City of Corona Utilities Department
Report on Water Quality
Relative to Public Health Goals
For 2019-2021

1. Introduction

Under the Calderon-Sher Safe Drinking Water Act of 1996 public water systems in California serving greater than 10,000 connections must prepare a brief report every three years providing information on any constituents that exceed a Public Health Goal (PHG) in the preceding three years.

The report must contain information on detection of any contaminant in drinking water at a level exceeding a Public Health Goal, estimate of costs to remove detected contaminants to below the PHG using Best Available Technology (BAT), and the health risk for each contaminant exceeding a PHG. This report has been prepared to address the requirement set forth in Section 116470 of the California Health and Safety Code. It is based on water quality analysis during calendar years 2019, 2020, and 2021. There are no regulations detailing the requirements for the preparation of Public Health Goal reports. The Association of California Water Agencies Water Quality Committee has prepared suggested guidelines for water utilities to use in preparing Public Health Goal Reports. These guidelines were used in the preparation of this report.

2. California Drinking Water Regulatory Process

California Health and Safety Code Section 116365 requires the State to develop a Public Health Goal for every contaminant with a primary drinking water standard or for any contaminant California is proposing to regulate with a primary drinking water standard. PHGs are set by the California Office of Environmental Health Hazard Assessment (OEHHA) and are based solely on public health risk considerations. None of the practical risk-management factors that are considered by the United States Environmental Protection Agency (USEPA) or the California Division of Drinking Water (DDW) in setting drinking water standards are considered in setting the PHGs. These factors include analytical detection capability, available treatment technology, benefits, and costs. The PHGs are not enforceable and are not required to be met by any public water system. Maximum Contaminant Level Goal (MCLG) is the federal equivalent to PHG.

3. Identification of Contaminants

Section 116470(b)(1) of the Health and Safety Code requires public water systems serving more than 10,000 connections to identify each contaminant present in drinking water that was above the Public Health Goal. The constituents presented in this section were detected at one or more locations in our drinking water system at levels that exceeded the PHG or the MCLG.

- **Arsenic:** It is a chemical naturally occurring in groundwater due to erosion; runoff from orchards; glass and electronics production wastes. The PHG for arsenic is 0.004 parts per billion (ppb) and the Maximum Contaminant Level (MCL) is 10 ppb. Arsenic was detected above the PHG in the local groundwater: Wells 7A, 8A, 9A, 11A, 12A, 14, 15, 17A, 19, 22, 25, 26, 28, 31, and 33. Average Arsenic detected in groundwater was 1.86 ppb. The calculated average after treatment and blending was 0.08 ppb.
- **Gross Alpha Particle Activity (gross alpha):** It is a measure of the total amount of radioactivity in a water sample attributable to the radioactive decay of alpha-emitting elements. It naturally occurs in groundwater due to erosion. The MCLG is zero and the MCL is 15 picocuries per liter (pCi/L). Gross alpha was detected in the local groundwater: Wells 7A, 8A, 17A, 19, 22, 25, 26, 27, 31, and 33. Average gross alpha detected was 11.6 pCi/L. The calculated average after treatment and blending was 0.140 pCi/L.
- **Coliform Bacteria:** It includes a large group of many types of bacteria that occur throughout the environment and in feces of all warm-blooded animals and humans. Most types of coliform bacteria are harmless to humans, but some can cause mild illnesses and a few can lead to serious waterborne diseases. Coliform bacteria are often referred to as “indicator organisms” because they indicate the potential presence of disease-causing bacteria in water. The MCLG is zero and the MCL is 5% of the samples collected monthly. The City collects between 120 and 150 routine coliform bacteria samples every month. During 2019, no more than 1% of these samples were positive in a month. During 2020, no more than 0% of these samples were positive in a month. During 2021, no more than 0% of these samples were positive in a month.
- **Hexavalent Chromium:** Hexavalent chromium is a toxic form of the element chromium. Hexavalent chromium compounds are man-made and widely used in many different industries. The PHG for Hexavalent chromium is 0.02 ppb, there is currently no MCL set. Hexavalent Chromium was detected above the PHG in the local groundwater: Wells 7A, 8A, 9A, 11A, 12A, 14, 15, 17A, 19, 22, 25, 26, 27, 28, 31, and 33. Average hexavalent chromium detected in groundwater was 0.75 ppb. The calculated average after treatment and blending was 0.074 ppb.
- **Perchlorate:** Perchlorate is a chemical that can occur naturally in the environment and also may be released by fireworks, improper handling or disposal of rocket fuel, and various industrial processes. The PHG for Perchlorate is 1 ppb, the MCL is 6 ppb. Perchlorate was detected above the PHG in the local groundwater: Wells 7A, 8A, 9A, 11A, 12A, 14, 17A, 19, 22, 25, 27, 28, 31, 33. Average Perchlorate detected in groundwater was 5.5 ppb. The calculated average after treatment and blending was 0.80 ppb.
- **Uranium:** Uranium is a radioactive compound that naturally occurs in varying amounts in the earth’s crust. The PHG for Uranium is 0.43pCi/L, the CA MCL is 20 pCi/L. Uranium was detected above the PHG in the local groundwater: Wells 7A, 8A, 12A, 15, 17A, 19, 22, 25, 26, 27, 28, 31, 29, and 33. Average Uranium detected in groundwater was 9.7 pCi/L. The calculated average after treatment and blending was 0.2921 pCi/L.

