



2010

Report on Public Health Goals

Artesia System

Report prepared by
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Public Health Goals - Background

Provisions of the California Health and Safety Code, Section 116470, require public water systems serving more than 10,000 service connections to prepare a report (in plain language) containing information on the “detection” of any contaminants at levels above the Public Health Goals (PHGs) adopted by the State Office of Environmental Health Hazard Assessment (OEHHA) or the additional Maximum Contaminant Level Goals (MCLGs) set by the United States Environmental Protection Agency (USEPA). The first report was required and prepared July 1, 1998 and is required to be revised every three years thereafter.

Golden State Water Company is providing information in conformance with this requirement by providing this revised and updated report at this time. If a constituent was detected in the water supply between 2007, 2008 or 2009 at a level exceeding an applicable PHG or MCLG, this report provides health and treatment cost information as required by law.

Regulations and Drinking Water

The USEPA and the California Department of Health Services (CDPH) are responsible for establishing regulations, and setting drinking water standards and goals. These agencies, along with the California Public Utilities Commission (CPUC) set rules and regulations for water systems to follow.

Drinking water goals include MCLGs and PHGs. MCLGs are levels of contaminants in drinking water below which there is no known or expected risk to public health. They are set by the USEPA and allow for a margin of safety. MCLGs are not enforceable drinking water standards. PHGs are water quality goals set by the OEHHA specific to California. PHGs are recommended target levels and are not required to be met by any public water system.

Drinking water standards are also known as Maximum Contaminant Levels (MCLs) and Action Levels (ALs). MCLs are the highest level of a contaminant allowed in drinking water. They are set as close to MCLGs and PHGs as are economically and technologically feasible. MCLs are enforceable water quality standards that public water systems must meet. An AL is the concentrations of a contaminant which, if exceeded, triggers treatment or other requirements that the water system must follow.

PHGs and MCLGs are not water quality standards, but rather are goals identifying extremely small risks. These risks are normally assessed where one person in a million, if they drink two liters of water every day for 70 years, would be at risk from a contaminant.

The USEPA and CDPH have established Best Available Technologies (BAT) to remove or reduce contaminants to levels at or approaching the PHGs and MCLGs, where technologically feasible. The following information discusses the constituents found in the water served by the Artesia system at or above the MCLGs and PHGs, the established BAT, and the cost estimate to remove the contaminant to the goal levels, where technologically feasible. Please note that accurate cost estimates are difficult, if not impossible, and are highly speculative and theoretical.

Preparation of Report

The Association of California Water Agencies (ACWA) formed a workgroup which prepared guidelines for water utilities to use in preparing these required reports. The ACWA guidelines were used in the preparation of our report. No guidance was available from state regulatory agencies.

Constituents Detected that Exceed PHGs or MCLGs

Radiological Contaminants

Gross Alpha Particle Activity

Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Gross alpha particle activity has been detected at levels up to 14.7 picoCuries/L (pCi/L) in the ground and surface water supplied to the Artesia system. There is no PHG for gross particle activity. The MCLG is 0 pCi/L, and the MCL is 15 pCi/L. The levels detected in our system were below the MCL at all times, but were over the level identified by USEPA as the MCLG.

The CDPH and USEPA, which set drinking water standards, have determined that gross alpha particle activity is a health concern at certain levels of exposure. This radiological constituent is a naturally occurring contaminant in some groundwater and surface water supplies. The category of health risk associated with gross alpha particle activity, and the reason that a drinking water standard was adopted for it, is that some people who drink water containing alpha 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 0 pCi/L is zero. CDPH and USEPA set the drinking water standard for gross alpha particle activity at 15 pCi/L to reduce the risk of cancer or other adverse health effects.

The Best Available Technology (BAT) identified to treat gross alpha particle activity is reverse osmosis (RO). The most effective method to consistently remove gross alpha particle activity to the MCLG is to install RO treatment at the select groundwater and surface water connections sites where the water exceeds the MCLG. The cost to install and operate RO removal systems to remove gross alpha particle activity to the MCLG in our Artesia system would be approximately \$5.24 million annually which includes construction and annual operational cost. This translates into a monthly cost of \$40.94 per connection (\$\$ cost /services) for the life of the treatment system.

