City of Woodland – Utilities Department
Public Water System CA5710006
Reporting Years 2020, 2021, 2022

2023 Triennial Public Health Goals Report

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Acronyms Used

AL	Action Level
BAT	Best Available Technology
HAA	Haloacetic acid
HAA5	Total Haloacetic acids 5
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NDPR	National Primary Drinking Water Regulations
OEHHA	Office of Environmental Health Hazard Assessment
PHG	Public Health Goal
SDWA	Safe Drinking Water Act
SWRCB DDW	State Water Resources Control Board, Division of Drinking Water
THM	Trihalomethanes
TTHM	Total Trihalomethanes
U.S. EPA	United States Environmental Protection Agency

Glossary of Water Quality Terms

Best Available Technologies (BATs)	The best available treatment techniques or other means available for achieving compliance with MCL.
Health Risks	Health risks with respect to Public Health Goals are based on long term exposures to low levels of contaminants as would occur with drinking water, rather than high doses from a single or short-term exposure. The health risk category describes the type of health risk. Types of health risks include chronic toxicity (shortened life span thyroid effects, liver effects, or kidney effects), acute toxicity (gastrointestinal effects), carcinogenicity (cancer), and reproductive toxicity.
Maximum Contaminant Level (MCL)	The maximum permissible level of a contaminant in water distributed to any user of a public water system. MCLs are enforceable standards.
Maximum Contaminant Level Goal (MCLG)	The level of a contaminant in drinking water below which there are no observable adverse effects to human health. MCLGs are similar to California PHGs, but not exactly the same. MCLGs are non-enforceable goals established by the U.S. EPA based on health considerations for non-carcinogenic constituents. For all carcinogenic constituents (i.e., those chemicals known or suspected of causing cancer), U.S. EPA's policy is to set the MCLG at zero.
National Primary Drinking Water Regulations (NPDWR)	Legally enforceable primary standards and treatment techniques set by the U.S. EPA for public water systems. NPDWRs limit the levels of contaminants in drinking water and are set to protect public health.
Numeric Health Risk	Describes the cancer risk. At the California MCL no cancer risk is calculated from chemicals considered "noncarcinogens." For carcinogens, PHGs are set at a concentration that does not pose any significant risk of cancer; this is usually a one-in-one-million excess cancer risk ($1x10^{-6}$).
One-in-one-million Risk Level	At the "one-in-one-million" risk 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 in the water.

Parts per billion (ppb)	Parts per billion is the number of units of mass of a contaminant per 1000 million units of total mass, equivalent to microgram per liter (µg/L).
Parts per million (ppm)	Parts per million is the number of units of mass of a contaminant per 1 million units of total mass, equivalent to milligrams per liter (mg/L).
Public Health Goal (PHG)	The concentration of a contaminant in drinking water below which no known or anticipated adverse health effects will occur with an adequate margin of safety. This level is based on estimates that would pose a significant risk to individuals, including the most sensitive subpopulations, consuming water every day over an entire lifetime. PHGs are unique to California and are established by the Office of Environmental Health Hazard Assessment (OEHHA).
Reproductive Toxicity	Adverse effects on an adult's reproductive capability
RfD (Reference Dose)	An estimate of the daily exposure to a human population that is likely to be without an appreciable risk of deleterious effect during a lifetime.
Safe Drinking Water Act	The Safe Drinking Water Act of 1974 was passed by Congress to protect the public water supply and sources of water including lakes, rivers, springs, reservoirs and groundwater wells. SDWA Allows the U.S. EPA to set standard regulations for drinking water.
Water Quality	The chemical, biological, and physical integrity of a body of water.

Background Information:

According to the California Health and Safety Code section 11470 (Appendix 1), water systems with more than 10,000 service connections must prepare a report every three years to identify contaminants which exceeded their public health goals (PHGs). The report must identify contaminants which exceed the maximum contaminant level goals (MCLGs) set by the United States Environmental Protection Agency (U.S. EPA) if a public health goal is yet to exist. The code was established under the Calderon-Sher Safe Drinking Water Act of 1996 and is regulated by the State Office of Environmental Health Hazard Assessment (OEHHA)—a department within the California Environmental Protection Agency (CalEPA). OEHHA uses current risk assessment methods and principles to establish each public health goal.

In reporting, water systems must identify all contaminants that exceed the PHG or MCLG for that contaminant. The numerical public health risk, determined by OEHHA, associated with either the PHG or the MCLG must be reported for each contaminant. The category of risk associated with drinking water must be identified, such as if the contaminant is potentially carcinogenic or acutely toxic. The report must describe the best available technologies available to reduce concentrations of the contaminant, as well as the cost estimates to provide this technology. Finally, the report must include recommended actions in addition to the basis for the recommendation. This report is a summary of the all the contaminants exceeding the respective PHGs or MCLGs identified in the three years including 2020, 2021, and 2022.

"The purpose of the legislation requiring these reports is to provide consumers with information on levels of contaminants even below the enforceable mandatory Maximum Contaminant Levels (MCLs) so that they would be aware of whatever risks might be posed by the presence of these contaminants at levels below MCLs" (ACWA, 2022). This report includes a cost analysis for the reduction in contaminants according to best available technologies, if the technology is available, and recommendations for future action. It is key to note, the U.S. EPA and the California State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) establish MCLs at very conservative levels to provide protection to consumers of the water supply. MCLs are still the regulatory measure for determining compliance.

What are PHGs and MCLGs?

Public Health Goals:

"The [Public Health Goal (PHG)] is a level of drinking water contamination at which adverse health effects are not expected to occur from a lifetime of exposure." (CalEPA, 2022)

To elaborate, a PHG for a chemical or contaminant is established with the condition that a lifetime of exposure does not significantly create the risk to health. PHGs are not regulated or enforced; they attempt to measure risk to public health and are only recognized in California. Per State law, the SWRCB is required to set standards for drinking water at a level very close to the respective PHG, but with consideration for detection technology, economic feasibility, and the ability for most public water systems implement a program. The SWRCB recognizes the challenges to implementation when developing a drinking water standard.

In order to establish a PHG, the California Office of Environmental Health Hazard Assessment (OEHHA) scientists first collect data and research available for the contaminant, including studies on animals and/or humans with known exposure. The gathered data becomes part of a health risk assessment whereby scientists aim to determine the levels of exposure which may lead to adverse health effects. Research is conducted to also identify effects at increasing concentrations of exposure. The level used to guide establishment of the PHG is the level OEHHA scientists believe would not pose a significant risk to health after 70 years of drinking the contaminant in water on a daily basis. Both long-term and immediate or short-term effects of exposure are considered.

"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." (CalEPA, 2022)

The SWRCB tries to set the regulatory drinking water as close to the PHG as possible, however, this is not always feasible. It can be a challenge to implement regulations considering the cost of treatment technology, the ability for laboratories to detect contaminants, and the economic impact the regulations could have on a water system. In some cases, the technology to treat is not yet available or not efficient for use in a large water system. The SWRCB must also consider that removal of one substance could lead to byproducts or introduction of new contaminants. It is also nearly impossible to accurately measure a substance to a level of zero, depending on the contaminant.

Maximum Contaminant Level Goals:

The maximum contaminant level goal (MCLG) is set by the United States Environmental Protection Agency (U.S. EPA) at the federal level. The MCLGs are not enforceable; MCLs are the overarching enforceable guideline for drinking water quality. MCLGs only take into account health effects and risk to exposure; they attempt to measure the maximum contamination of a substance in drinking water which would provide no known adverse effects on the health of a person. In establishing these goals, the U.S. EPA considers vulnerable populations such as infants, children, the elderly, and people with a compromised immune system. They do not consider limits of detection nor the feasibility or effectiveness of treatment technologies (U.S. EPA, 2022).

Below are excerpts from the U.S. EPA methods for regulation determination of MCLGs:

"*The way EPA determines MCLGs depends on the type of contaminant targeted for regulation:*
*For **microbial contaminants** that may present public health risk, EPA sets the MCLG at zero. This is because ingesting one protozoan, virus, or bacterium may cause adverse health effects.*
*For **chemical contaminants that are carcinogens,** EPA sets the MCLG at zero if both of these are the case:*

- *there is evidence that a chemical may cause cancer*
- *there is no dose below which the chemical is considered safe.*

If a chemical is carcinogenic and a safe dose can be determined, EPA sets the MCLG at a level above zero that is safe.

*For **chemical contaminants that are non-carcinogens but can cause adverse non-cancer health effects** (for example, reproductive effects), the MCLG is based on the reference dose. A **reference dose** (RfD) is an estimate of the amount of a chemical that a person can be exposed to on a daily basis that is not anticipated to cause adverse health effects over a lifetime.*

- *To determine the RfD, the concentration for the non-carcinogenic effects from an epidemiology or toxicology study is divided by uncertainty factors (for example, for sensitive subpopulations). This provides a margin of safety for consumers of drinking water.*
- *The RfD is multiplied by body weight and divided by daily water consumption to provide a Drinking Water Equivalent Level (DWEL).*
- *The DWEL is multiplied by the relative source contribution. The relative source contribution is the percentage of total drinking water exposure for the general population, after considering other exposure routes (for example, food, inhalation).*

Once the MCLG is determined, EPA sets an enforceable standard. In most cases, the standard is a maximum contaminant level (MCL). The MCL is the maximum level allowed of a contaminant in water which is delivered to any user of a public water system.
When there is no reliable method that is economically and technically feasible to measure a contaminant at concentrations to indicate there is not a public health concern, EPA sets a "treatment technique" rather than an MCL. A treatment technique is an enforceable procedure or level of technological performance which public water systems must follow to ensure control of a contaminant.
Treatment technique rules also list:

- *The best available technology for meeting the standard*
- *Compliance technologies available and affordable for small systems*

Examples of treatment technique rules are the:

- *Surface Water Treatment Rule (disinfection and filtration)*
- *Lead and Copper Rule (optimized corrosion control)*
- *Acrylamide and Epichlorohydrin Rules (purity of treatment chemicals)*

The MCL is set as close to the MCLG as feasible. Taking cost into consideration, EPA must determine the feasible MCL or treatment technique. This is defined by SDWA [the Safe Drinking Water Act] as the level that may be achieved with:

- *use of the best available technology or treatment approaches*
- *other means which EPA finds are available (after examination for efficiency under field conditions, not solely under laboratory conditions)*

As a part of the rule analysis, SDWA also requires EPA to prepare a health risk reduction and cost analysis (HRRCA) in support of any [National Primary Drinking Water Regulations]. EPA must analyze the quantifiable and non-quantifiable benefits that are likely to occur as the result of compliance with the proposed standard. EPA must also analyze certain increased costs that will result from the proposed drinking water standard.
In addition, EPA must consider:

- *Incremental costs and benefits associated with the proposed and alternative MCL values*
- *The contaminant's adverse health effects on the general population and sensitive subpopulations*
- *Any increased health risk to the general population that may occur as a result of the new MCL*
- *Other relevant factors such as data quality and the nature of the risks*

Where the benefits of a new MCL do not justify the costs, EPA may adjust the MCL for a particular class or group of systems to a level that "maximizes health risk reduction benefits at a cost that is justified by the benefits."

(U.S. EPA, 2022)

Guidelines followed:

The Office of Environmental Health Hazard Assessment (OEHHA) provides a guidance document titled "*Health Risk Information for Public Health Goal Exceedance Reports*." The document released February, 2022 served as a guide. The City of Woodland also referenced the April, 2022 guidance document provided by the Association of California Water Agencies (ACWA) titled "*Suggested Guidelines for Preparation of Required Reports on PUBLIC HEALTH GOALS (PHGs) to satisfy the requirements of California Health and Safety Code Section 116470(b)*." Both documents are attached as Appendix 6. The City of Woodland used the cost estimates per ACWA guidelines as a basis for treatment technology recommendation (refer to Appendix 6, page 74 for cost estimates).

Best Available Treatment Technologies and Cost Estimates:

Drinking water can be treated by several methods to reduce contaminant levels to below the MCL, or to potentially lower the contaminant levels to near the PHG or MCLG. The United States Environmental Protection Agency (U.S. EPA) and the State Water Resources Control Board Division of Drinking Water (SWRCB DDW) have classified certain techniques as "Best Available Technologies" or BATs, which they found to be the best-known methods for treatment. In addition, the U.S. EPA and the SWRCB DDW have attempted to provide a cost estimate for using each of these technologies. However, since some PHGs or MCLGs are set at zero or close to zero, it is almost impossible to accurately determine if a substance was completely removed. It may be feasible to reduce a contaminant, but in some cases, it may not be cost effective, or it may lead to alternative water quality changes, such as byproducts of drinking water disinfection. Further, testing methods available are limited by the ability to detect a substance. Each testing method has an established DLR or Detection Limit for the Purpose of Reporting, which is the minimum amount detected required to be reported to the state, established based on the lowest analyte concentration that can be reported with confidence for a specific testing method (U.S. EPA, 2023).

Appendix 7 of this report contains a table of Cost Estimates for Treatment Technologies obtained from the guidance document titled *"Health Risk Information for Public Health Goal Exceedance Reports – February 2022"* (CalEPA, 2022). Costs for various techniques were updated in 2012 and indexed to 2021 estimates.