4. Numerical Public Health Risks

Section 116470(b)(2) of the Health and Safety Code requires disclosure of the numerical public health risk determined by the OEHHA associated with the maximum contaminant levels, action levels, public health goals, and maximum contaminant level goals.

- **Arsenic:** The OEHHA has determined that the health risk associated with the PHG is one excess case of cancer in a million people and the risk associated with the MCL is 2.5 excess cases of cancer in 1,000 people exposed for a 70-year lifetime.
- **Gross Alpha Particle Activity (gross alpha):** The USEPA has determined that the health risk associated with the MCLG is zero and the risk associated with the MCL is one excess case of cancer in 1,000 people over a lifetime exposure.
- **Coliform Bacteria**: 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 indicate that they cannot do so with coliforms. The reason for the coliform drinking water standard is to minimize the possibility of the water containing pathogens which are organisms that cause waterborne disease.
- **Hexavalent Chromium:** The California Department of Public Health and USEPA have determined that Chromium Six is a health concern at certain levels of exposure. The category of health risk associated with Chromium Six is that continued exposure to Chromium Six could result in allergic dermatitis (skin reactions) and has been found to cause gastrointestinal tumors in rats and mice. The numerical health risk for cancer attached to levels above the PHG is $1x10^{-6}$ which means one excess cancer case per million people exposed.
- **Perchlorate:** Perchlorate is a chemical that can occur naturally in the environment and also may be released by fireworks, improper handling or disposal of rocket fuel, and various industrial processes. Perchlorate is known to block the thyroid's ability to take in and process iodide, which is a nutrient essential to brain development, growth, heart function, and other systems.
- **Uranium:** Uranium is a radioactive compound that naturally occurs in varying amounts in the earth's crust. 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 cancer risk associated with drinking water with uranium greater than the MCL of 20 pCi/L is $5x10^{-5}$, or five surplus cancer cases per hundred thousand people who drink water in excess of the MCL over a lifetime. The cancer risk for uranium at the PHG of 0.43 pCi/L is $1x10^{-6}$, or one surplus cancer case per million people drinking water in excess of the PHG over a lifetime.

5. Identification of Risk Categories

Section 116470(b)(3) of the Health and Safety Code requires identification of the category of risk to public health associated with exposure to the contaminant in drinking water.

6. Description and Cost of Best Available Technology.

Section 116470(b)(4) of the Health and Safety Code requires a description of the best available technology to remove or reduce the concentrations of the contaminants identified in this report as exceeding the set parameters. Section 116470(b)(5) of the Health and Safety Code requires an estimate of the additional cost and additional cost per customer if utilizing the best available technology to reduce the concentration of a contaminant to a level at or below the PHG or the MCLG. Both the USEPA and DDW adopt best available technologies, BATs, which are the best-known methods for reducing contaminant levels to the MCL. Many MCLGs and PHGs are set to a numerical value far below the respective Detection Limit for Purposes of Reporting (DLRs). This makes it difficult to know if a constituent was actually lowered to zero.

