

Introduction

The California Health and Safety Code, Section 116470(b), requires California water utilities serving more than 10,000 connections to compare their water every three years to California Public Health Goals and the United States Environmental Protection Agency (U.S. EPA) Maximum Contaminant Level Goals (MCLGs). If any substance that has a Maximum Contaminant Level (MCL) is found to exceed one of these Public Health Goals, the water agency must prepare a written report discussing:

- The detection of any chemical in drinking water above a Public Health Goal (PHG) or Maximum Contaminant Level Goal (MCLG);
- A brief discussion of health risks associated with these chemicals;
- The estimated costs to remove the detected chemical; and
- The actions, if any, the water utility intends to take

Since the Safe Drinking Water Act was implemented in 1977, Anaheim's drinking water has consistently met all state and federal water quality requirements. These standards, which were established to ensure the protection of public health, are enforced by the State Water Resources Control Board's Division of Drinking Water and U.S. EPA. Anaheim conducts over 44,000 water quality analyses each year to ensure that its water meets all standards.

Anaheim's water met the Public Health Goals for 81 out of the 88 substances applicable for this report. Concentrations of the following compounds were found above Public Health Goals from 2019-2021:

Naturally Occurring

- Arsenic
- Gross Alpha
- Gross Beta
- Uranium

Disinfection Byproducts

- Bromate

Industrial Sources

- Perchlorate
- Trichloroethylene

This report discusses each of these substances, which provides the information required by the California Health and Safety Code.

The water quality data used in this report was collected between 2019 and 2021. Additional water quality data are summarized in annual Consumer Confidence Reports available to all of Anaheim's water customers.

Public Health Goals

PHGs are goals established by the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA). PHGs are established at levels intended to be protective of the most sensitive subpopulation such as children and pregnant women, and represent a level at which there is essentially no health risk. PHGs do not consider practical issues such as analytical detection capability and may be set below laboratory analytical detection limits for reporting (DLRs). PHGs do not consider costs. PHGs may not be attainable given current remediation technologies, are not enforceable, and are not required to be met by any public water system.

In contrast, maximum contaminant levels (MCLs) are enforceable water quality standards. A water system may not serve water with detections above an MCL. Anaheim continued to meet or exceed MCL requirements.

While this report is required to discuss estimated costs to remove chemicals to concentrations below the PHG, the actual cost of treatment is highly variable and can depend upon factors including the type of treatment needed, the desired level of treatment, the number of separate treatment facilities required, and whether multiple treatment systems are necessary to treat multiple chemicals. The estimates herein include construction and annual operation expenses. The costs assume each water source will produce its maximum permitted volume of water, and the entire quantity of water would require treatment. Annual costs are then divided by the number of connections served by Anaheim's system. Many additional factors, such as land acquisitions, may be required to facilitate construction and operation of these treatment technologies. Therefore, actual costs may be substantially higher than these estimates.

Detections above PHGs or MCLGs

Occurrence of compounds above PHGs or MCLGs are described in the following sections. No compounds were detected above state or federal drinking water standards.

Arsenic

The MCL for arsenic is 10 parts per billion (ppb), the PHG is 0.004 ppb, and the DLR is 2 ppb. Arsenic is naturally occurring and present at low concentrations in soil and water throughout Southern California. Arsenic was detected above the PHG in water supplied by the Lenain Water Treatment Plant (Lenain) and at one groundwater well at concentrations up to 2.4 ppb.

OEHHA has determined that the health risk associated with concentrations at the PHG is equivalent to 1 excess case of cancer in 1,000,000 people. The health risk associated with arsenic at the MCL is equivalent to 2.5 excess cases of cancer in 1,000 people.

BAT for reducing arsenic levels include activated alumina, oxidation, coagulation and filtration, adsorptive media, ion exchange, biological sulfate reduction, lime precipitation, and reverse osmosis. All of these processes require disposal of the arsenic contaminated media creating new environmental concerns. If reverse osmosis was selected for arsenic remediation at Lenain and the affected groundwater well, it would cost an estimated \$25,000,000; or, approximately \$400 per water customer. No further treatment programs are planned at this time because:

- Arsenic levels are below the state and federal drinking water standards;
- Treatment will require generation and disposal of arsenic waste products;
- Treatment may not reduce existing concentrations to levels below the PHG.