Constituents Detected That Exceed a PHG or an MCLG:

Table 1 on the following page identifies all the constituents that were detected by City of Woodland above a Public Health Goal or a Maximum Contaminant Level Goal during the years 2020-2022. Not all contaminants with a designated California PHG have a federal MCLG. In addition to the PHG and MCLG, the regulatory MCL is presented for comparison. Over the last three years, the City of Woodland's drinking water met all MCLs and safe drinking water standards adopted by the United States Environmental Protection Agency and the State Water Resources Control Board, Division on Drinking Water.

The contaminants exceeding the PHG or MCLG included arsenic, hexavalent chromium, copper, and several byproducts of drinking water disinfection. Bromodichloromethane, bromoform, chloroform, dibromochloromethane, dichloroacetic acid, trichloroacetic acid, dibromoacetic acid, and bromate, are commonly produced as a byproduct of disinfection including chlorination, chloramination, and ozonation. U.S. EPA studies of disinfection byproducts concluded that while high doses of these chemicals can increase the risk of toxicity or carcinogenicity when exposed over a lifetime, the benefits of disinfection and microbial control critically outweigh the costs. As a protective measure, disinfection byproducts, including all listed in this report, are tightly regulated under the U.S. EPA's "Disinfectants and Disinfection Byproducts Rule." The U.S. EPA recognizes that select treatment processes can form a reduced number or low concentration of chemical byproducts, including the use of chloramines, ozone, chlorine dioxide, and ultraviolet light (U.S. EPA, 2005). The City of Woodland's main source of treated water from the Woodland-Davis Clean Water Agency, the regional water treatment facility, utilizes one of these technologies—ozonolysis, in addition to chlorination. Ozonolysis is highly effective for disinfecting drinking water, produces a relatively low amount of disinfection byproducts, and, in turn, allows the City of Woodland to meet increasingly stringent regulatory standards. Each detected substance is discussed further below.

Table 1: Substances detected above the Public Health Goal (PHG) or Maximum Contaminant Level Goal (MCLG), 2020-2022

Substance	State PHG	Federal MCLG) (µg/L	MCL (µg/L)	Average Detected Level (µg/L)	Year	Source	Health Risk Category
Arsenic	0.004	zero	10	1.19 1.33	2022 2021	GW Wells GW Wells	carcinogenicity (causes cancer)
Chromium, Hexavalent 0.01-mg/L MCL & 0.001-mg/L DLR repealed September 2017	0.02	None	None	1.56 0.16 17.67 0.18 0.14	2022 2022 2021 2021 2020	ASR Wells WDCWA GW Wells WDCWA GW Wells	carcinogenicity (causes cancer)
Copper (*Action Level for 90th percentile of samples)	300	1300	1300	*320	2022	City Homes	digestive system toxicity (causes nausea, vomiting, diarrhea)
Bromodichloromethane	0.06	zero	None	5.13 4.3 3.5 3.94	2022 2022 2020 2020	ASR Wells WDCWA Distribution Sites WDCWA	carcinogenicity (causes cancer)
Bromoform	0.5	zero	None	0.3	2022	ASR Wells	carcinogenicity (causes cancer)
Chloroform	0.4	70	None	13.43 12.05 5.27 7.28	2022 2022 2020 2020	ASR Wells WDCWA Distribution Sites WDCWA	carcinogenicity (causes cancer)
Dibromochloromethane	0.1	60	None	2.04 2.09 2.39 2.58	2022 2022 2020 2020	ASR Wells WDCWA Distribution Sites WDCWA	carcinogenicity (causes cancer)
Dichloroacetic Acid	0.2	zero	None	0.51 5.46 3.86 1.88 3.12	2022 2022 2021 2020 2020	ASR Wells WDCWA WDCWA Distribution Sites WDCWA	carcinogenicity (causes cancer)
Trichloroacetic Acid	0.1	20	None	1 3.15 1.16	2022 2022 2020	ASR Wells WDCWA Distribution Sites	hepatoxicity (harms the liver)
Dibromoacetic Acid	0.03	None	None	1 0.74	2022 2020	WDCWA WDCWA	NA
Bromate	0.1	zero	10	1.15 0.4	2022 2021	WDCWA WDCWA	carcinogenicity (causes cancer)

Sources of Water for Detected Contaminants:

The sources of water listed in **Table 1** include water from WDCWA (the Woodland-Davis Clean Water Agency), ASR wells (Aquifer Storage and Recovery Wells), GW Wells (Groundwater Wells—mainly City Well #24), Distribution Sites (Sample stations across the city within the distribution system), and City Sites (samples were taken from homes throughout the community).

Water from WDCWA consists of treated surface water from the Sacramento River and accounts for the vast majority of Woodland's potable water. The secondary water source consists of Woodland's 3 ASR Wells, which are wells capable of storage and recovery of the surface water from WDCWA; they can provide surface water quality as long as stored surface water is available. If the ASR wells are pumped beyond the stored surface water quality, it is possible for the wells to pump water that reflects a mixture of stored surface water and native ground water. The city of Woodland injects water into these wells seasonally (generally in the winter) and recovers the water as needed (generally in the summer) to meet city demands. The third source of water includes GW Wells (native groundwater wells). The city maintains 6 groundwater wells, 3 of which blend native water with surface water to provide higher water quality. The city prioritizes the use of water sources based on demand, water use restrictions, and the goal to provide the highest quality water to Woodland residents. In 2020, City of Woodland used mainly surface water from WDCWA; groundwater wells made up approximately 0.4% of the supply of potable water. In 2021, the city supplied over 90% surface water from WDCWA and ASR wells and approximately 9% water from native groundwater wells. The year 2022 saw a reduction in well use and supplied over 99% surface water from WDCWA. Less than one percent of potable water came from groundwater in 2022.

Arsenic:

Arsenic is a natural substance found in the earth's crust and can be found in high levels in groundwater in several countries, including the United States, Argentina, Mexico, and in several countries throughout Asia. It can take on organic or inorganic forms, and contaminate air, water, and soil. Inorganic arsenic shows greater toxicity than organic forms (commonly found in seafood and poultry in trace amounts). Exposure can also occur through industry practices such as in the "processing of glass, pigments, textiles, paper, metal adhesives, wood preservatives and ammunition" (WHO, 2022). Tobacco plants can take up inorganic arsenic from the soil and create a secondary hazard for cigarette smokers. According to the World Health Organization, long-term exposure to arsenic, especially the inorganic type, can lead to chronic arsenic poisoning, skin lesions, and cancer. Exposure can also occur from drinking water or crops irrigated with contaminated water (WHO, 2022).

California established the PHG for arsenic at 0.004 ppb (µg/L) in April of 2004. The federal MCLG is set at zero, which is set at zero for all labeled toxins based on the consideration that no allowable limit is deemed acceptable for toxic substances. However, it is not feasible to completely remove some substances which are naturally occurring in the environment. Effective January 2006, the federal arsenic MCL was reduced from 50 ppb to 10 ppb. The PHG for arsenic at 0.004 ppb is much lower than the Detection Limit for Reporting (DLR) of 2 ppb and far below the level of accuracy that can be measured through commercial testing technologies.

From 2020 through 2022, City of Woodland's main water supply came from WDCWA, the Woodland-Davis Clean Water Agency—a raw water treatment facility which provides surface water from the Sacramento River. The City of Woodland detected arsenic in groundwater wells in both 2021 and 2022. The amount detected was found at 1.33 ppb and 1.19 ppb in 2021 and 2022 respectively. In 2021, pumped groundwater made up approximately 9% of the overall system supply. When water was distributed, it was diluted at a ratio of 1:4 or less; all the water supplied from wells came from a 'blending well.' In 2022, groundwater made up approximately 0.7% of the water supply. While this amount is not presumed to be significant, the result is listed for informational purposes. The City of Woodland prioritizes surface water from WDCWA as the primary supply. However, as demands fluctuate and water restrictions change, some years can see higher groundwater usage than others. If necessary to use groundwater, this second potable supply will come from groundwater wells blended with surface water, as occurred in 2021. It is key to note that the average amount of arsenic detected was far below the regulatory MCL of 10 ppb and arsenic was only detected in groundwater wells.

Current available technologies to remove arsenic include:

- Ion Exchange
- Activated Alumina
- Reverse Osmosis
- Modified Coagulation and Filtration

According to the U.S. EPA, these methods remove 90 to 95 percent of arsenic from drinking water. Thus, even with the best available technologies, if arsenic is present, it is nearly impossible to completely remove it from the drink water supply (CalEPA, 2022). Routine regulatory monitoring allows us to trend data and ensures potable water supplies never reach the maximum contaminant level.

More information on the topic of arsenic in drinking water can be found at the State's website: www.oehha.ca.gov/water/public-health-goal-arsenic-drinking-water.

Hexavalent Chromium:

Hexavalent chromium was first regulated in 1987. "… it was one of the first substances identified as a carcinogen under California's Safe Drinking Water and Toxic Enforcement Act of 1986, more commonly known as Proposition 65" (Brown, 2011). Hexavalent chromium is the soluble form of the heavy metal chromium, also known as trivalent chromium. The trivalent form is a required nutrient and presents low toxicity. In the environment, it is interchangeable with hexavalent chromium, where it can become highly toxic. Hexavalent chromium is considered a carcinogen with routes of exposure through inhalation and ingestion. As an inhalant, water droplets have higher potency than the oral route, however, ingestion is the dominant route for cancer risk. Studies on hexavalent chromium in mice showed the substance can convert to the less toxic form of trivalent chromium in the acidic environment of the stomach, but does not completely interchange and can also be found in the bloodstream after absorption. Further studies in mice found support for increased carcinomas and adenomas, including stomach tumors and oral cancers. A study of humans with increased exposure in drinking water showed an increase in primary liver cancer (Brown, 2011).

The current PHG for hexavalent chromium is 0.02 ppb and was established in 2014. There is no current federal MCLG and the federal MCL (previously 10 ppb) and the DLR (1 ppb) was removed from use in September 2017. At this time, the United States Environmental Protection Agency (U.S. EPA) is in the process of re-establishing a new DLR and MCL.

In the previous three years, hexavalent chromium was detected in both groundwater and surface water in trace amounts. In groundwater wells in 2020, 2021, and 2022, it was detected at an average of 0.14, 17.67, and 1.56 ppb respectively. In water from the regional surface water treatment facility (WDCWA), hexavalent chromium was detected at an average of 0.18 ppb in 2021 and 0.16 ppb in 2022.

To discuss the results above, most water sampled had test results very close to or below the detection level for the purpose of reporting (DLR). The result of 17.67 ppb came from Well #24, which is a city blending well. Water from this well provided roughly 300 million gallons to customers in 2021 out of the total 3249.4 million gallons sent to the distribution system. Well 24 contributed to approximately 9 percent of the water supply in 2021. To add, Well 24 is a blending well, which mixes native ground water pumped to the distribution system with purchased surface water at a ratio of roughly 1:4 or less. Customers using the potable water supply always receive water from this well in diluted amounts.

The Best Available Technologies to reduce hexavalent chromium to below the MCL are:

- Coagulation and Filtration—hexavalent chromium must be reduced to trivalent chromium prior to using this technique
- Ion Exchange
- Reverse osmosis

(U.S. EPA, 2023)

While there is currently no enforceable MCL (removed in September, 2017), the City of Woodland anticipates a new regulation for hexavalent chromium to be implemented in the coming months. The previous MCL of 10 ppb set a guide for reference. City of Woodland continues to proactively monitor for this analyte in preparation of an MCL reinstatement. The City's transition to WDCWA-supplied treated surface water in 2016 was planned to reduce hexavalent chromium concentrations delivered to customers, amongst other reasons including general water quality improvements, reliability, and sustainability.

Copper:

Copper is found in proteins and is needed for "hemoglobin synthesis, carbohydrate metabolism, catecholamine biosynthesis and cross-linking of collagen, elastin, and hair keratin" (ATSDR, 2004). Copper is a necessary nutrient in humans and not known to have carcinogenic effects in either humans or animals. However, various studies of copper have concluded that excess amounts of copper have been linked to effects in small children, especially infants. Copper poisoning is fairly uncommon, but has been reported to cause "Indian Childhood Cirrhosis" (Sethi *et al*., 1993). In these cases, it is believed that increased dietary exposure occurred from water or milk stored in copper containers and given to children 5 years old and younger.

Copper can be found in home plumbing, fixtures, and potable water lines connecting city water mains to homes. Excess copper can lead to nausea, vomiting, abdominal pain, diarrhea, and weight loss. The Public Health Goal for copper takes into account infants are a sensitive group and was created with consideration of exposure via breastmilk and formula in addition to drinking water (Fan, 2008).

The State PHG for copper is set at 300 ppb and the federal MCLG is set at 1300 ppb. Copper is currently regulated under the federal MCL of 1300 ppb. The MCL is based on the Action Level at the 90th percentile of samples.

The City of Woodland's 90th percentile value measured below the Action Level. Copper was sampled throughout homes within the City of Woodland in 2022 and the 90th percentile of samples measured was 320 ppm. It is important to note that 320 ppm is not a typical value. The vast majority of homes sampled resulted in levels that were "non-detect." Homes selected for sample testing are prioritized with respect to the time period they were built, which make them more likely to have copper service lines. Since these samples were collected from within the homes, the water quality measured could be reflective of the home's internal network of pipes and plumbing structures, copper piping in city water service lines (the pipes connecting water mains to homes) or a combination of both. Standard regulatory copper sampling occurs once every three years.

