation 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 Untied States Environmental Protection Agency (USEPA). Only constituents which have a California primary drinking water standard and for which either a PHG or MCLG has been set are to be addressed.

This report provides information regarding constituents that were detected in the City's water supply between year 2016 and 2018 (3-year data) at a level exceeding an applicable PHG or MCLG. This includes the numerical public health risk associated with the Maximum Contaminant Level (MCL) and the PHG or MCLG, the category or type of risk to health that could be 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 appropriate and feasible.

There are a few other constituents that are routinely detected in water systems at levels usually well below the drinking water standards for which no PHG nor MCLG has yet been adopted by OEHHA or USEPA. Notable among these is Total Trihalomethanes. These will be addressed in a future required report after a PHG has been adopted.

California Health and Safety code section 116470 (b) requires water agencies to prepare a report and hold a public meeting for the purpose of accepting and responding to public comments on the report. The City of San Diego Public Utilities Department will present this report at a City Council meeting by December 2019.

What Are Public Health Goals?

PHGs are set by the California Office of Environmental Health Hazard Assessment (OEHHA), which is part of Cal-EPA, and are based solely on public health risk considerations. A PHG is the level of a chemical contaminant in drinking water that does not pose a significant risk to health. PHGs are not regulatory standards. None of the practical risk-management factors that are considered by the USEPA or the California State Water Resources Control Board (SWRCB) – Division of Drinking Water (DDW) in setting drinking water standards (MCLs) are considered in setting the PHGs. These factors include analytical detection capability, available treatment technology, and costs versus benefits. However, state law requires DDW to set drinking water standards for chemical contaminants as close to the corresponding PHG as is economically and technologically feasible. In some cases, it may not be feasible for SWRCB to set the drinking water standard for a contaminant at the same level as the PHG. The technology to treat the chemicals may not be available, or the cost of treatment may be very high. SWRCB considers these factors when developing a drinking water standard. PHGs are not enforceable and are not required to be met by any public water system. MCLGs are the federal equivalent to PHGs.

How Does OEHHA Establish a Public Health Goal?

The process for establishing a PHG for a chemical contaminant in drinking water is very rigorous. OEHHA scientists first compile all relevant scientific information available, which includes studies of the chemical's effects on laboratory animals and studies of humans who have been exposed to the chemical. The scientists use data from these studies to perform a health risk assessment, in which they determine the levels of the contaminant in drinking water that could be associated with various adverse health effects. When calculating a PHG, OEHHA uses all the information it has compiled to identify the level of the chemical in drinking water that would not cause significant adverse health effects in people who drink that water every day for 70 years. OEHHA must also consider any evidence of immediate and severe health effects when setting the PHG.

For cancer-causing chemicals, OEHHA typically establishes the PHG at the “one-in-one million” risk level. At that level, not more than one person in a population of one million people drinking the water daily for 70 years would be expected to develop cancer as a result of exposure to that chemical.

Water Quality Data Considered

All water quality data collected by the City for purposes of determining compliance with drinking water standards in the years 2016, 2017 and 2018 were considered. These data were also summarized in our 2016, 2017, and 2018 Consumer Confidence Reports, which were mailed to all our customers and can be found on the City’s website.

Guidelines Followed

The Association of California Water Agencies (ACWA) formed a workgroup which prepared guidelines for water utilities to use in preparing these reports. The ACWA guidelines were used in the preparation of this report. No other guidelines were established by state regulatory agencies.

Constituents Detected That Exceed a PHG or a MCLG

Water quality during the years 2016, 2017, 2018 considered for this report, contained no constituents that exceeded state or federal compliance standards. However, there were a few that were detected at levels above the PHG or MCLG. The following is a discussion of these constituents.

Total Coliform Bacteria

Coliform bacteria are organisms that are present in the environment and are not generally considered harmful. Total coliforms (TC) are monitored because EPA considers them a useful indicator of other pathogens in drinking water. If a sample tests positive for coliform bacteria, it indicates the possibility of bacterial organisms in the water and needs to be further investigated. It is not unusual for a water system to have an occasional positive sample.