Bromate

The MCL for bromate is 10 ppb (based on a running annual average), the MCLG is zero, the PHG is 0.1 ppb, and the DLR is 1 ppb. Bromate is formed when water containing naturally occurring bromide is treated with ozone for disinfection. Bromate was detected above the PHG in water supplied by Lenain and the Metropolitan Water District of Southern California (MWD) at concentrations up to 17 ppb. The running annual average remained below the MCL.

OEHHA has determined that the health risk associated with concentrations at the PHG is equivalent to 1 excess case of cancer in 1,000,000 people. The health risk associated with bromate at the MCL is equivalent to one excess cancer case per 10,000 people.

The BAT for reducing bromate levels is ozone control. Anaheim and MWD already operate their treatment plants with the goal of minimizing the production of bromate. However, ozone must be

maintained at certain levels for proper disinfection of the water. More advanced treatment such as coagulation and filtration, granular activated carbon, or reverse osmosis would be required to achieve levels below the PHG. If reverse osmosis was selected for bromate remediation at each affected water source, it would cost an estimated \$114,000,000; or, approximately \$1,800 per water customer. No further treatment programs are planned at this time because:

- Bromate levels are below the state and federal drinking water standards;
- Extraordinary construction and maintenance efforts would be required to install and operate treatment systems; and
- Treatment may not reduce existing concentrations to levels below the PHG.

Gross Alpha Particle Activity

The MCL for gross alpha particle activity (gross alpha) is 15 picocuries per liter (pCi/L), the MCLG is zero, and the DLR is 3 pCi/L. Gross alpha is a naturally occurring effect caused by the decay of radioactive material and is often found where naturally occurring mildly radioactive substances, such as uranium, are present. A PHG has not been established, but USEPA has established an MCLG of zero. Due to uncertainties in laboratory testing methods, it is not technically feasible to measure levels of gross alpha to zero. Gross alpha was detected in water supplied by Lenain, MWD, and groundwater wells at concentrations up to 10.4 pCi/L.

The health risk associated with gross alpha at the MCL is equivalent to one excess cancer case per 1,000 people. The health risk associated with gross alpha at the MCLG is zero.

BAT for reducing gross alpha levels is reverse osmosis. When drilling new wells, Anaheim conducts depth specific sampling to ensure that water is drawn from depths that contain the best water quality. If reverse osmosis was selected for gross alpha remediation, it would cost an estimated \$130,000,000; or, approximately \$2,100 per water customer. No further treatment programs are planned at this time because:

- Gross alpha levels are below the state and federal drinking water standards;
- It is not technically feasible to assess the level of gross alpha to the MCLG of zero;
- Treatment will require generation and disposal of gross alpha waste products;
- Treatment may not reduce existing concentrations to levels below the PHG; and
- Insufficient land area is available to install treatment systems at most well sites.

Gross Beta Particle Activity

The MCL for gross beta particle activity (gross beta) is 4 millirems per year (mrem/yr), the MCLG is zero, and the DLR is 4 mrem/yr. Gross beta is a naturally occurring effect caused by the decay of radioactive material and is often found where naturally occurring mildly radioactive substances, such as uranium, are present. A PHG has not been established, but USEPA has established an MCLG of zero. Due to uncertainties in laboratory testing methods, it is not technically feasible to measure levels of gross beta to zero. Therefore, it is not technically feasible to assess levels of gross beta to this standard. The MCL of 4 mrem/yr is approximately 50 pCi/L. Gross beta was detected in water supplied by MWD at concentrations up to 7 pCi/L.

The health risk associated with gross beta at the MCL is equivalent to two excess cancer cases per 1,000 people. The health risk associated with gross beta at the MCLG is zero.