Bromodichloromethane (THM):

Bromodichloromethane is a Trihalomethane (THM) and a byproduct of drinking water disinfection. Drinking water disinfection is necessary to prevent infectious diseases in the potable water supply. Disinfection reactions can create byproduct formation; THMs are the most common substance found due to chlorination or chloramination. The City of Woodland uses a 12.5% sodium hypochlorite solution for disinfection, also known as chlorination.

Bromodichloromethane is a colorless liquid which can be created by algae. The formations can dissolve in water, but also readily evaporate into air. Small amounts can be found naturally. In drinking water, it becomes a contaminant and is regulated under the MCL for "Total Trihalomethanes" as 0.080 ppm (mg/L) or 80 ppb (µg/L). The state PHG is set at 0.06 parts per billion and the federal MCLG is set at zero because it is considered to be a carcinogen. According to OEHHA, the risks to health of these by products in comparison are below the risks to health with inadequate disinfection. Microorganisms which are mitigated by disinfection, i.e., chlorination, can be pathogenic and are known to cause a myriad of illnesses and diseases (NCBI, 2023).

Bromodichloromethane was detected in 2020 in surface water from the Regional Water Treatment Facility (WDCWA) at a range of 1-5 ppb and in sites throughout the distribution system with an average of 3.5 ppb. In 2022, it was detected with an average of 4.3 ppb in WDCWA water and 5.13 ppb average in ASR wells. Since ASR wells are used to store treated surface water and recover when needed, the data from ASR wells is often reflective of the surface water injected into the wells. The range of detection for bromodichloromethane falls far below the regulatory MCL of 80 ppb for all Trihalomethanes; it is not regulated as an individual contaminant.

Bromoform (THM):

Bromoform is also a Trihalomethane (THM) and a byproduct of drinking water disinfection. It is nearly colorless and the pale-yellow liquid has a semi-sweet odor. It can be found in swimming pools where bromine compounds have been used for disinfection. It has been used for various industrial purposes such as solvents for waxes and oils, fire-resistant chemicals, and as a fluid for mineral ore separation to name a few. The most common form of exposure to bromoform is through drinking water, but evaporated liquid can also be inhaled. (U.S. EPA, 2000)

Studies on humans conclude exposure to large amounts of bromoform can cause acute effects on the central nervous system, liver injury, kidney damage, a reduced speed of brain activities, sedation, narcosis, and even unconsciousness. Chronic effects observed in long-term studies of animals have indicated bromoform exposure can cause liver, kidney and central nervous system effects. The U.S. EPA considers bromoform to be a probably carcinogen due to the correlation of bromoform in drinking water and several cancer types, however, the studies were found to be incomplete and did not account for personal habits or other exposures (U.S. EPA, 2000) (Brown, 2020). Nonetheless, as a 'probable carcinogen,' the U.S. EPA set the maximum contaminant level goal at zero.

The PHG for Bromoform is 0.5 ppb or 0.5 µg/L and the MCLG is set at zero. In drinking water, it becomes a contaminant and is regulated under the MCL for "Total Trihalomethanes" as 0.080 mg/L or 80 parts per billion, but not regulated as an individual chemical. It was detected in 2022 in ASR Wells at a level of 0.3 ppb or µg/L. To summarize, bromoform was detected above the federal MCLG of zero, below the PHG and far below the regulatory limit of 80 ppb for Total Trihalomethanes.

Chloroform (THM):

Chloroform is also a Trihalomethane (THM) and a byproduct of drinking water disinfection. Studies in rodents have linked chloroform to increases in tumors in the kidneys or liver. Studies have concluded this substance can create reproductive toxicity, developmental toxicity and adverse non-cancerous effects (Brown, 2020).

The PHG for Chloroform is 0.4 ppb or 0.4 µg/L and the MCLG is set at 70 ppb. In drinking water, it becomes a contaminant and is regulated under the MCL for "Total Trihalomethanes" as 0.080 mg/L or 80 parts per billion. It is not regulated as an individual contaminant.

In the City of Woodland water system, chloroform was found in the range of 5.27-13.43 ppb in 2020 and 2022. In 2020 it was found in surface water from WCDWA and in sample stations throughout the City of Woodland's distribution system. In 2022, it was detected again in surface water from WDCWA and in ASR wells, which share characteristics of surface water. This is not uncommon as surface water is treated via chlorination to prevent microbial contamination and pathogens from spreading in the water system. The levels detected were far below the regulatory federal MCL.

Dibromochloromethane (THM):

The PHG for Dibromochloromethane is 0.1 ppb or 0.1 µg/L and the MCLG is set at 60 ppb. In drinking water, it becomes a contaminant and is regulated under the MCL for "Total Trihalomethanes" as 0.08 mg/L or 80 parts per billion.

Dibromochloromethane is a byproduct of drinking water disinfection with limited data on adverse effects. It is classified as a carcinogen based on animal studies. Studies in mice demonstrated increased risk of cancer directed at the kidneys and liver. It is considered mutagenic and has a similar structure to other THMs.

While this substance is considered carcinogenic, the risk assessed over the lifetime of exposure is minimal compared to the potential risk of inadequate drinking water disinfection. It is evident that OEHHA and the SWRCB considers drinking water disinfection to be a priority in managing potable water supplies (Brown, 2020).

Regarding all Haloacetic acids (HAAs): The following three chemicals underlined below are part of the group of regulated Haloacetic acids. California has found up to 13 types of Haloacetic acids in drinking water of which 5 types are regulated. According to OEHHA, the range of concentrations for HAAs in drinking water in California is approximately 0.6-4.2 ppb. Both the SWRCB, the federal EPA and the World Health Organization consider microbial disinfection of drinking water to be of "unquestionable importance." It is imperative that adequate disinfection not be compromised in trying to control for disinfection byproducts (Soshilov, 2022).

Dichloroacetic Acid (HAA5):

Dichloroacetic acid (DCA) is associated with liver cancer, reproductive toxicity and hepatic (liver) toxicity. It was first listed as a carcinogen under Proposition 65, California's safe Drinking Water and Toxic

Enforcement Act of 1986. It was classified as a carcinogen based on assays on mice, but not based on significant evidence from human exposure. (Soshilov, 2022)

Dichloroacetic acid recently received a PHG issuance of 0.2 ppb in December, 2022. The federal MCLG is set at zero and DCA is regulated with the MCL of 60 ppb as part of 5 Total Haloacetic acids (HAA5). It is not regulated as an individual analyte.

In the City of Woodland's water system, DCA was identified in surface water from WCDWA in 2020-2022 in the range of 3.12-5.46 ppb. Testing of the distribution sites within the city detected DCA at an average of 1.88 ppb in 2020. In ASR wells, which are injected with treated surface water, the level of detection was 0.51 ppb. Overall, DCA detection was above the PHG of 0.1, but far below the MCLG of 60 ppb.

Trichloroacetic Acid (HAA5):

Trichloroacetic acid is also associated with liver cancer and classified as a carcinogen based on increased liver tumors in studies of mice. In 2013, it was added to the list of chemicals listed in Proposition 65. Similar to DCA, studies of TCA were not performed on humans. (Soshilov, 2022)

Trichloroacetic acid received a PHG of 0.1 ppb in December, 2022. It is regulated at the federal level with the MCL of 60 ppb as part of 5 Total Trihaloacetic acids (HAA5). It is not regulated individually (Soshilov, 2022). TCA was detected in sites throughout the city's distribution system in 2020 with an average of 1.16 ppb. In 2022, it was detected in treated water from WDCWA and in ASR wells, which are injected with treated water from WDCWA, with a range of 1-3.15 ppb. The ranges detected were above the PHG, but far below the MCLG of 20 ppb.

Dibromoacetic Acid (HAA5):

Dibromoacetic acid (DBA) is a byproduct of drinking water disinfection, commonly formed when chloramines or chlorines are added to the drinking water supply. Dibromoacetic acid is associated with lung and liver cancer and alveolar and bronchial tumors. The noncancerous effects of exposure include changes in male reproductive toxicity and changes in organ weights (Soshilov, 2022). Dibromoacetic acid received a PHG of 0.03 ppb in December, 2022. It is regulated by the U.S. EPA with the MCL of 60 ppb as part of 5 Total Trihaloacetic acids (HAA5). It is not regulated individually.

In the City of Woodland, DBA was detected in treated surface water from WDCWA in both years 2020 and 2022. The level of detected averaged 0.74 ppb and 1 ppb in those years respectively. The level detected was slightly above the public health goal of just above zero. There is no current MCLG for DBA and the amount detected was far below the MCL for Haloacetic acids as a group.

Bromate:

Bromate is a negatively charged ion with the chemical formula BrO_3^-. It can react with hydrogen to form bromic acid, which is only stable in water. Bromate can react with other substances to form salts, such as potassium bromate and sodium bromate. Bromate salts are often used in food products including cheese and beer and also used as food additives in products such as bread dough. Bromate salts can also be found in permanent hair waving styling products where it is used to neutralize the wave. Studies of long-term exposure to bromate indicated increased risk to kidney and thyroid health. Exposure in rodents led to diminished body weight gain. It is considered to be a probable carcinogen based on studies on animals. (Fan, 2009)

Bromate can get into drinking water as a byproduct of disinfection. It can form when water is treated with ozonation, which is a highly effective tool to control for Cryptosporidium parvum—a zoonotic parasitic protozoan (OEHHA, 2009). The Regional Water Treatment Facility (WDCWA) utilizes ozonation as part of the regular treatment process for disinfection. Although uncommon, bromate can form as a byproduct of chlorination when chlorinated water containing bromide sits under sunlight (Fan, 2009).

The state PHG for Bromate is 0.1 ppb with a federal MCLG of zero µg/L (ppb). The current regulatory MCL is 10 µg/L. Within the last three calendar years, bromate was detected with an average of 0.4 ppb (µg/L) in 2021 and an average of 1.15 ppb (µg/L) in 2022. In both years, the values detected were in treated surface water from WDCWA. The PHG for bromate is 0.1 ppb and the MCLG is zero since it is classified as a carcinogen. The detected levels were far below the regulatory MCL of 10 ppb. The sources where detection occurred included WDCWA in 2021 and 2022, and groundwater wells in 2020. Groundwater well detection occurred in the ASR wells—wells injected with treated surface water from WDCWA.

RECOMMENDATIONS FOR FUTHER ACTIONS

The drinking water quality of the City of Woodland meets or exceeds all state and federal drinking water MCL standards set to protect public health. The City of Woodland utilizes surface water from the Sacramento River as a primary source for drinking water, which provides better water quality than native groundwater wells. When supplemental water is needed to meet demand, such as for peak hourly usage or during surface water right curtailments during periods of drought, the City of Woodland first utilizes Aquifer Storage and Recovery Wells (ASR wells), which can provide surface water quality for months at a time. ASR wells are injected with treated water from the Sacramento River and the water is recovered as needed.

The next source of water includes three 'blending' groundwater wells. These provide native groundwater, but mix them at approximately a 1:4 ratio or less of native groundwater to surface water; this can dilute any naturally occurring minerals or analytes existing underground. Finally, the City of Woodland maintains one other groundwater well and two emergency standby wells (also groundwater), which are available as a last resort. All wells are functional and maintained to provide water which meets all federal MCL standards.

The regulatory standard for hexavalent chromium was established and removed from regulation in September, 2017. The City of Woodland is following current discussions which will reestablish a new regulatory MCL. Water quality concerns associated with hexavalent chromium are largely mitigated by the 2016 construction of a surface water treatment plant which provides water quality with near-zero concentrations of hexavalent chromium. The City of Woodland staff is vigilant and proactive in following current trends in groundwater monitoring and will consider treatment technologies as may fit the current water system. The City of Woodland recommends continuing to follow discussions which may lead to further regulation, however, there is no recommendation for treatment techniques at this time.

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APPENDIX 1

Excerpt from California Health & Safety Code: Section 116470

(a) As a condition of its operating permit, every public water system shall annually prepare a consumer confidence report and mail or deliver a copy of that report to each customer, other than an occupant, as defined in Section 799.28 of the Civil Code, of a recreational vehicle park. A public water system in a recreational vehicle park with occupants as defined in Section 799.28 of the Civil Code shall prominently display on a bulletin board at the entrance to or in the office of the park, and make available upon request, a copy of the report. The report shall include all of the following information:

(1) The source of the water purveyed by the public water system.

(2) A brief and plainly worded definition of the terms "maximum contaminant level," "primary drinking water standard," and "public health goal."

(3) If any regulated contaminant is detected in public drinking water supplied by the system during the past year, the report shall include all of the following information:

(A) The level of the contaminant found in the drinking water, and the corresponding public health goal and primary drinking water standard for that contaminant.

(B) Any violations of the primary drinking water standard that have occurred as a result of the presence of the contaminant in the drinking water and a brief and plainly worded statement of health concerns that resulted in the regulation of that contaminant.

(C) The public water system's address and phone number to enable customers to obtain further information concerning contaminants and potential health effects.

(4) Information on the levels of unregulated contaminants, if any, for which monitoring is required pursuant to state or federal law or regulation.

(5) Disclosure of any variances or exemptions from primary drinking water standards granted to the system and the basis therefor.

(b) On or before July 1, 1998, and every three years thereafter, public water systems serving more than 10,000 service connections that detect one or more contaminants in drinking water that exceed the applicable public health goal, shall prepare a brief written report in plain language that does all of the following:

(1) Identifies each contaminant detected in drinking water that exceeds the applicable public health goal.