The MCL for coliform is 5%, which means that a maximum of 5% of water samples per month can be positive for coliform. The MCLG is 0% of samples per month. The reason for the coliform drinking water standard is to minimize the possibility of the water containing pathogens (organisms that cause waterborne disease). Because coliform is only a surrogate indicator of the potential presence of pathogens, it is not possible to state a specific numerical health risk. While USEPA normally sets MCLGs "at a level where no known or anticipated adverse effects on persons would occur", they are unable to do so with coliforms.

In 2016, the City collected a total of 6795 samples for total coliform analysis with a monthly range between 519 and 616 samples collected. All months were significantly below the MCL of 5%. However, the months of April, August, September and October exceed the MCLG of 0%.

In 2017, the City collected a total of 6780 samples for total coliform analysis with a monthly range between 515 and 618 samples collected. All months were below the MCL of 5%. However, the months of April and May exceeded the MCLG of 0%.

In 2018, the City collected a total of 6866 samples for total coliform analysis with a monthly range between 518 and 656 samples collected. All months were again below the MCL of 5%, however the months of September and October exceed the MCLG of 0%.

Factors that can produce positive TC test besides degraded water quality include, but are not limited to, the weather and environmental conditions when samples are taken, and the human factor associated with the collection methods, sample handling, and test procedures.

The City has taken all of the steps described by DDW as Best Available Technology (BATs) for coliform bacteria in Section 64447, Title 22 of the California Code of Regulations.

The City adds ozone or chlorine dioxide at our water treatment plants to assure that the water served is microbiologically safe. Chlorine and chloramines are added post filtration to ensure a disinfectant residual in the distribution system. The chloramine residual levels are carefully controlled to provide the best health protection without causing the water to have undesirable taste and odor or increasing the disinfection byproduct level. This careful balance of treatment processes is essential to continue supplying our customers with safe drinking water.

Other equally important measures that the City has implemented include: an effective cross-connection control program, maintenance of a disinfectant residual throughout our system, an effective monitoring and surveillance program, and maintaining positive pressures in our distribution system.

Bromate

Bromate is formed when naturally occurring bromide reacts with ozone during the disinfection process. The MCL for bromate is 10 ppb (parts per billion) and the PHG is 0.1 ppb. The category of health risk for bromate is carcinogenicity. Carcinogenic risk means capable of producing cancer. The numerical health risk based on the California PHG for bromate is 1 in a million. This means one excess cancer case per one million population when the water is consumed daily for 70 years.

The City collected and analyzed 337 samples for bromate during 2016-2018, with values that ranged from non-detect (ND) to 10 ppb, with all samples at or below the MCL. The BAT for bromate reduction is reverse osmosis (RO). RO treatment reduces the naturally-occurring bromide in source water by reducing the natural organic matter (NOM) in water. When this is reduced, the demand for ozone decreases, therefore reducing bromate formation. Because the detection limit for reporting (DLR) for bromate (5 ppb) is greater than the PHG (0.1ppb), it would be difficult to assess the effectiveness of RO treatment on reaching the PHG level.

Chlorite

The City's use of chlorine dioxide, as a pre-oxidant prior to chlorination of drinking water to destroy natural water impurities that would otherwise produce trihalomethanes, leads to the formation of the by-product chlorite. The MCL for chlorite is 1 ppm (part per million), with a PHG of 0.05 ppm.

The PHG is based on hematological effects observed in offspring at 3 mg/kg-day and higher in a two-generation rat reproductive study. There are no acceptable carcinogenicity studies on chlorite. Several of these studies (sub chronic, chronic, and developmental) reveal that oral exposure to chlorite can result in significant hematological, endocrine, reproductive, and gastrointestinal effects as well as changes in neurobehavioral development.

The USEPA Maximum Contaminant Level Goal (MCLG) for chlorite is 0.8 mg/L. This value is based on the same study utilized by OEHHA (CMA, 1996), but inferring a no observed adverse effect level (NOAEL) of 3 mg/kg-day based on the reduced response to auditory stimuli. The USEPA calculated a reference dose (RfD) of 0.03 mg/kg-day, using a combined uncertainty factor of 100 (U.S. EPA 1998a, b, 2000). Their recommended health-protective chlorite level (the MCLG) is calculated using adult water consumption values.

The City collected and analyzed 808 samples for chlorite during 2016-2018, with values that ranged from ND to 1 ppm, with all sample results at or below the MCL. The BAT for chlorite reduction is reverse osmosis (RO).