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 has been detected at levels up to 9.7 pCi/L in the ground and surface water supplied to the Artesia system. There is no PHG for gross particle activity. The MCLG is 0 pCi/L, and the MCL is 50 pCi/L. The levels detected in our system were below the MCL at all times, but were over the level identified by USEPA as the MCLG.

The CDPH and USEPA, 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 groundwater 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 0 pCi/L is zero. The CDPH and USEPA 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 Technology (BAT) identified to treat gross beta particle activity are ion exchange and reverse osmosis (RO). The most effective method to consistently remove beta and photon emitters in order to meet the MCLG is to install RO treatment at the select groundwater and surface water connections sites where the water exceeds the MCLG. The cost to install and operate RO removal systems to remove beta and photon emitters to the MCLG in our Artesia system would be approximately \$2.39 million annually which includes construction and annual operational cost. This translates into a monthly cost of \$18.66 per connection (\$\$ cost /services) for the life of the treatment system.

Radium

Radium is a naturally-occurring radioactive metal. Its most common isotopes are radium-226, radium-224, and radium-228. Radium is a radionuclide formed by the decay of uranium and thorium in the environment. It occurs at low levels in virtually all rock, soil, water, plants, and animals. The CDPH and USEPA have set MCLs for the isotopes radium-226 and radium-228 in drinking water. Combined radium (226 + 228) has been detected at levels up to 2 pCi/L in the ground and surface water supplied to the system. There is no PHG for combined radium-226 and radium-228. The MCLG is 0 pCi/L, and the MCL is 5 pCi/L. The levels detected in our system were below the MCL at all times, but were over the level identified by the USEPA as the MCLG.

The CDPH and USEPA, which set drinking water standards, have determined that combined radium is a health concern at certain levels of exposure. This radiological constituent is a naturally occurring contaminant in some groundwater and surface water supplies. The category of health risk associated with combined radium, and the reason that a drinking water standard was adopted for it, is that some people who drink water containing radium-226 and/or or radium-228 in excess of the MCL over many years may have an increased risk of getting cancer. The numerical health risk for the MCLG of 0 pCi/L is zero. CDPH and USEPA set the drinking water standard for combined radium at 5 pCi/L to reduce the risk of cancer or other adverse health effects.

The Best Available Technologies (BATs) identified to remove combined radium from drinking water are ion exchange, reverse osmosis (RO), and lime softening. The most effective method to consistently remove combined radium to the MCLG is to install RO treatment at the select groundwater and surface water connections sites where the water exceeds the MCLG. The cost to install and operate RO removal systems to remove beta and photon emitters to the MCLG in our Artesia system would be approximately \$4.55 million annually which includes construction and annual operational cost. This translates into a monthly cost of \$35.64 per connection (\$\$ cost /services) for the life of the treatment system.

Uranium

Uranium has been detected at levels up to 15.9 pCi/L in the ground and surface water supplied to the system. The PHG for uranium is 0.43 pCi/L, and the MCL is 20 pCi/L. The levels detected in our system were below the MCL at all times, but were over the level identified by CDPH as the PHG.

The CDPH and USEPA, which set drinking water standards, have determined that uranium is a health concern at certain levels of exposure. This radiological constituent is a naturally occurring contaminant in some groundwater and surface water supplies. The category of health risk associated with uranium, and the reason that a drinking water standard was adopted for it, is that some people who drink water containing uranium in excess of the MCL over many years may have kidney problems or an increased risk of getting cancer. The numerical health risk associated with the PHG of 0.43 pCi/L is one excess cancer case per million people. CDPH set the drinking water standard for uranium at 20 pCi/L to reduce the risk of cancer or other adverse health effects.