(2) Discloses the numerical public health risk, determined by the office, associated with the maximum contaminant level for each contaminant identified in paragraph (1) and the numerical public health risk determined by the office associated with the public health goal for that contaminant.

(3) Identifies the category of risk to public health, including, but not limited to, carcinogenic, mutagenic, teratogenic, and acute toxicity, associated with exposure to the contaminant in drinking water, and includes a brief plainly worded description of these terms.

(4) Describes the best available technology, if any is then available on a commercial basis, to remove the contaminant or reduce the concentration of the contaminant. The public water system may, solely at its own discretion, briefly describe actions that have been taken on its own, or by other entities, to prevent the introduction of the contaminant into drinking water supplies.

(5) Estimates the aggregate cost and the cost per customer of utilizing the technology described in paragraph (4), if any, to reduce the concentration of that contaminant in drinking water to a level at or below the public health goal.

(6) Briefly describes what action, if any, the local water purveyor intends to take to reduce the concentration of the contaminant in public drinking water supplies and the basis for that decision.

(c) Public water systems required to prepare a report pursuant to subdivision (b) shall hold a public hearing for the purpose of accepting and responding to public comment on the report. Public water systems may hold the public hearing as part of any regularly scheduled meeting.

(d) The department shall not require a public water system to take any action to reduce or eliminate any exceedance of a public health goal.

(e) Enforcement of this section does not require the department to amend a public water system's operating permit.

(f) Pending adoption of a public health goal by the Office of Environmental Health Hazard Assessment pursuant to subdivision (c) of Section 116365, and in lieu thereof, public water systems shall use the national maximum contaminant level goal adopted by the United States Environmental Protection Agency for the corresponding contaminant for purposes of complying with the notice and hearing requirements of this section.

(g) This section is intended to provide an alternative form for the federally required consumer confidence report as authorized by 42 U.S.C. Section 300g-3(c).

(Repealed and added by Stats. 1996, Ch. 755, Sec. 12. Effective January 1, 1997.)

APPENDIX 2

Excerpt from California Health & Safety Code: Section §116365

(a)The state board shall adopt primary drinking water standards for contaminants in drinking water that are based upon the criteria set forth in subdivision (b) and shall not be less stringent than the national primary drinking water standards adopted by the United States Environmental Protection Agency. A primary drinking water standard adopted by the state board shall be set at a level that is as close as feasible to the corresponding public health goal placing primary emphasis on the protection of public health, and that, to the extent technologically and economically feasible, meets all of the following:

(1) With respect to acutely toxic substances, avoids any known or anticipated adverse effects on public health with an adequate margin of safety.

(2) With respect to carcinogens, or any substances that may cause chronic disease, avoids any significant risk to public health.

(b) The state board shall consider all of the following criteria when it adopts a primary drinking water standard:

(1) The public health goal for the contaminant published by the Office of Environmental Health Hazard Assessment pursuant to subdivision (c).

(2) The national primary drinking water standard for the contaminant, if any, adopted by the United States Environmental Protection Agency.

(3) The technological and economic feasibility of compliance with the proposed primary drinking water standard. For the purposes of determining economic feasibility pursuant to this paragraph, the state board shall consider the costs of compliance to public water systems, customers, and other affected parties with the proposed primary drinking water standard, including the cost per customer and aggregate cost of compliance, using best available technology.

(c)(1) The Office of Environmental Health Hazard Assessment shall prepare and publish an assessment of the risks to public health posed by each contaminant for which the state board proposes a primary drinking water standard. The risk assessment shall be prepared using the most current principles, practices, and methods used by public health professionals who are experienced practitioners in the fields of epidemiology, risk assessment, and toxicology. The risk assessment shall contain an estimate of the level of the contaminant in drinking water that is not anticipated to cause or contribute to adverse health effects, or that does not pose any significant risk to health. This level shall be known as the public health goal for the contaminant. The public health goal shall be based exclusively on public health considerations and shall be set in accordance with all of the following:

(A) If the contaminant is an acutely toxic substance, the public health goal shall be set at the level at which no known or anticipated adverse effects on health occur, with an adequate margin of safety.

(B) If the contaminant is a carcinogen or other substance that may cause chronic disease, the public health goal shall be set at the level that, based upon currently available data, does not pose any significant risk to health.

(C) To the extent information is available, the public health goal shall take into account each of the following factors:

(i) Synergistic effects resulting from exposure to, or interaction between, the contaminant and one or more other substances or contaminants.
(ii) Adverse health effects the contaminant has on members of subgroups that comprise a meaningful portion of the general population, including, but not limited to, infants, children, pregnant women, the elderly, individuals with a history of serious illness, or other subgroups that are identifiable as being at greater risk of adverse health effects than the general population when exposed to the contaminant in drinking water.
(iii) The relationship between exposure to the contaminant and increased body burden and the degree to which increased body burden levels alter physiological function or structure in a manner that may significantly increase the risk of illness.
(iv) The additive effect of exposure to the contaminant in media other than drinking water, including, but not limited to, exposures to the contaminant in food, and in ambient and indoor air, and the degree to which these exposures may contribute to the overall body burden of the contaminant.

(D) If the Office of Environmental Health Hazard Assessment finds that currently available scientific data are insufficient to determine the level of a contaminant at which no known or anticipated adverse effects on health will occur, with an adequate margin of safety, or the level that poses no significant risk to public health, the public health goal shall be set at a level that is protective of public health, with an adequate margin of safety. This level shall be based exclusively on health considerations and shall, to the extent scientific data is available, take into account the factors set forth in clauses (i) to (iv), inclusive, of subparagraph (C), and shall be based on the most current principles, practices, and methods used by public health professionals who are experienced practitioners in the fields of epidemiology, risk assessment, and toxicology. However, if adequate scientific evidence demonstrates that a safe dose response threshold for a contaminant exists, then the public health goal should be set at that threshold. The state board may set the public health goal at zero if necessary to satisfy the requirements of this subparagraph.

(2) The determination of the toxicological endpoints of a contaminant and the publication of its public health goal in a risk assessment prepared by the Office of Environmental Health Hazard Assessment are not subject to the requirements of Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code. The Office of Environmental Health Hazard Assessment and the state board shall not impose any mandate on a public water system that requires the public water system to comply with a public health goal. The Legislature finds and declares that the addition of this paragraph by Chapter 777 of the Statutes of 1999 is declaratory of existing law.

(3)(A) The Office of Environmental Health Hazard Assessment shall, at the time it commences preparation of a risk assessment for a contaminant as required by this subdivision, electronically post on its Internet Web site a notice that informs interested persons that it has initiated work on the risk assessment. The notice shall also include a brief description, or a bibliography, of the technical documents or other information the office has identified to date as relevant to the preparation of the risk assessment and inform persons who wish to submit information concerning the contaminant that is the subject of the risk assessment of the name and address of the person in the office to whom the

information may be sent, the date by which the information shall be received in order for the office to consider it in the preparation of the risk assessment, and that all information submitted will be made available to any member of the public who requests it.
(B) A draft risk assessment prepared by the Office of Environmental Health Hazard Assessment pursuant to this subdivision shall be made available to the public at least 45 calendar days before the date that public comment and discussion on the risk assessment are solicited at the public workshop required by Section 57003.

(C) At the time the Office of Environmental Health Hazard Assessment publishes the final risk assessment for a contaminant, the office shall respond in writing to significant comments, data, studies, or other written information submitted by interested persons to the office in connection with the preparation of the risk assessment. These comments, data, studies, or other written information submitted to the office shall be made available to any member of the public who requests it.

(D) After the public workshop on the draft risk assessment, as required by Section 57003, is completed, the Office of Environmental Health Hazard Assessment shall submit the draft risk assessment for external scientific peer review using the process set forth in Section 57004 and shall comply with paragraph (2) of subdivision (d) of Section 57004 before publication of the final public health goal.

(d) Notwithstanding any other provision of this section, any maximum contaminant level in effect on August 22, 1995, may be amended by the state board to make the level more stringent pursuant to this section. However, the state board may only amend a maximum contaminant level to make it less stringent if the state board shows clear and convincing evidence that the maximum contaminant level should be made less stringent and the amendment is made consistent with this section.

(e) (1) All public health goals published by the Office of Environmental Health Hazard Assessment shall be established in accordance with the requirements of subdivision (c) and shall be reviewed at least once every five years and revised, pursuant to subdivision (c), as necessary based upon the availability of new scientific data.
(2) On or before January 1, 1998, the Office of Environmental Health Hazard Assessment shall publish a public health goal for at least 25 drinking water contaminants for which a primary drinking water standard has been adopted by the state board. The office shall publish a public health goal for 25 additional drinking water contaminants by January 1, 1999, and for all remaining drinking water contaminants for which a primary drinking water standard has been adopted by the state board by no later than December 31, 2001. A public health goal shall be published by the Office of Environmental Health Hazard Assessment at the same time the state board proposes the adoption of a primary drinking water standard for any newly regulated contaminant.

(f) The state board or Office of Environmental Health Hazard Assessment may review, and adopt by reference, any information prepared by, or on behalf of, the United States Environmental Protection Agency for the purpose of adopting a national primary drinking water standard or maximum contaminant level goal when it establishes a California maximum contaminant level or publishes a public health goal.

(g) At least once every five years after adoption of a primary drinking water standard, the state board shall review the primary drinking water standard and shall, consistent with the criteria set forth in subdivisions (a) and (b), amend any standard if any of the following occur:

(1) Changes in technology or treatment techniques that permit a materially greater protection of public health or attainment of the public health goal.

(2) New scientific evidence that indicates that the substance may present a materially different risk to public health than was previously determined.

(h) No later than March 1 of every year, the state board shall provide public notice of each primary drinking water standard it proposes to review in that year pursuant to this section. Thereafter, the state board shall solicit and consider public comment and hold one or more public hearings regarding its proposal to either amend or maintain an existing standard. With adequate public notice, the state board may review additional contaminants not covered by the March 1 notice.

(i) This section shall operate prospectively to govern the adoption of new or revised primary drinking water standards and does not require the repeal or readoption of primary drinking water standards in effect immediately preceding January 1, 1997.

(j) The state board may, by regulation, require the use of a specified treatment technique in lieu of establishing a maximum contaminant level for a contaminant if the state board determines that it is not economically or technologically feasible to ascertain the level of the contaminant.

(Added by Stats.1996, c. 755 (S.B.1307), § 9. Amended by Stats.1999, c. 777 (S.B.635), § 1; Stats.2015, c. 24 (S.B.83), § 18, eff. June 24, 2015.) Current as of January 18, 2019

APPENDIX 3

ANNUAL WATER QUALITY REPORT

Reporting Year 2022

Presented By

CITY OF WOODLAND CALIFORNIA

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo o hable con alguien que lo entienda bien.

PWS ID#: 5710006

Dear Woodland Neighbor,

We are pleased to present the annual water quality report covering all water quality testing performed from January 1 through December 31, 2022. Our city tested over 1000 samples for regulated contaminants plus over one hundred samples for general quality and aesthetics.

We are proud of the water supply portfolio we have built. Within the last decade, the City of Woodland has invested in Aquifer Storage and Recovery (ASR) technology to capture surface water and store it underground where it is less susceptible to evaporation compared to above ground storage. Both stored water and surface water tested met all Federal and State regulations in 2022. During the severe drought last year, the city managed to provide an ample quantity of water while maintaining high quality for all customers. Although 2022 ended with heavy rainfall, we anticipate cyclical wet and dry years. Ongoing investments in expanding ASR operations will increase the sustainability of our underground aquifers and, additionally, mitigate the environmental impacts of groundwater extraction.

Moving forward, we continue to focus on quality, scope, and scale of this precious commodity. In 2022, we served roughly 61,000 residents and supplied an average of over 7 million gallons per day. As stewards of water management, we strive to combine quality control with utmost consideration of health effects, environmental impacts and production for a sustainable future. This report demonstrates Woodland's continued commitment to excellence through 2022 and beyond.

Sincerely,

Tim Busch
Principal Utilities Engineer

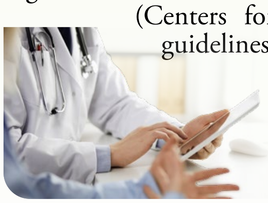
Where Does Your Water Come From?

The City of Woodland has two sources of drinking water—surface water and groundwater. Our surface water comes from the Sacramento River. The Woodland-Davis Clean Water Agency (WDCWA) Regional Water Treatment Facility (RWTF) collects water from the Sacramento River east of Woodland and treats it by clarification, ozonation, and filtration. It is then chlorinated to maintain disinfection during distribution.

Roughly 99 percent of Woodland's potable water came from WDCWA in 2022. The city also maintains nine groundwater wells, three of which can store water (ASR) for peak demand or drought. Groundwater wells serve as backup supply, and water is chlorinated for disinfection prior to distribution. Approximately 10 percent of the water used last year came from the ASR wells, which provide surface-water quality. Traditional groundwater wells produced less than 1 percent of Woodland's water supply.

Important Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at (800) 426-4791 or http://water.epa.gov/drink/hotline.



Lead in Home Plumbing

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. We are responsible for providing high-quality drinking water, but we cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. (If you do so, you may wish to collect the flushed water and reuse it for another beneficial purpose, such as watering plants.) If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at (800) 426-4791 or www.epa.gov/safewater/lead.

Questions?

For more information about this report, or for any questions relating to your drinking water, please phone Celia Taylor at (530) 661-5915 or email celia.taylor@cityofwoodland.org.

Property owners, please share this information with your tenants!