The Best Available Technology (BAT) to lower the level of arsenic, gross alpha, hexavalent chromium, and uranium below the PHG is reverse osmosis (RO). Current levels are already below the MCL; reverse osmosis is one option in trying to lower the levels even further to below the PHG. Cost estimating guides from the Association of California Water Agencies (ACWA) guidance report were used in determining the estimated cost to implement additional RO. Please note cost estimates are theoretical. According to the cost estimates, provided by ACWA, to install and operate an RO system it would cost anywhere between $2.25 - $4.75 per 1,000 gallons of water treated. The estimated annualized capital, operation, and maintenance costs for the City to install, run, and maintain would range from $23.7 million/year to $50 million/year. The cost per customer connection would range from $542 to $1,144 per year.

The Best Available Technology (BAT) to lower the level of Perchlorate below the PHG is Ion Exchange (IE). Current levels are already below the MCL; ion exchange is one option in trying to lower the levels even further to below the PHG. Cost estimating guides from the Association of California Water Agencies (ACWA) guidance report were used in determining the estimated cost to implement additional IE. Please note cost estimates are theoretical. According to the cost estimates, provided by ACWA, to install and operate an RO system it would cost anywhere between $0.73- $0.97 per 1,000 gallons of water treated. The estimated annualized capital, operation, and maintenance costs for the City to install, run, and maintain would range from $7.7 million/year to $10.2 million/year. The cost per customer connection would range from $176 to $234 per year.

The BAT for inactivating coliform bacteria in drinking water as determined by the State is the protection of wells from coliform contamination, maintenance of a disinfectant residual throughout the distribution system, proper maintenance of the distribution system, and filtration and/or disinfection of surface and groundwater. The City already disinfects all water served to the public. The City adds chloramines, and maintains a chloramine residual, to the distribution system used to deliver

drinking water to ensure the water is microbiologically safe. 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 By Product (DBPs) levels. Other equally important measures that have been implemented include: an effective cross-connection control program, an effective monitoring program, a successful tank cycling program, routine dead-end flushing program, and maintaining positive pressure in our distribution system.

7. Recommendations for Further Action:

Section 116470(b)(6) of the Health and Safety Code requires a brief description of any actions the water purveyor intends to take to reduce the concentration of the contaminant and the basis for that decision. The drinking water quality for the City of Corona meets all 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 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.

2022 PUBLIC HEALTH GOAL REPORT
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Table 1

PARAMETER	UNITS OF MEASUREMENT	PHG OR (MCLG)	MCL	CONCENTRATION		CATEGORY OF RISK	CANCER RISK AT PHG or MCLG	CANCER RISK AT MCL	BEST AVAILABLE TECHNOLOGIES
				Average	Range				
Arsenic	ppb	0.004	10	1.86	ND – 4.3	C	one per million	2.5 per thousand	AA,C/F,IE,LS,RO
Gross Alpha Particle Activity	pCi/L	0	15	11.6	3.1-19.3	C	zero	one per thousand	RO
Total Coliform	% samples positive	0	5	0.33	0-1	NA	NA	NA	RO
Hexavalent Chromium	µg/L	0.02	none	0.75	.029-3.35	C	one per million	NA	C/F, IE, RO
Perchlorate	ug/L	1	6	5.50	1.9-9.1	NA	NA	NA	IE
Uranium	pCi/L	0.43	20	9.7	0.84-20.5	C	one per million	one per hundred thousand	C/F, IE, RO, LS

Table 2

PARAMETER	TREATMENT TECHNOLOGY	Annualized Capital and O&M Costs		Additional Costs per Connection per Year	
		Ranges		Ranges	
Arsenic	RO	$23,724,923	$50,085,948	$542	$1,144
Gross Alpha Particle Activity	RO	$23,724,923	$50,085,948	$542	$1,144
Hexavalent Chromium	RO	$23,724,923	$50,085,948	$542	$1,144
Perchlorate	IE	$7,697,419	$10,228,078	$176	$234
Uranium	RO	$23,724,923	$50,085,948	$542	$1,144

RISK CATEGORIES

C (Carcinogen): A substance that is capable of producing cancer

ABBREVIATION

PHG: Public Health Goal

MCL: Maximum Contaminant Level

MCLG: Maximum Contaminant Level Goal

µg/L: Micrograms per liter

pCi/L: picoCuries per liter

ND: No Detection

TREATMENT TECHNOLOGIES

AA: Activated Carbon

C/F: Coagulation/Filtration

IE: Ion Exchange

LS: Lime Softening

RO: Reverse Osmosis