The Best Available Technologies (BATs) identified to treat uranium are ion exchange, reverse osmosis (RO), lime softening, and coagulation/filtration. The most effective treatment system to consistently remove uranium to the PHG is RO treatment installed at the select groundwater and surface water connection sites where the water exceeds the PHG. The cost to install and operate RO removal systems to remove uranium to the PHG in our Artesia system would be approximately \$2.39 million annually which includes construction and annual operational cost. This translates into a monthly cost of \$18.66 per connection (\$\$ cost /services) for the life of the treatment system.

Microbiological Contaminants

Total Coliform Bacteria

Total coliform bacteria have been present in a maximum of 1.6% in monthly samples collected from the distribution system with repeat samples being consistently negative. The 1.6% is the highest monthly percentage over the 36-month period from 2007 through 2009. GSWC's Artesia system collects between 48 and 60 samples every month at points throughout the water distribution system that are analyzed for total coliforms. Total coliform bacteria were only present in 2 samples of the 1,902 samples collected during the 36 months from 2007 through 2009. The MCL for total coliform is 5% of monthly samples and the MCLG is 0% for monthly samples. The total coliform bacteria percentage levels for water in the distribution system were below the MCL at all times, but at times was over the MCLG.

The CDPH and USEPA, which set drinking water standards, have determined that the presence of total coliform is a possible health concern. Coliforms are common in the environment and are generally not harmful themselves. The presence of these bacteria in drinking water, however, generally is a result of a problem with water treatment or the pipes that distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water.

Because total coliform is only an indicator of the potential presence of pathogens, it is not possible to state a specific numerical health risk. The CDPH has set an enforceable drinking water standard for total coliform to reduce the risk of these adverse health effects. Under this standard, no more than 5% of the samples collected during a month can contain these bacteria. Drinking water that meets this standard is usually not associated with a health risk from disease causing bacteria and should be considered safe.

The CDPH lists four operating and maintenance conditions as the Best Available Technology (BAT) for protection against microbiological contaminants. These conditions are practiced by the Artesia System, and are as follows:

- Protection of wells from coliform contamination by appropriate placement and construction;
- Maintenance of a disinfectant residual throughout the distribution system;
- Proper maintenance of the distribution system; and
- Filtration and disinfection of approved surface water, and disinfection of groundwater.

Inorganic Chemicals

Lead and Copper

Based on the Lead and Copper Rule, GSWC conducted monitoring of lead and copper in water samples collected from wells, the distribution system, and customers' home taps. All the samples collected from wells and distribution system from 2007 through 2009 contained less than 0.005 milligrams per liter (mg/L) (<0.005 mg/L) of lead and less than 0.05 mg/L (<0.05 mg/L) of copper. There is no MCL for lead or copper. Instead the 90th percentile value of all samples from household taps in the distribution system cannot exceed an Action Level of 0.015 mg/L for lead and 1.3 mg/L for copper. The PHG for lead is 0.0002 mg/L. The PHG for copper is 0.3 mg/L. "Action Level" means the concentrations of lead or copper in water which is used to determine the treatment requirements that a water system needs to meet. The results indicate that lead and copper levels in our wells and distribution system are less than the Action Levels and PHGs.

GSWC also analyzed samples from taps inside customer's houses. Home tap samples are currently collected on a triennial basis. The most recent data were collected in 2007. A total of 30 home tap samples were collected in 2007 with lead never detected and copper levels ranging from non-detection to 0.49 mg/L. The 90th percentile level for lead was non-detection and for copper was 0.27 mg/L. These values are significantly below the Action Levels per the Lead and Copper Rule; however, the value for copper is above the PHG level.

The category of health risk for lead is damage to the kidneys or nervous system of humans. The category of health risk for copper is gastrointestinal irritation. Numerical health risk data on lead and copper have not yet been provided by OEHHA, the State agency responsible for providing that information.

Our water system is in full compliance with the Lead and Copper Rule. Based on our extensive sampling, it was determined according to State regulatory requirements that we meet the Action Levels for lead and copper. Therefore, we are deemed by CDPH to have "optimized corrosion control" for our system.