Para más información acerca del reporte o si tiene preguntas acerca del agua potable por favor llame a Celia Taylor al (530) 661-5915 o envíe un correo electrónico a celia.taylor@cityofwoodland.org.

¡Propietarios, compartan esta información con sus ocupantes!

Substances That Could Be in Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material and can pick up substances resulting from the presence of animals or from human activity.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (U.S. EPA) and the State Water Resources Control Board (State Board) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulations and California law also establish limits for contaminants in bottled water that provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife;

Inorganic Contaminants, such as salts and metals, that can be naturally occurring or can result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming;

Pesticides and Herbicides, that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses;

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production and which can also come from gas stations, urban stormwater runoff, agricultural applications, and septic systems;

Radioactive Contaminants, that can be naturally occurring or can be the result of oil and gas production and mining activities.

More information about contaminants and potential health effects can be obtained by calling the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

Source Water Assessment

The State Board, Division of Drinking Water, requires water providers to conduct a source water assessment (SWA) to help protect the quality of future water supplies. The SWA describes where a water system's drinking water comes from, the type of polluting activities that may threaten source water quality, and an evaluation of the water's vulnerability to those threats.

The SWA for the Sacramento River was conducted by several agencies and identified eight potential watershed contaminant sources: agricultural drainage, livestock, forest activities, river corridor and river recreation, stormwater and urban runoff, industrial NPDES dischargers, wastewater facilities, and watershed spills. The report states that "Overall, the Sacramento River continued to provide good quality raw water. The raw water can currently be treated to meet all drinking water standards using conventional water treatment processes." The Sacramento River Watershed Sanitary Survey 2020 Update Report can be found at https://cityofwoodland.org/SacramentoRiverSanitarySurvey.

Get Involved

The City of Woodland periodically conducts public meetings and workshops concerning water issues. Regular City Council meetings are held on the first and third Tuesday of each month. For more information, please call (530) 661-5800 or visit www.cityofwoodland.org/608/City-Council.

Test Results

Our water is monitored for many different kinds of substances on a very strict sampling schedule, and the water we deliver must meet specific health standards. Here, we only show those substances that were detected in our water (a complete list of all our analytical results is available upon request). Remember that detecting a substance does not mean the water is unsafe to drink; our goal is to keep all detects below their respective maximum allowed levels.

The state recommends monitoring for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

REGULATED SUBSTANCES

				WDCWA RWTF		Aquifer Storage and Recovery Wells			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
1,2-Dichlorobenzene (ppb)	2022	600	600	52.5	45–61	56.6	49–71	No	Discharge from industrial chemical factories
Aluminum (ppm)	2022	1	0.6	0.08	ND–0.11	0.04	ND–0.12	No	Erosion of natural deposits; residue from some surface water treatment processes
Arsenic (ppb)	2022	10	0.004	ND	NA	1.19	ND–2.5	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Bromate (ppb)	2022	10	0.1	1.15	ND–2.5	NA	NA	No	By-product of drinking water disinfection
Chlorine (ppm)	2022	[4.0 (as Cl2)]	[4 (as Cl2)]	0.9	0.8–0.9	0.7[1]	0.1–1.4[1]	No	Drinking water disinfectant added for treatment
Control of DBP Precursors [TOC] (ppm)	2022	TT	NA	0.73	0.44–1.20	0.37	ND–0.79	No	Various natural and human-made sources
HAA5 [sum of 5 haloacetic acids]–Stage 2 (ppb)	2022	60	NA	19.8	11–24	6.7	ND–15	No	By-product of drinking water disinfection
Hexavalent Chromium (ppb)	2022	NS[2]	0.02	0.16	NA	1.56	0.22–4.70	No	Discharge from electroplating factories, leather tanneries, wood preservation, chemical synthesis, refractory production, and textile manufacturing facilities; erosion of natural deposits
Nitrate [as nitrogen] (ppm)	2022	10	10	ND	NA	0.45	ND–1.9	No	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
TTHMs [total trihalomethanes]–Stage 2 (ppb)	2022	80	NA	9.3	4.3–15	21.3	7.3–27	No	By-product of drinking water disinfection

Tap water samples were collected for lead and copper analyses from sample sites throughout the community

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AL	PHG (MCLG)	AMOUNT DETECTED (90TH %ILE)	SITES ABOVE AL/TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2022	1.3	0.3	0.32	1/35	No	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead (ppb)	2022	15	0.2	ND	1/35	No	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits

SECONDARY SUBSTANCES

				WDCWA RWTF		Aquifer Storage and Recovery Wells			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	SMCL	PHG (MCLG)	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2022	500	NS	7.9	NA	11.6	5–31	No	Runoff/leaching from natural deposits; seawater influence
Color (units)	2022	15	NS	5	NA	NA	NA	No	Naturally occurring organic materials
Iron (ppb)	2022	300	NS	ND	NA	20.5	ND–76	No	Leaching from natural deposits; industrial wastes

SECONDARY SUBSTANCES

				WDCWA RWTF		Aquifer Storage and Recovery Wells			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	SMCL	PHG (MCLG)	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Specific Conductance (µmho/cm)	2022	1,600	NS	190	NA	272	189–431	No	Substances that form ions when in water; seawater influence
Sulfate (ppm)	2022	500	NS	15	NA	17	12–25	No	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (ppm)	2022	1,000	NS	126	100–180	158	110–280	No	Runoff/leaching from natural deposits
Turbidity (NTU)	2022	5	NS	0.21	NA	0.27	ND–0.88	No	Soil runoff

UNREGULATED SUBSTANCES [3]

		WDCWA RWTF		Aquifer Storage and Recovery Wells		
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	TYPICAL SOURCE
Boron (ppb)	2022	290	220–360	134	ND–440	NA
Bromodichloromethane (ppb)	2022	4.3	3.0–5.0	5.1	3.8–7.5	By-product of drinking water disinfection
Bromoform (ppb)	2022	ND	NA	0.3	ND–2.5	By-product of drinking water disinfection
Chloroform (ppb)	2022	12.1	5.3–19.0	13.4	7.8–34.0	By-product of drinking water disinfection
Dibromochloromethane (ppb)	2022	2.1	1.3–3.1	2.0	1.2–4.3	By-product of drinking water disinfection
Hardness, Total [as CaCO3] (ppm)	2022	63	NA	84	57–160	Erosion of natural deposits
Hardness [as CaCO3] (grains per gallon),	2022	3.7	NA	4.9	3.3–9.4	Erosion of natural deposits
Sodium (ppm)	2022	16	NA	19	14–30	Naturally occurring; road salt; water softeners; animal waste

OTHER UNREGULATED SUBSTANCES [3]

		WDCWA RWTF		Aquifer Storage and Recovery Wells		
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	TYPICAL SOURCE
1,3-Dimethyl-2-nitrobenzene (ppb)	2022	0.88	0.81–0.94	NA	NA	NA
1-Br-2-Nitrobenzene (ppb)	2022	0.45	0.43–0.46	NA	NA	NA
2-Bromobutanoic Acid (ppb)	2022	9.8	9.3–10.0	9.8	8.5–11.0	NA
2-Fluorobiphenyl (ppb)	2022	2.8	1.8–4.7	NA	NA	NA
Alkalinity [as CaCO3] (ppm)	2022	71	NA	92	40–170	NA
Aminomethylphosphonic Acid [AMPA] (ppb)	2022	200	200–200	NA	NA	NA
Bromofluorobenzene (ppb)	2022	51.2	45–59	50.5	43–60	NA
Calcium (ppm)	2022	13.2	11–16	17.9	13–32	NA
Chlorate (ppb)	2022	153	42–630	NA	NA	NA
Dibromoacetic Acid (ppb)	2022	1	0.99–1.1	ND	NA	By-product of drinking water disinfection
Dichloroacetic Acid (ppb)	2022	5.5	2.6–7.5	0.5	ND–2.2	By-product of drinking water disinfection
Dimethyl Tetrachloroterephthalate [DCPAA] (ppb)	2022	37	NA	NA	NA	NA
Magnesium (ppm)	2022	7.1	NA	9.4	6.2–19.0	Erosion of natural deposits
Nitrobenzene-d5 (ppb)	2022	3.0	1.9–5.1	NA	NA	NA
p-Terphenyl-d14 (ppb)	2022	3.1	1.9–5.1	NA	NA	NA

OTHER UNREGULATED SUBSTANCES[3]						
		WDCWA RWTF		Aquifer Storage and Recovery Wells		
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	TYPICAL SOURCE
pH (units)	2022	7.9	7.9–7.9	8.0	7.6–8.2	NA
Phosphate (ppm)	2022	1.7	1.5–2.0	1.4	0.9–1.7	Water additive for corrosion control
Potassium (ppb)	2022	ND	NA	1.0	ND–2.2	Erosion of natural deposits
Triphenyl Phosphate (ppb)	2022	1.2	1.0–1.3	NA	NA	NA

[1] Sampled from distribution system sites across the city.
[2] There is currently no MCL for hexavalent chromium. The previous MCL of 10 ppb was withdrawn on September 11, 2017.
[3] Unregulated contaminant monitoring helps U.S. EPA and the State Board determine where certain contaminants occur and whether the contaminants need to be regulated.

Definitions

90th %ile: The levels reported for lead and copper represent the 90th percentile of the total number of sites tested. The 90th percentile is equal to or greater than 90% of our lead and copper detections.

AL (Regulatory Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs (SMCLs) are set to protect the odor, taste, and appearance of drinking water.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

MRDL (Maximum Residual Disinfectant Level): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA: Not applicable.

ND (Not detected): Indicates that the substance was not found by laboratory analysis.

NS: No standard.

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

PDWS (Primary Drinking Water Standard): MCLs and MRDLs for contaminants that affect health, along with their monitoring and reporting requirements and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

µmho/cm (micromhos per centimeter): A unit expressing the amount of electrical conductivity of a solution.

APPENDIX 4

ANNUAL WATER QUALITY REPORT

Reporting Year 2021

Presented By

City of Woodland

For more information about this report, or for any questions relating to your drinking water, please call the Woodland Public Works Department at (530) 661-5962 or email pubworks@cityofwoodland.org.

Para más información acerca del reporte o si tiene preguntas acerca del agua potable por favor llame al Departamento de Obras Públicas de la Ciudad de Woodland al (530) 661-5962 o envió un correo electrónico a pubworks@cityofwoodland.org.

Property owners, please share this information with your tenants!

PWS ID#: 5710006

Dear Woodland Water Customer,

The City of Woodland is proud to provide this 2021 water quality report and inform you that your tap water met all state and federal drinking water standards. Over 1,000 water quality samples were taken in 2021 to ensure you're receiving the highest-quality drinking water.

2021 was one of the driest years ever recorded in California. The American West's megadrought deepened so much last year that it's now the driest in at least 1,200 years, according to a study in the journal Nature Climate Change. The dry conditions and lack of precipitation present numerous challenges for water supply but also accentuate the benefits of the city's water supply planning efforts. The past 10 years of investment in water infrastructure are paying dividends now.

The city's primary water source was and will continue to be treated Sacramento River surface water - 75 percent of the total water supply in 2021. To prepare for droughts, the city constructed three aquifer storage and recovery (ASR) wells to store high-quality treated Sacramento River water in the underground aquifer. Stored ASR water is the secondary water source and made up 15 percent of the total water supply in 2021. The city also tapped its tertiary water source in 2021, local groundwater, which is blended with treated Sacramento River water prior to delivery to customers. This ensures that all customers receive high-quality water throughout the year. Water from these wells made up 10 percent of Woodland's water portfolio in 2021.

Since converting the water system to surface water in 2016, 2021 is the first year that Woodland provided a mixture of surface water and groundwater. Water quality results are displayed for both sources, but it's important to understand that no Woodland water customers received water reflective of the groundwater testing results since groundwater was always blended with surface water. Groundwater never exceeded 19 percent of the water supply blend for any given month.

With the drought continuing into 2022, Woodland faces even more significant water right curtailments, but the water quality is likely to be very similar to that of 2021 thanks to advanced planning by the city and the Woodland-Davis Clean Water Agency (WDCWA). Our staff is available if you have questions or concerns about your water.

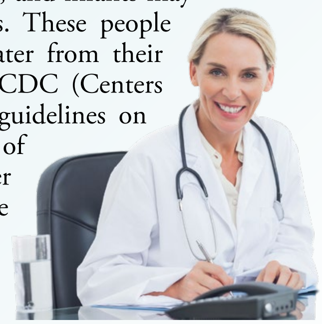
Sincerely,

Tim Busch, Principal Utilities Civil Engineer

Important Health Information

Nitrate in drinking water at levels above 10 parts per million (ppm) is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 10 ppm may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask advice from your health care provider.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at (800) 426-4791 or water.epa.gov/drink/hotline.



Lead in Home Plumbing

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. We are responsible for providing high-quality drinking water, but we cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. (If you do so, you may wish to collect the flushed water and reuse it for another beneficial purpose, such as watering plants.) If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at (800) 426-4791 or epa.gov/safewater/lead.

Source Water Assessment

The State Board, Division of Drinking Water, requires water providers to conduct a source water assessment (SWA) to help protect the quality of future water supplies. The SWA describes where a water system's drinking water comes from, the type of polluting activities that may threaten source water quality, and an evaluation of the water's vulnerability to those threats.

