PUBLIC HEALTH GOAL REPORT

JUNE 2013

Introduction

California's regulatory drinking water standards protect the public from harmful substances, but no water supply is ever completely free of contaminants. Some, such as arsenic, can occur naturally. Others, such as fuels, industrial solvents, pesticides and metals, may enter water supplies from chemical spills and leaking tanks and pipelines, or they may be a legacy of agricultural and waste-disposal practices that pre-date modern environmental laws.

It is natural for people to want their drinking water to be completely free of all contaminants. However, preventing or removing all contamination often is not economically or technologically feasible. State health authorities are responsible for determining the levels of contaminants that, based on current laws and recommendations, can remain in water supplies without threatening human health.

Public Health Goals and Drinking Water Standards

To help keep drinking water safe, the California Legislature passed the Calderon-Sher Safe Drinking Water Act of 1996. This law requires the California Department of Public Health ("CDPH") to regularly test drinking water supplies and set standards for contaminants in water. The Act also requires the Office of Environmental Health Hazard Assessment ("OEHHA") to develop Public Health Goals ("PHGs") for contaminants in California's publicly supplied drinking water.

The purpose of the law is to give water system customers access to information on levels of contaminants even below the enforceable mandatory drinking water standard, known as Maximum Contaminant Levels ("MCLs"). In addition, the law intends to provide an idea of the cost to totally eliminate any trace of contaminant from drinking water regardless of how minimal the risk might be. The required report is unique to California.

The law requires water systems with more than 10,000 service connections to prepare an exceedance report every three years if one or more chemical contaminant exceeds PHG levels. The report provides information on health risks posed by the contaminant as well as the cost and technology needed to reduce the contaminant to the PHG level. The report must also explain what action, if any, the local water supplier has planned to address the contamination. The water supplier must hold a public hearing on the report.

What is a PHG?

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; however, State law requires CDPH to set drinking water standards for chemical contaminants as close to the corresponding PHG as is economically and technically feasible. In some cases, it may not be feasible for CDPH 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. CDPH must consider these factors when developing a drinking water standard.

PHGs are set by the OEHHA which is part of California Environmental Protection Agency ("Cal/EPA") and are based solely on public health risk considerations. None of the practical risk-management factors that are considered by the U.S. EPA or the CDPH in setting drinking water standard MCLs are considered in setting the PHGs. These practical risk factors include analytical detection capability, treatment technology available, benefits and costs. PHGs are not enforceable and are not required to be met by any public water system. MCLGs are the federal equivalent to PHGs. Attachment No. 1 lists California's PHGs and Federal MCLGs.

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 2 liters of water containing that contaminant 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 2 liters of that water daily for 70 years would be expected to develop cancer as a result of exposure to that chemical.

Water Quality Data Considered

All of the water quality data collected by the City of Brentwood ("City") in the years 2010, 2011, and 2012 for purposes of determining compliance with drinking water standards were considered in making this report. This data is also summarized in the City's Annual Water Quality reports which are mailed out to all customers in July of each year and can be found on the City's website.

This PHG report provides the information required by the law if a constituent was detected in the City of Brentwood water supply between the years 2010 to 2012 at a level exceeding an applicable PHG or MCLG. Also included in the report is the numerical public health risk associated with the MCL and the PHG or MCLG, the category or type of risk to health that could be associated with each constituent, the Best Available Treatment Technology ("BAT") 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.

Is Water Safe to Drink if Contaminant Levels Exceed Public Health Goals?

As long as drinking water complies with all MCLs, it is considered safe to drink, even if some contaminants exceed PHG levels. A PHG represents a health-protective level for a contaminant that CDPH and California's public water systems should strive to achieve *if* it is feasible to do so. However, a PHG is *not* a boundary line between a "safe" and "dangerous" level of a contaminant, and drinking water can still be considered acceptable for public consumption even if it contains contaminants at levels exceeding the PHG.

For More Information on Health Risks

The adverse health effects for each chemical with a PHG are summarized in technical support documents available on the OEHHA web site http://www.oehha.ca.gov. Also, U.S. EPA has consumer and technical fact sheets on most of the chemicals having MCLs. For copies of the fact sheets, call the Safe Drinking Water Hotline at 1-800-426-4791, or explore the U.S. EPA Ground Water and Drinking Water web page at http://water.epa.gov/drink/.

Best Available Treatment Technologies and Cost Estimates

Both the U.S. EPA and CDPH adopted what are known as Best Available Treatment Technologies ("BATs"). BATs are the best known methods of reducing contaminant levels to below MCL. Costs can be estimated for such technologies. Since many PHGs and all MCLGs 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 costs to reduce a constituent to zero is difficult, if not impossible, to verify by analytical means that the level has been lowered to zero. Additionally, 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.

Constituents Detected That Exceed a PHG or MCLG

The following is a discussion of the constituents that were detected in the City's drinking water sources and water distribution system above the PHG, or if no PHG, above the MCLG.

Arsenic

Arsenic is a naturally occurring element in the earth's crust and is very widely distributed in the environment. All humans are exposed to small quantities of arsenic (inorganic and organic) largely from food and to a lesser degree from drinking water and air. Some edible seafood may contain higher concentrations of arsenic which are predominantly found in the less acutely toxic organic forms. City wells have an average level of 1.95 micrograms per liter (ug/L) of arsenic, which is well below the current "not-to-exceed" or MCL limit of 10 micrograms per liter of arsenic. The OEHHA has established a PHG of 0.004 micrograms per liter. OEHHA has determined arsenic as a carcinogen. OEHHA has a numerical cancer risk of one additional cancer case per million people for the 0.004 micrograms per liter PHG, and 1 in four hundred for the MCL of 10 micrograms per liter.