The BAT for removing gross beta in water is reverse osmosis or ion exchange. If reverse osmosis was selected for gross beta particle remediation at each affected water source, it would cost an

estimated \$92,000,000; or, approximately \$1,500 per water customer. No further treatment programs are planned at this time because:

- Gross beta levels are well below the state and federal drinking water standards;
- It is not technically feasible to assess level of gross beta to the MCLG of zero;
- Treatment will require generation and disposal of gross beta waste products;
- Treatment may not reduce existing concentrations to levels below the PHG; and
- Insufficient land area is available to install treatment systems at the impacted MWD interconnections.

Perchlorate

The MCL for Perchlorate is 6 ppb, the PHG is 1 ppb and the DLR is 2 ppb. Perchlorate is both naturally occurring and a man-made contaminant that is found in groundwater, surface water and soil. Perchlorate-based chemicals are also used in the construction of highway safety flares, fireworks, matches, pyrotechnics, explosives, and common batteries. Perchlorate was detected in water supplied by groundwater wells at concentrations up to 3.6 ppb.

OEHHA has determined that perchlorate is associated with endocrine toxicity. However, OEHHA has not identified a cancer risk at the PHG.

The BAT for reducing perchlorate levels is ion exchange. If ion exchange was selected for perchlorate remediation at each affected water source, it would cost an estimated \$16,000,000; or, approximately \$260 per water customer. At this time, no treatment programs are planned because:

- Perchlorate levels are well below the state and federal drinking water standards; and
- Treatment will require generation and disposal of perchlorate waste products.

Trichloroethylene

The MCL for trichloroethylene (TCE) is 5 ppb, the PHG is 1.7 ppb and the DLR is 0.5 ppb. TCE is an organic solvent used in dry cleaning, metal degreasing, and other industrial applications. TCE was detected in groundwater from one well at a concentration up to 2.3 ppb.

OEHHA has determined that the health risk associated with concentrations at the PHG is equivalent to 1 excess case of cancer in 1,000,000 people. The health risk associated with TCE at the MCL is equivalent to three excess cases of cancer in one million people.

The BAT for reducing TCE levels are granular activated carbon and packed tower aeration. If packed tower aeration was selected for TCE remediation at the affected water source, it would cost an estimated \$1,200,000; or, approximately \$20 per water customer.

When drilling new wells, Anaheim evaluates the surrounding land for evidence of prior TCE usage, and conducts depth specific sampling to ensure that water is drawn from depths that contain the best water quality. At this time, no treatment programs are planned because:

- TCE levels are below the state and federal drinking water standards;
- Subsequent testing indicates the level of TCE has reduced below the PHG; and
- Treatment will require generation and disposal of TCE waste products.

Uranium

The MCL for uranium is 20 pCi/L, the PHG is 0.43 pCi/L, and the DLR is 1 pCi/L. Uranium is found in groundwater and the Colorado River commonly due to its natural presence in sediments

throughout the United States. According to the Orange County Water District, all groundwater in the Santa Ana Groundwater Basin contains naturally occurring uranium. Uranium was detected in water supplied by Lenain, MWD, and groundwater wells at concentrations up to 12.5 pCi/L.

OEHHA has determined that the health risk associated with concentrations at the PHG is equivalent to 1 excess case of cancer in 1,000,000 people. The health risk associated with uranium at the MCL is equivalent to 5 excess cases of cancer in 100,000 people.

BAT for removing uranium includes ion exchange, lime softening, reverse osmosis, and enhanced coagulation and filtration. When drilling new wells, Anaheim conducts depth specific sampling to ensure that water is drawn from depths that contain the best water quality. If reverse osmosis was selected for uranium remediation at each affected water source, it would cost an estimated \$140,000,000; or, approximately \$2,300 per water customer. No further treatment programs are planned at this time because:

- Uranium levels are below state and federal drinking water standards;
- The DLR is above the PHG making it difficult to quantify low levels of uranium;
- Treatment will require generation and disposal of uranium waste products; and
- Insufficient land area is available to install treatment systems at most well sites and MWD interconnections.

Anaheim continues to exceed all regulatory requirements to ensure safe and fresh tasting drinking water is provided to every customer. Anaheim is committed to providing safe drinking water and will continue to test for these substances to ensure continued compliance with all regulations. If you have any questions about this report, please contact Jonathan Sanks at 714-765-4117.