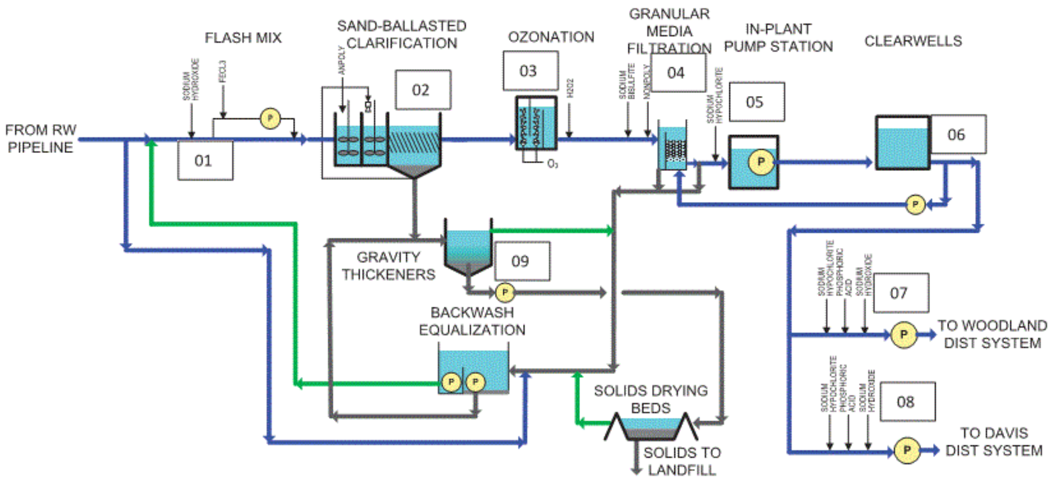
The source water assessment for the Sacramento River was conducted by several agencies and identified eight potential watershed contaminant sources: agricultural drainage, livestock, forest activities, river corridor and river recreation, stormwater and urban runoff, industrial NPDES dischargers, wastewater facilities, and watershed spills. The report states: "Overall, the Sacramento River continued to provide good-quality raw water. The raw water can currently be treated to meet all drinking water standards using conventional water treatment processes." The Sacramento River Watershed Sanitary Survey 2020 Update Report can be found here: cityofwoodland.org/SacramentoRiverSanitarySurvey.

Where Does Your Water Come From?

The City of Woodland has two sources of drinking water: surface water (primary supply) and groundwater (backup supply).

Surface water is pumped from the Sacramento River to the WDCWA's regional water treatment facility (RWTF) for various treatment processes (see diagram) and the addition of chlorine (for disinfection) prior to distribution. For more information about the RWTF, visit wdcwa.com. Surface water is also stored below ground in the city's three ASR wells for use in summer months to supplement WDCWA water. The city intends to meet demand primarily through the use of treated surface water and stored ASR water but also maintains four active groundwater wells and two standby wells as backup water sources. Groundwater is treated with liquid chlorine (sodium hypochlorite) at the wells for disinfection. When groundwater sources are needed, the city prioritizes the use of wells that blend groundwater with the primary surface water supply prior to distribution to maintain high-quality drinking water for all customers.

Surface Water Treatment Process



Substances That Could Be in Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (U.S. EPA) and the State Water Resources Control Board (State Board) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulations and California law also establish limits for contaminants in bottled water that provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife;

Inorganic Contaminants, such as salts and metals, that can be naturally occurring or can result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming;

Pesticides and Herbicides that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses;

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and which can also come from gas stations, urban stormwater runoff, agricultural applications, and septic systems;

Radioactive Contaminants that can be naturally occurring or can be the result of oil and gas production and mining activities.

More information about contaminants and potential health effects can be obtained by calling the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

Test Results

Our water is monitored for many different kinds of substances on a very strict sampling schedule. The water we deliver must meet specific health standards. Here, we only show those substances that were detected in our water (a complete list of all our analytical results is available upon request). Remember that detecting a substance does not mean the water is unsafe to drink; our goal is to keep all detects below their respective maximum allowed levels.

Though results are shown for surface water from the Woodland Davis Clean Water Agency's Regional Water Treatment Facility (WDCWA RWTF) and groundwater (City of Woodland Wells) as distinct sources, it's important to understand that no Woodland customers received water reflective of the groundwater testing results since groundwater was always blended with surface water and never exceeded 19 percent of the water supply blend in 2021.

The state recommends monitoring for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

REGULATED SUBSTANCES

				WDCWA RWTF		City of Woodland Wells			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Barium (ppm)	2019	1	2	NA	NA	0.25	NA	No	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits
Bromate (ppb)	2021	10	0.1	0.4	ND–1.3	NA	NA	No	By-product of drinking water disinfection
Chlorine (ppm)	2021	[4.0 (as Cl2)]	[4 (as Cl2)]	0.89	0.8–0.9	NA	NA	No	Drinking water disinfectant added for treatment
Chromium, Total (ppb)	2019	50	(100)	NA	NA	17	NA	No	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits
Control of DBP Precursors [TOC] (ppm)	2021	TT	NA	0.945	0.36–2.3	NA	NA	No	Various natural and human-made sources
HAA5 [sum of 5 haloacetic acids]–Stage 2 (ppb)	2021	60	NA	3.8	ND–7.6	NA	NA	No	By-product of drinking water disinfection
Hexavalent Chromium (ppb)	2021	NS[1]	0.02	0.18	NA	17.67	15–20	No	Discharge from electroplating factories, leather tanneries, wood preservation, chemical synthesis, refractory production, and textile manufacturing facilities; erosion of natural deposits
Nitrate [as nitrogen] (ppm)	2021	10	10	ND	NA	5.7	5.2–6.9	No	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Selenium (ppb)	2019	50	30	NA	NA	13	NA	No	Discharge from petroleum, glass, and metal refineries; erosion of natural deposits; discharge from mines and chemical manufacturers; runoff from livestock lots (feed additive)
TTHMs [total trihalomethanes]–Stage 2 (ppb)	2021	80	NA	15.3	5.7–21	NA	NA	No	By-product of drinking water disinfection
Uranium (pCi/L)	2016	20	0.43	NA	NA	1.6	NA	No	Erosion of natural deposits

Tap water samples were collected for lead and copper analyses from sample sites throughout the community

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AL	PHG (MCLG)	AMOUNT DETECTED (90TH %ILE)	SITES ABOVE AL/TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2019	1.3	0.3	0.0715	0/35	No	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead (ppb)	2019	15	0.2	ND	0/35	No	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits

SECONDARY SUBSTANCES

				WDCWA RWTF		City of Woodland Wells			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	SMCL	PHG (MCLG)	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2021	500	NS	30	NA	NA	NA	No	Runoff/leaching from natural deposits; seawater influence
Odor, Threshold (TON)	2020	3	NS	1.6	1.2–2	NA	NA	No	Naturally occurring organic materials
Specific Conductance (μmho/cm)	2021	1,600	NS	240	NA	1,000[2]	NA	No	Substances that form ions when in water; seawater influence
Sulfate (ppm)	2021	500	NS	6.4	NA	NA	NA	No	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (ppm)	2021	1,000	NS	143	110–180	NA	NA	No	Runoff/leaching from natural deposits
Turbidity (NTU)	2021	5	NS	0.03	0.03–0.04	NA	NA	No	Soil runoff

UNREGULATED SUBSTANCES [3]

		WDCWA RWTF		City of Woodland Wells	
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH
Boron (ppm)	2021	NA	NA	2.2	NA
Calcium (ppm)	2021	14	11–21	71[2]	NA
Chlorate (ppb)	2021	157	79–290	NA	NA
Hardness, Total [as CaCO3] (ppm)	2021	78	62–100	400[2]	NA
Magnesium (ppm)	2021	7.5	NA	54[2]	NA
pH (units)	2021	7.9	7.9–7.9	8[2]	NA
Phosphate (ppm)	2021	2	1.9–2.1	NA	NA
Sodium (ppm)	2021	25	NA	66[2]	NA

[1] There is currently no MCL for hexavalent chromium. The previous MCL of 10 ppb was withdrawn on September 11, 2017.

[2] Sampled in 2019.

[3] Unregulated contaminant monitoring helps U.S. EPA and the State Board determine where certain contaminants occur and whether the contaminants need to be regulated.

Definitions

90th %ile: The levels reported for lead and copper represent the 90th percentile of the total number of sites tested. The 90th percentile is equal to or greater than 90% of our lead and copper detections.

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NA: Not applicable.

ND (Not detected): Indicates that the substance was not found by laboratory analysis.

NS: No standard.

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

pCi/L (picocuries per liter): A measure of radioactivity.

PDWS (Primary Drinking Water Standard): MCLs and MRDLs for contaminants that affect health, along with their monitoring and reporting requirements and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

TON (Threshold Odor Number): A measure of odor in water.

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

μmho/cm (micromhos per centimeter): A unit expressing the amount of electrical conductivity of a solution.

APPENDIX 5

ANNUAL WATER QUALITY REPORT

REPORTING YEAR 2020

Presented By
City of Woodland

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo o hable con alguien que lo entienda bien.

PWS ID#: 5710006

Dear Woodland Water Customer,

The City of Woodland is proud to provide the 2020 Water Quality Report and inform you that your tap water met all state and federal drinking water standards. Over 1,000 water quality samples were taken in 2020 to ensure you're receiving the highest-quality drinking water.

The past couple of water years have been some of the driest on record in California. Though the lack of precipitation presents numerous challenges for water utilities, the outlook for 2021 water supply demonstrates the benefits of the city's recent investments in water infrastructure.

The Sustainable Groundwater Management Act (SGMA) has placed renewed emphasis on managing groundwater basin sustainably in California. The City's 2016 conversion to surface water has improved water quality while decreasing the reliance on groundwater. Treated Sacramento River water remains the primary source for Woodland in 2021. To deal with drought conditions, the City of Woodland is prepared with its recently constructed Aquifer Storage and Recovery (ASR) wells to pump high-quality, treated surface water that the city has stored in the underground aquifer. In addition to the stored surface water, the city maintains groundwater wells that can be blended with surface water to ensure adequate supply while maintaining high-quality water throughout.

Our staff is available if you have questions or concerns about your water.

Sincerely,

Tim Busch,
Principal Utilities Civil Engineer

Benefits of Chlorination

Disinfection, a chemical process used to control disease-causing microorganisms by killing or inactivating them, is unquestionably the most important step in drinking water treatment. By far, the most common method of disinfection in North America is chlorination.

Before communities began routinely treating drinking water with chlorine (starting with Chicago and Jersey City in 1908), cholera, typhoid fever, dysentery, and hepatitis A killed thousands of U.S. residents annually. Drinking water chlorination and filtration have helped to virtually eliminate these diseases in the U.S. Significant strides in public health are directly linked to the adoption of drinking water chlorination. In fact, the filtration of drinking water plus the use of chlorine is probably the most significant public health advancement in human history.

How chlorination works:

Potent Germicide Reduction in the level of many disease-causing microorganisms in drinking water to almost immeasurable levels.

Taste and Odor Reduction of many disagreeable tastes and odors like foul-smelling algae secretions, sulfides, and odors from decaying vegetation.

Biological Growth Elimination of slime bacteria, molds, and algae that commonly grow in water supply reservoirs, on the walls of water mains, and in storage tanks.

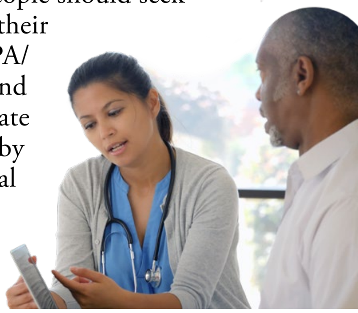
Chemical Removal of hydrogen sulfide (which has a rotten egg odor), ammonia, and other nitrogenous compounds that have unpleasant tastes and hinder disinfection. It also helps to remove iron and manganese from raw water.

Lead in Home Plumbing

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. We are responsible for providing high-quality drinking water, but we cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. (If you do so, you may wish to collect the flushed water and reuse it for another beneficial purpose, such as watering plants.) If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at (800) 426-4791 or at www.epa.gov/safewater/lead.

Important Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at (800) 426-4791 or http://water.epa.gov/drink/hotline.



Contact Us

For more information about this report, or for any questions related to your drinking water, please phone the Woodland Public Works Department at (530) 661-5962 or email at pubworks@cityofwoodland.org.

Para más información acerca del reporte o si tiene preguntas acerca del agua potable por favor llame al Departamento de Obras Públicas de la Ciudad de Woodland al (530) 661-5962 o envié un correo electrónico a pubworks@cityofwoodland.org.

Property owners, please share this information with your tenants!

Substances That Could Be in Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (U.S. EPA) and the State Water Resources Control Board (State Board) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulations and California law also establish limits for contaminants in bottled water that provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife;

Inorganic Contaminants, such as salts and metals, that can be naturally occurring or can result from urban storm-water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming;

Pesticides and Herbicides, that may come from a variety of sources such as agriculture, urban storm-water runoff, and residential uses;

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and which can also come from gas stations, urban storm-water runoff, agricultural applications, and septic systems;

Radioactive Contaminants, that can be naturally occurring or can be the result of oil and gas production and mining activities.