Activated alumina, ion exchange, reverse osmosis, lime softening, coagulation/filtration are the water treatment technologies available for achieving compliance with the MCL for arsenic. It would cost the City approximately $1.8 million in capital costs including annual operation and maintenance costs to reduce the arsenic levels of all its well water to the PHG level of 0.004 micrograms per liter.

Lead

There is no MCL for lead. Instead, the 90th percentile value of all samples from household taps in the distribution system cannot exceed an "Action Level" or AL of 15 micrograms per liter. The PHG for lead is 0.2 micrograms per liter. Based on extensive sampling of the City's distribution system in 2012, the 90th percentage value for lead was 1.9 micrograms per liter. The typical source of lead in water is discharges from industrial manufacturers, erosion of natural deposits, and internal corrosion of household plumbing systems. The category of health risk for lead is damage to the kidneys or nervous system of humans. Numerical health risk data on lead have not been provided by OEHHA. California has a PHG of 2 micrograms per liter, cancer risk of 3 additional cases in 100 million people (PHG is not based on this effect), numerical health risk at the MCL (Action Level) is two additional cases per million. The City water system is in full compliance with the Federal Lead and Copper Rule. Based on extensive sampling in 2012, it was determined according to Federal regulatory requirements that the City meets the AL for lead. Therefore, the City is deemed by CDPH to have optimized corrosion control for our system.

In general, optimizing corrosion control is considered to be the best available technology to deal with corrosion issues and with the findings of any lead or copper concentrations. The City continues to monitor water quality parameters that relate to corrosivity such as: pH, hardness, alkalinity, conductivity, and calcium. And if necessary, the City will take action to maintain the distribution system in an "optimized corrosion control" condition.

Gross Alpha Particle Activity

Radionuclides such as gross alpha in water supplies are from erosion of natural deposits. The term radionuclide refers to naturally occurring elemental radium, radon, uranium, and thorium. Each of those elements has an unstable atomic nucleus that spontaneously decays producing ionizing radiation. Gross alpha is defined as the sum total of these radionuclides. Exposure to ionizing radiation in concentrations exceeding the MCL may have carcinogenic (cancer causing), mutagenic (causing mutation of cells) or teratogenicity (causing abnormalities in offspring) effects. The U.S. EPA's MCLG for gross alpha particle is zero and the California MCL is 15 pCi/L. The City wells have an average level of gross alpha is 0.696 pCi/L. Any levels detected were below MCL at all times. Health risk category based on experimental animal testing data evaluated in the U.S. EPA MCLG document and California MCL has determined gross alpha particle as a carcinogen. The U.S. EPA's MCLG for Gross Alpha is zero and a cancer risk of 1 additional case per million people for the CDPH MCL of 15 pCi/L. *Note: Cancer Risk =Theoretical 70-year lifetime excess cancer risk at a statistical confidence limit. Actual cancer risk may be lower or zero.*

Reverse osmosis, lime softening, and coagulation/filtration are the water treatment technologies available for achieving compliance with the MCL for gross alpha particle activity. Removal and reduction via reverse osmosis could be achieved at a cost of $10.4 million to the City including annual operation and maintenance costs.

Gross Beta Particle Activity

Certain minerals are radioactive and may emit a form of radiation known as photons and beta radiation. Gross beta particle activity was measured at 1.251 pCi/L in the groundwater supplied to the City distribution system. There is no PHG for gross particle activity. The MCLG is zero pCi/L, and the MCL is 50 pCi/L. The levels detected in the City system were below the MCL at all times, but were over the level identified by the U.S. EPA as the MCLG. The CDPH and U.S. EPA, which set drinking water standards, have determined that gross beta particle activity is a health concern at certain levels of exposure. This radiological constituent is a naturally occurring contaminant in some ground water and surface water supplies. The category of health risk associated with gross beta particle activity, and the reason that a drinking water standard was adopted for it, is that some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer. The numerical health risk for the MCLG of zero pCi/L is zero. CDPH and U.S. EPA set the drinking water standard for gross beta particle activity at 50 pCi/L to reduce the risk of cancer or other adverse health effects.

The Best Available Treatment Technologies identified to treat gross beta particle activity are ion exchange and reverse osmosis. The most effective method to consistently remove beta and photon emitters to the MCLG is to install reverse osmosis treatment at the select groundwater and surface water connection sites where the water exceeds the MCLG. The cost to install and operate reverse osmosis removal systems to remove beta and photon emitters to the MCLG in the City water system would be approximately $10.4 million which includes construction and annual operational costs. This could be accomplished concurrently with Gross Alpha.

Summary of Findings:

Drinking water provided by the City of Brentwood meets 100 percent of all enforceable California Department of Public Health, and United States Environmental Protection Agency primary drinking water standards.

Overall, arsenic, lead, gross alpha particles, and gross beta particle, were detected in the City water system at concentrations above PHGs or MCLGs. However, at no time did the City of Brentwood serve water containing contaminants above recognized and enforceable MCLs. The drinking water quality of the City meets all drinking water standards to protect public health.

If you have any questions about this report, please contact City of Brentwood Public Works-Water Operations Division at (925) 516-6000, Monday through Friday between the hours of 7:00 a.m. to 3:30 p.m., or visit the City of Brentwood website at www.brentwoodca.gov.

Conversion Information

1 part per billion (ppb)	= 1 microgram per liter (µg/L)
1,000 micrograms per liter	= 1 milligram per liter (mg/L)