Gross Alpha

Radionuclides such as gross alpha particles in water supplies are predominantly from erosion of natural deposits. The term radionuclide refers to naturally occurring elemental radium, radon, uranium, and thorium with unstable atomic nuclei that spontaneously decay, producing ionizing radiation. Gross alpha is defined as the sum total of these radionuclides. The MCL for gross alpha is 15 picocuries per liter of water (pCi/L) and the MCLG is 0 pCi/L.

The City collected and analyzed 6 samples for gross alpha particles during 2016-2018, with values that ranged from non-detect (ND) to 5.95 pCi/L, with an average value of 2.15 pCi/L, all sample results were below the MCL. The category of health risk for alpha particles is carcinogenicity. Carcinogenic risk means capable of producing cancer. The numerical health risk based on USEA's MCLG is zero therefore the cancer risk is zero. The BAT for gross alpha reduction is reverse osmosis (RO).

Gross Beta

Gross beta particles in water supplies are predominantly from the decay of natural and man-made deposits. The MCL for gross beta particles is 50 pCi/L and MCLG is 0 pCi/L.

The City collected and analyzed 6 samples for gross beta particles during 2016-2018, with values that ranged from non-detect (ND) to 5.73 pCi/L, with an average value of 3.17 pCi/L, all sample results were below the MCL of 50 pCi/L. The category of health risk for beta particles is carcinogenicity. Carcinogenic risk means capable of producing cancer. The numerical health risk based on USEA's MCLG is zero therefore the cancer risk is zero. The BAT for gross beta reduction is reverse osmosis (RO).

Uranium

Uranium is a naturally-occurring radioactive element present in geological formations and the earth's crust. It is introduced into groundwater and surface water through erosion. The MCL for uranium is 20 pCi/L and the PHG for uranium is 0.43 pCi/L.

The City collected and analyzed 5 samples for uranium during 2016-2018, with values that ranged from ND to 2.1 pCi/L, with an average value of 1.2 pCi/L, with all samples below the MCL. The category of health risk for uranium is carcinogenicity chronic toxicity (kidneys). Carcinogenic risk means capable of producing cancer. Chronic toxicity means that adverse effects may develop gradually from low levels of exposure over a long period of time. The BAT for uranium reduction is reverse osmosis (RO).

Best Available Treatment Technology and Cost Estimates

Both the USEPA and DDW adopt what are known as BATs or Best Available Technologies, which are the best-known methods of reducing contaminant levels to the MCL. Costs can be estimated for such technologies. However, since many PHGs and all MCLGs are set much lower than the MCL, it is not always possible nor 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, if not impossible, because it is not possible to verify by analytical means that the level has been lowered to zero. In some cases, installing treatment to try and further reduce very low levels of one constituent may have adverse effects on other aspects of water quality.

The best available technology (BAT) to lower the level of these compounds below the PHG is reverse osmosis. Since the levels are already below the MCL, reverse osmosis would be required to attempt to lower the levels to below the PHG. Please note that accurate cost estimates are difficult, if not impossible, and are highly speculative and theoretical. All costs including annualized capital, construction, engineering, planning, environmental, contingency, and O&M are included, but only very general assumptions can be made for most of these items. Costs estimating guides from the Association of California Water Agencies guidance report were used in determining the estimated cost to implement the BAT. According to the Association of California Water Agencies (ACWA) Cost Estimates for Treatment Technology BAT, to install and operate a RO system would cost approximately $1.85 - $4.33 per 1,000 gallons of water treated. The City's 2019 treatment capacity is 374 million gallons per day. The estimated annualized capital and operation and maintenance costs, based on the current capacity of 374 million gallons per day, to install and operate a reverse osmosis system at the City's three treatment plants would be between $251 million and $589 million/year for the life of the system. The cost per customer service connection would range from $912 to $2,135 per year. There would be additional costs for water conditioning to ensure water treated by reverse osmosis is optimized for distribution system corrosion control.

Recommendations for Further Action

The City of San Diego's drinking water meets all California SWRCB's DDW and USEPA drinking water quality standards. All constituents identified in this report are below or at the MCL after treatment via the City's Water Treatment Plants. To further reduce the levels of the constituents identified in this report that are already significantly below the Maximum Contaminant Levels 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.