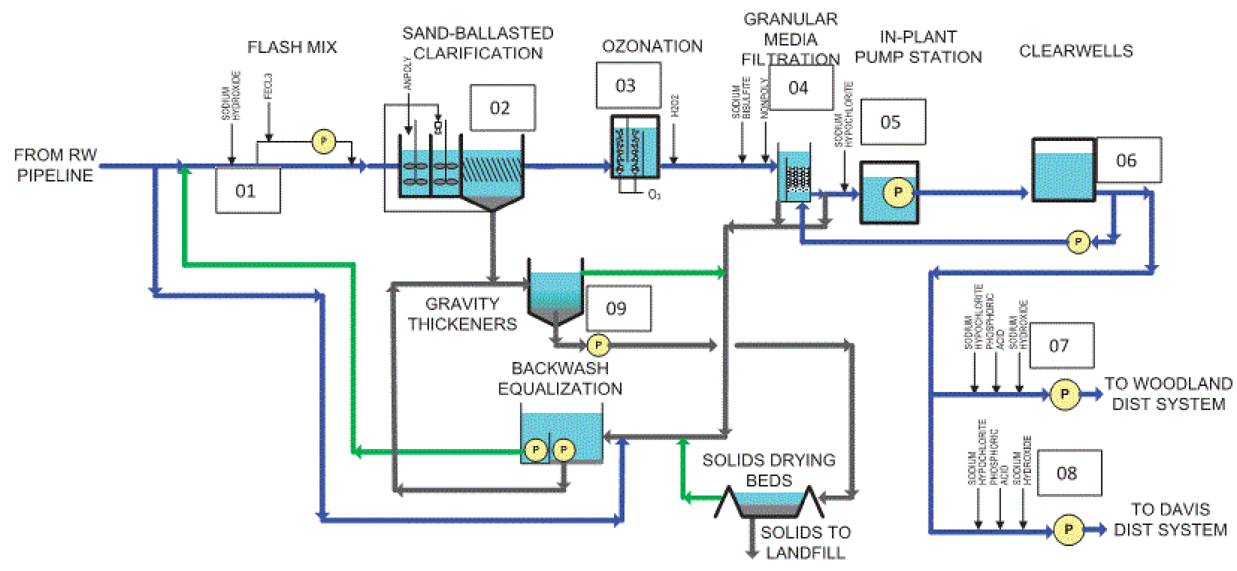
More information about contaminants and potential health effects can be obtained by calling the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

Where Does Your Water Come From?

The City of Woodland has two sources of drinking water: surface water (primary supply) and groundwater (backup supply).

Surface water is pumped from the Sacramento River to the Woodland Davis Clean Water Agency's (WDCWA) Regional Water Treatment Facility (RWTF) for various treatment processes (see diagram) and the addition of chlorine (for disinfection) prior to distribution. For more information about the RWTF, visit www.wdcwa.com/. Surface water is also stored below ground in the city's three Aquifer Storage & Recovery (ASR) wells for use in summer months to supplement WDCWA-supplied water. The city intends to meet demand primarily through the use of treated surface water and stored ASR water but also maintains five active groundwater wells and six standby wells as additional backup water sources. Groundwater is treated with liquid chlorine (sodium hypochlorite) at the wells for disinfection. When groundwater sources are needed, the city prioritizes the use of groundwater wells that blend groundwater with the primary surface water supply prior to distribution to maintain high-quality drinking water for all customers.

Surface Water Treatment Process



Test Results

Our water is monitored for many different kinds of substances on a very strict sampling schedule. The water we deliver must meet specific health standards. Here, we only show those substances that were detected in our water (a complete list of all our analytical results is available upon request). Remember that detecting a substance does not mean the water is unsafe to drink; our goal is to keep all detects below their respective maximum allowed levels.

The state recommends monitoring for certain substances less often than once per year because the concentration of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

We participated in the 4th stage of the U.S. EPA's Unregulated Contaminant Monitoring Rule (UCMR4) program by performing additional tests on our drinking water. UCMR4 sampling benefits the environment and public health by providing the U.S. EPA with data on the occurrence of contaminants suspected to be in drinking water, in order to determine if U.S. EPA needs to introduce new regulatory standards to improve drinking water quality. Unregulated contaminant monitoring data are available to the public, so please feel free to contact us if you are interested in obtaining that information. If you would like more information on the U.S. EPA's Unregulated Contaminants Monitoring Rule, please call the Safe Drinking Water Hotline at (800) 426-4791.

REGULATED SUBSTANCES

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Bromate (ppb)	2020	10	0.1	0.08	ND–1	No	By-product of drinking water disinfection
Chlorine (ppm)	2020	[4.0 (as Cl2)]	[4 (as Cl2)]	0.9	0.8–0.9	No	Drinking water disinfectant added for treatment
Control of DBP precursors [TOC] (ppm)	2020	TT	NA	0.87	0.32–1.2	No	Various natural and man-made sources
Haloacetic Acids (ppb)	2020	60	NA	11.2	ND–39	No	By-product of drinking water disinfection
Hexavalent Chromium (ppb)	2020	NS[1]	0.02	0.14	0.12–0.15	No	Discharge from electroplating factories, leather tanneries, wood preservation, chemical synthesis, refractory production, and textile manufacturing facilities; Erosion of natural deposits
Nitrate [as nitrogen] (ppm)	2020	10	10	ND	NA	No	Runoff and leaching from fertilizer use; Leaching from septic tanks and sewage; Erosion of natural deposits
TTHMs [Total Trihalomethanes] (ppb)	2020	80	NA	19.5	4.6–34	No	By-product of drinking water disinfection

Tap Water Samples Collected for Copper and Lead Analyses from Sample Sites throughout the Community

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AL	PHG (MCLG)	AMOUNT DETECTED (90TH %ILE)	SITES ABOVE AL/ TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2019	1.3	0.3	0.0715	0/35	No	Internal corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives
Lead (ppb)	2019	15	0.2	ND	0/35	No	Internal corrosion of household water plumbing systems; Discharge from industrial manufacturers; Erosion of natural deposits

SECONDARY SUBSTANCES

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	SMCL	PHG (MCLG)	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2020	500	NS	24.5	20–29	No	Runoff/leaching from natural deposits; Seawater influence
Odor–Threshold (TON)	2020	3	NS	1.6	1.2–2	No	Naturally occurring organic materials
Specific Conductance (µmho/cm)	2020	1,600	NS	255	220–290	No	Substances that form ions when in water; Seawater influence
Sulfate (ppm)	2020	500	NS	10.2	7.4–13	No	Runoff/leaching from natural deposits; Industrial wastes
Total Dissolved Solids (ppm)	2020	1,000	NS	137	87–170	No	Runoff/leaching from natural deposits
Turbidity (NTU)	2020	5	NS	0.03	0.03–0.04	No	Soil runoff

UNREGULATED CONTAMINANT MONITORING RULE – PART 4 (UCMR4)			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH
Manganese (ppb)	2020	4.79	0.43–13

UNREGULATED AND OTHER SUBSTANCES [2]			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH
Calcium (ppm)	2020	14.1	11–18
Chlorate (ppb)	2020	125.5	75–210
Hardness, Total [as CaCO3] (ppm)	2020	74	43–111
Magnesium (ppm)	2020	8.7	7.6–9.8
Phosphate (ppm)	2020	2	1.9–2.1
pH (Units)	2020	7.9	7.9–7.9
Sodium (ppm)	2020	22.5	19–26

[1] There is currently no MCL for hexavalent chromium. The previous MCL of 10 ppb was withdrawn on September 11, 2017.

[2] Unregulated contaminant monitoring helps U.S. EPA and the State Water Resources Control Board to determine where certain contaminants occur and whether the contaminants need to be regulated.

Source Water Assessment

The State Water Resources Control Board -- Division of Drinking Water, requires water providers to conduct a source water assessment (SWA) to help protect the quality of future water supplies. The SWA describes where a water system's drinking water comes from, the type of polluting activities that may threaten source water quality, and an evaluation of the water's vulnerability to those threats.

The source water assessment for the Sacramento River was conducted by several agencies and identified eight potential watershed contaminant sources: agricultural drainage, livestock, forest activities, river corridor and river recreation, storm water and urban runoff, industrial NPDES dischargers, wastewater facilities, and watershed spills. The report states that "overall, the Sacramento River continued to provide good quality raw water. The raw water can currently be treated to meet all drinking water standards using conventional water treatment processes." The Sacramento River Watershed Sanitary Survey 2020 Update Report can be found here: https://cityofwoodland.org/SacramentoRiverSanitarySurvey.

Definitions

90th %ile: The levels reported for lead and copper represent the 90th percentile of the total number of sites tested. The 90th percentile is equal to or greater than 90% of our lead and copper detections.

AL (Regulatory Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs (SMCLs) are set to protect the odor, taste and appearance of drinking water.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

MRDL (Maximum Residual Disinfectant Level): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA: Not applicable.

ND (Not detected): Indicates that the substance was not found by laboratory analysis.

NS: No standard

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

PDWS (Primary Drinking Water Standard): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

TON (Threshold Odor Number): A measure of odor in water.

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

µmho/cm (micromhos per centimeter): A unit expressing the amount of electrical conductivity of a solution.

How Long Can I Store Drinking Water?

The disinfectant in drinking water will eventually dissipate, even in a closed container. If that container housed bacteria prior to filling up with the tap water, the bacteria may continue to grow once the disinfectant has dissipated. Some experts believe that water can be stored up to six months before needing to be replaced. Refrigeration will help slow the bacterial growth.

Information on the Internet

The U.S. EPA (https://goo.gl/TFAMKc) and the Centers for Disease Control and Prevention (www.cdc.gov) Web sites provide a substantial amount of information on many issues relating to water resources, water conservation, and public health. Also, the Division of Drinking Water and Environmental Management has a Web site (https://goo.gl/kGepu4) that provides complete and current information on water issues in California, including valuable information about our watershed.

APPENDIX 6

Association of California Water Agencies

Bringing Water Together

April 2022

Suggested Guidelines for Preparation of Required Reports on PUBLIC HEALTH GOALS (PHGs) to satisfy requirements of California Health and Safety Code Section 116470(b)

Background

Public water systems serving more than 10,000 service connections must prepare a brief, written report in plain language by July 1, 2022 that gives information on the "detection" of any contaminants above the Public Health Goals (PHGs) published by the state's Office of Environmental Health Hazard Assessment (OEHHA). The report must also list the "detection" of any contaminant above the Maximum Contaminant Level Goals (MCLGs) set by United States Environmental Protection Agency (U.S. EPA) for all other contaminants until such time as OEHHA has published PHGs for those contaminants.

It is emphasized that the report only needs to provide information on the number of contaminants that a water system has found at a level exceeding a PHG or a MCLG.

The purpose of the legislation requiring these reports was to provide consumers with information on levels of contaminants even below the enforceable mandatory Maximum Contaminant Levels (MCLs) so they would be aware of whatever risks might be posed by the presence of these contaminants at levels below the MCLs. Additionally, each water system must provide an estimate of the cost to reduce the contaminant(s) to the PHG (or MCLG if there is no PHG) regardless of how minimal the risk might be.

The following should be considered when preparing the mandated reports:

1. The U.S. EPA and the California State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) establish MCLs at very conservative levels to provide protection to consumers against all but very low to negligible risk. In other words, MCLs are the regulatory definition of what is "safe." Adopted MCLs are still the criteria for being in compliance, not those proposed or possible in the future, and certainly not MCLGs or PHGs.

SACRAMENTO 980 9th Street, Suite 1000, Sacramento, CA 95814 • (916) 441-4545
WASHINGTON, D.C. 400 North Capitol Street NW, Suite 357, Washington, DC 20001 • (202) 434-4760
www.acwa.com

2. MCLGs and PHGs are often set at very low levels depending on the established health risk, and in the case of U.S. EPA, MCLGs are also set at zero for some contaminants. Determination of health risk at these low levels is theoretical based on risk assessments with multiple assumptions and mathematical extrapolations. Many contaminants are considered to be carcinogenic and U.S. EPA's policy is to set the applicable MCLGs at zero because they consider no amount of these contaminants to be without risk. It is understood by all that zero is an unattainable goal and cannot be measured by the practically available analytical methods. Note that by regulation, OEHHA cannot set a PHG at zero and must calculate a numerical level to address risk, even though it may be unattainable or impossible to measure.

3. PHGs and MCLGs are not enforceable. The Best Available Technology (BAT) to reach such low levels has not been defined and may not realistically be available. Accurate cost estimates are difficult, if not impossible, and are highly speculative and theoretical. Therefore, they have limited value and may not warrant significant investment of agency time and money.

These reports are unique to California. They are required in addition to the extensive public reporting of water quality information that California water utilities have been doing for many years and in addition to the federally mandated Consumer Confidence Reports (CCRs). Hence, it should be kept in mind that in addition to this required report, each utility will continue reporting annually in great depth on the quality of the water it serves.

The guidance herein is intended to assist water suppliers in completing the required reports.

The DDW is the primary enforcing agency of all provisions of the Health and Safety (H&S) Code relative to drinking water systems. It has the authority to ensure that public water systems comply with the report requirement. DDW requests that utilities report in writing as to how they have complied with the fundamental requirements of this section, which are:

1) Prepare a brief written report,
2) Hold a public hearing (meeting), and
3) Notify DDW that the meeting was held and the report is available.

Detailed Guidelines:

I. Who must prepare a PHG report?

California H&S Code, Section 116470(b) is clear that a system ONLY needs to do a report IF it has at least 10,000 service connections AND IF it exceeds one or more PHG or MCLG. Also, a public hearing is NOT required if a report does not have to be prepared.

Utilities that do NOT have to do the report may choose to submit an information item to their governing board advising them that no report is required.