In general, optimizing corrosion control is considered to be the Best Available Technology (BAT) to deal with lead and copper findings. We will continue to monitor our water quality parameters that relate to corrosion control, such as the pH, hardness, alkalinity and total dissolved solids, and will take action if necessary to maintain our system in an "optimized corrosion control" condition.

Since we are meeting the "optimized corrosion control" requirement, it is not prudent to initiate additional corrosion control treatment as it involves the addition of other chemicals and there could be additional water quality issues raised. Therefore, no estimate of cost has been included.

Arsenic

Arsenic has been detected at levels up to 13 micrograms per liter (mg/L) in the groundwater supplied to the Artesia system. The USEPA MCL is 10 mg/L (effective 1/23/06) and the PHG is 4 nanograms per liter (ng/L). Our water system is in full compliance with the federal drinking water standard for arsenic; however, the arsenic level in the system at times exceeded the PHG.

The category of health risk associated with arsenic, and the reason that a drinking water standard was adopted for it, is that some people who drink water containing arsenic above the MCL over many years may experience skin damage and circulatory system problems and are at a higher risk of getting cancer. The numerical health risk associated with the PHG of 4 ng/L is one in a million.

The Best Available Technologies (BATs) for removing arsenic to below the MCL are activated alumina, ion exchange, lime softening, coagulation/filtration and reverse osmosis (RO). The most effective method to consistently remove arsenic to below the PHG is to install RO treatment at the select groundwater and surface water connections sites where the water exceeds the PHG. The cost to install and operate RO removal systems to remove arsenic to below the PHG in the Artesia system would be approximately \$6.84 million annually which includes construction and annual operational cost. This translates into a monthly cost of \$53.53 per connection (\$\$ cost /services) for the life of the treatment system.

Disinfection By-Products

Bromate

Bromate is a chemical that is formed when ozone is used to disinfect drinking water and reacts with naturally occurring bromide found in source water. Bromate has been detected at levels up to 10 ug/L in purchased surface water supplied to the system. The MCL for bromate is 10 ug/L, and the PHG is 0.1 ug/L. The Artesia water system is in full compliance with the federal drinking water standard for bromate, but we have detected bromate in the system above the MCLG.

The CDPH and USEPA have determined that bromate is a health concern at certain levels of exposure. The category of health risk associated with bromate, and the reason that a drinking water standard was adopted for it, is that some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer. The numerical health risk for the MCLG of 0 ug/L is zero. CDPH and USEPA set the drinking water standard for bromate at 10 ug/L to reduce the risk of cancer or other adverse health effects.

The Best Available Technology (BAT) for removing bromate to below the MCLG is control of ozone treatment process to reduce production of bromate. This is typically accomplished by treating the source water in a variety of ways to reduce the natural organic matter (NOM), which will allow a reduction in the applied dose of ozone used for disinfection. However, in the Artesia water system, the source water is treated by a third party. Therefore, the bromate would need to be treated directly. The most effective treatment technique to reduce the bromate levels in the source water to levels below the MCLG is to treat the water by reverse osmosis (RO) at the select sites where the water exceeds the MCLG. The cost to install and operate an RO system to remove bromate to below the MCLG in the Artesia water system would be approximately \$2.39 million annually which includes construction and annual operational cost. This translates into a monthly cost of \$18.66 per connection for the life of the treatment system.

Summary of Findings

Overall, lead, copper, arsenic, alpha particles, beta particles, radium, uranium, total coliform bacteria and bromate constituents were detected in our Artesia System at concentrations above the PHGs or MCLGs. At no time did we ever serve water containing contaminants above recognized and enforceable MCLs. The drinking water quality of GSWC's Artesia System meets all the drinking water standards to protect public health.

If you have any questions about this report, please call us at (800) 999-4033. We are available to answer your questions 24 hours a day, 7 days a week, or visit our website at <http://www.gswater.com>.