This report is required every three years.

II. Wholesalers (<10,000 service connections) are NOT required to do a PHGreport.

Wholesalers who do not directly serve more than 10,000 service connections are not required to meet the PHG report requirements of California H&S Code, Section 116470(b).

III. Timing, Notification, Meetings

A. Timing and Meeting: The report must be prepared by July 1, 2022. A public hearing, which can be held as part of any regularly scheduled meeting, should be held sometime after July 1 and prior to reporting to DDW. The public hearing "should be held within a reasonable time after the report's completion" so the information is current. The purpose of the hearing is to "accept and respond to" public comment. The governing board or council of public water agencies would also likely approve the staff report at that time. This would represent endorsement by the board of the part of the report where any action (or no action) would be proposed regarding reduction of contaminants to levels lower than required for compliance with MCLs.

Notification: There is no requirement to send a copy of the report to the public. Public agencies must "notice" public hearings so this hearing would be subject to the normal notice requirements (i.e., number of days advance, publishing in appropriate newspaper, etc.) The notice would appropriately indicate the report is the subject of the hearing and indicate it is available forthe public to review or to get a copy upon request.

(NOTE: Investor-owned utilities will likely have to schedule a special "meeting" since they are not subject to the same meeting notice requirements and may not have any authority to hold a "public hearing" per se. Their notification of the public could however be similar to public agencies (e.g., publication of legal notice in newspaper of general circulation.)

B. Submission of Reports: DDW does not specifically require that a copy of the report be submitted to them.

IV. Interpretations

A. What contaminants must be covered?

A table of relevant current PHGs, MCLGs, MCLs, and Detection Limits for purposes of Reporting (DLRs) is attached to this guidance as Attachment No. 1.

1. Only contaminants that **have an existing MCL** AND were "detected" at a level that "exceeds" the PHG or, where there is no PHG, the Federal MCLG**,** need to be included in the report. (See guidance below on "detected" and "exceed")

2. All contaminants that, **as of December 31, 2021**, have Primary Drinking Water Standards (PDWS) set by California **AND** have an equivalent PHG or a MCLG. This includes chemical, microbiological and radiological constituents. PDWS may be either MCLs or Treatment Techniques (TT). For example, the Surface Water Treatment Rule (SWTR) is a TT for the following contaminants: *Giardia lamblia*, viruses, *Cryptosporidium*, *Legionella* and heterotrophic bacteria (HPC). A TT is set when it is not possible to reliably analyze for the contaminant of concern (the SWTR) orwhen it is not feasible or appropriate to set a numerical standard (e.g., the Lead & Copper Rule).

3. It does NOT include contaminants, such as radon, for which U.S. EPA has considered adopting an MCL, nor does it include any contaminants DDW plans to regulate in the future.

   It does NOT include contaminants for which there is no final PHG or MCLG as of December 31, 2021, nor does it include any secondary MCLs(e.g., TDS, SO_4, Na, etc).

B. What data are to be used for the report due by July 1, 2022?

1. It is recommended that the data used should be from the 3 consecutive calendar years prior to the year the report is prepared. For example, the 2022 report would be based on the analytical data from samples taken in 2019, 2020, and 2021. The data should be the same as that used by the drinking water system in determining compliance with DDW requirements. In most cases, this would be after blending or treatment. Individual well data would only be used if the well feeds directly to the distribution system.

2. For utilities that purchase water from another agency or from a wholesaler, it is suggested that the same guidance or ground rules be followed as for the CCRs. If the only source for a retail system is treated water from a wholesaler and that water contains a constituent above a PHG or MCLG, the retailer should use its own distribution system monitoring data. For systems with both its own sources of water and purchased water, the retailer should evaluate its own distribution system compliance monitoring and compare the annual average value with the PHG or MCLG.

C. What do the terms “detect” and “exceed” mean in the context of the required report?

1. Keep in mind that there are no regulations that relate to “meeting” or “complying with” PHGs. The logical approach would be to use the same procedures and requirements that Title 22 of the California Code of Regulations specify for determining compliance with MCLs. For example, if Title 22 or DDW guidance specifies that the average of a group of samples be compared to the MCL for compliance purposes, the same averaging should be used to compare to the PHG or MCLG. For most constituents (coliform is an exception), compliance with MCLs is measured at the “point of entry” to the distribution system. This means that, for the most part, the analytical results for each well must be evaluated separately and compared to the MCLG or PHG. If wells are blended or treated before delivery to the system, the judgment as to whether there was a “detection exceeding the MCLG or PHG” should be based on the “point of entry” data just as for compliance with MCLs.

2. Be sure to report the PHG (or MCLG) as a number equal to or greater than 1.0 as specified in the State Consumer Confidence Report Guidance for Water Suppliers. It is recommended that all data be converted to match CCR data. Attachment No. 1 concentration numbers are given as mg/L, unless otherwise noted.

3. Keep in mind that if a utility determines that a constituent has been found at a level exceeding the PHG or MCLG, a cost estimate is mandated. A utility would ordinarily be required to perform a cost estimate only if it is clear that the MCL has been clearly exceeded, not just momentarily, or on one sample. In the same way, only when the PHG/MCLG level is clearly exceeded should a cost estimate be calculatedand reported.

4. Significant figures, analytical detection limits, reporting limits, and different methods of determining compliance, all affect the assessment of which constituents were “detected” above the PHG or the MCLG.

5. Results that are reported below the state regulatory Detection Limit for Purposes of Reporting (DLR - See California Code of Regulations Title 22, Sections 64432 & 64445.1 and other DDW guidance on compliance reporting) should be treated as 0 (zero) which is accepted DDW practice. U.S. EPA also recommends treating non-detection (ND) as zero.

6. As in all cases of reporting results to the state, the results of analyses should be rounded to reflect the appropriate number of significant figures. (EXAMPLE: For E. coli bacteria, the MCLG is 0% samples positive per month which indicates one significant figure. So, if during 2021, a system had a positive sample but the percentage of samples positive for the month was <0.49%, this could be rounded to one significant figure, as the MCLG is expressed, so it would be rounded to 0%.) (SECOND EXAMPLE: For a constituent like PCBs where the MCL is 0.5ppb and the DLR is 0.5 ppb, how do you determine if you exceeded the MCLG of "zero"? Webster defines "zero" as "having no measurable or otherwise determinable value," which, in effect, is the DLR. So for PCBs, if the average of results for a given well is less than the DLR, the value would be reported as "zero." Note that by regulation, OEHHA cannot set a PHG at zero and must calculate a numerical level to address risk.)

7. In averaging the results for a constituent over a specified period during which some of the data is less than the DLR, the average value obtained should be rounded to the appropriate significant figure before comparingto the PHG or MCLG. (EXAMPLE: If a well were sampled for PCE and 0.6 ppb was found and the resample showed 0.6 ppb, it would constitute a confirmed positive detection. But if 3 additional compliance samples were taken from the well and all had less than 0.5 ppb, which is the DLR, then averaging the 5 samples would give an average of 0.24 ppb, which would be rounded to zero. The average from the well does not exceed the PHG of 0.06 ppb, and no cost estimate would be needed for this well.)

D. What does the term "best available technology" (BAT) mean as used in this portion of the law?

1. While a specific definition of the term is not in the California H&S Code, the accepted meaning in all other sections is that it refers to a technology to achieve compliance with MCLs. In fact, where "best available technology" is listed or explained (Sections 64447, 64447.2 & 64447.4), the usage is "for achieving compliance with the MCLs." This is also true for BAT specified in federal regulations.

2. However, in Section 116470(b)(4), the term refers to "BAT," if any is available on a commercial basis, to remove or reduce the concentration of the contaminant. Specifically, subdivision (b)(5) requires cost estimates of using the technology described in subdivision (b)(4) to "reduce the contaminant...to a level at or below the" PHG (or MCLG).

3. Obviously, where MCLGs are set at zero, there may not be commercially available technology to reach a non-detectable level. This should be clearly stated in the report. Since there is little data readily available to "estimate" cost of treatment to achieve absolute zero levels, rough estimates of "BAT" as defined in law might be used with a clearly written caveat that use of this "BAT" may still not achieve the PHG or MCLG and the costs may be significantly higher to do so.

E. Must the report deal with total coliforms?

No. No PHG or MCLG for total coliforms existed during the period covered by the 2022 report. For reports on PHGs prepared in 2019 and prior years, results for total coliforms needed to be evaluated because the U.S. EPA established a MCLG of zero (0) for total coliforms that remained applicable until March 31, 2016. In 2013, U.S. EPA revised the 1989 Total Coliform Rule (TCR) and one of the provisions of the revised Total Coliform Rule (RTCR) eliminated the MCLG for total coliforms effective April 1, 2016.

F. How should the report deal with *E. coli*?

The federal RTCR included a MCL and MCLG for *E. coli* effective April 1, 2016. The MCLG for E. coli is zero (0). DDW adopted a MCL for *E. coli* which became effective July 1, 2021. Even though there is no PHG, *E. coli*. is subject to PHG report requirements because there is a MCLG and a MCL.

1. The *E. coli* MCL is based on either an *E. coli* positive repeat sample following a total coliform (TC) positive routine sample, aTC-positive repeat sample following an *E. coli* -positive routine sample, failure to collect all required repeat samples following a E. coli positive routine sample, or failure to test for E. coli when any repeat sample is TC-positive. The PWS should report the number of *E. coli* detections that occurred during the three-year period (2019, 2020, and 2021 for this report). The MCLG of zero is therefore appropriately interpreted as zero samples positive.

2. If it is determined that the system has exceeded the MCLG of zero for *E. coli*, the following factors are pertinent for deciding what action, if any, is appropriate to consider and for estimating costs:

   a. Exceeding zero *E. coli* bacteria at any one time, in and of itself, would not normally constitute the need for any treatment or action.

   b. There is no action that could be taken with absolute certainty that could ensure that the system would always have zero-percent *E. coli* every single time.

c. The “best available technology” (to meet the MCL, not the MCLG) that is specified for total coliform by DDW in California Code of Regulations Title 22, Section 64447 would also apply to *E. coli* and for the most part is already followed by many systems.

d. The one single action that would most likely decrease the possibility of positive *E. coli* detection would be to significantly increase the disinfectant residual. This would likely result in increased disinfection byproducts (DBPs). While disinfection protects against acute health risks, such as *E. coli* and *Giardia*, DBPs can have potentially adverse chronic health risks. The limits to the amount of disinfectant residual allowed in the distribution system are the maximum residual disinfectant levels (MRDLs) as established by the Disinfectants and Disinfection Byproducts Rule (DBPR).

e. Utilities should point out the positive, proactive steps they take to prevent E. coli contamination in the distribution system, including preventive maintenance, main flushing, special monitoring, residual maintenance and testing, cross-connection control, etc.

G. How should the report handle the MCLGs of zero for *Giardia lamblia*, *Cryptosporidium*, *Legionella* and viruses?

1. The MCL for pathogenic micro-organisms is a TT (i.e., the SWTR). No monitoring is mandated for the organisms because there are no standardized methods for testing or the analyses are not timely (like virus testing – 30 days) to provide public health protection.

2. For these reasons, since the intent of the TT (SWTR) is to protect against these pathogens, it can properly be assumed that if the SWTR is met, that the utility has met the MCLG because there is no uniform way to assess possible pathogen levels.

3. For utilities doing voluntary monitoring of pathogens (such as *Giardia* and Cryptosporidium), the results are appropriately considered research or for operational purposes and not for compliance purposes.

H. How should the report deal with Lead and Copper?

1. Any lead or copper values below the respective DLR should be reported as zero.

2. For monitoring lead at the tap, if the 90 percentile lead value is ND, or <0.005 mg/l, then you should assume you do not exceed the lead PHG of 0.2 ppb.

3. For monitoring copper at the tap, if the 90 percentile copper value is not above 300 ppb, then you have not exceeded the copper PHG.

4. While not precisely stated in the regulations, best available technology for Lead and Copper compliance is a TT (in lieu of MCLs) of "optimized corrosion control." For larger systems with >10,000 service connections, this depends on a series of steps involving sampling, reports, studies, etc. If a system meets the requirements of having optimized corrosion control but still has a 90 percentile lead or copper value above the PHGs, it is not clear what additional steps could be considered, particularly without causing other potential water quality problems. It may be appropriate to explain this in a straight-forward manner rather than putting in "hypothetical" cost figures.

I. Must the report deal with Total Trihalomethanes (TTHMs) or Haloacetic Acids (HAAS)?

No. MCLG/PHG exceedances must be reported only for those contaminants that have a primary drinking water standard in place and an associated MCLG/PHG. Although U.S. EPA has adopted MCLGs for some individual THMs and HAAs (such as dibromochloromethane or dichloroacetic acid), there are no MCLs in effect for these individual constituents. Likewise, U.S. EPA has adopted standards for the cumulative byproduct groups, but there are no MCLGs or PHGs established for the groups. In California, DDW has adopted an MCL for both cumulative byproduct groups, but there are no associated PHGs. (Note: OEHHA published a draft PHG of 0.8 ppb for total trihalomethanes in September 2010, but it had not been finalized as of December 31, 2021).

On February 7, 2020, OEHHA published PHGs of 0.4 ppb for chloroform, 0.5 ppb for bromoform, 0.06 ppb for bromodichoromethane, and 0.1 ppb for dibromochloromethane but there are no MCLs for individual trihalomethanes so these constituents do not need to be included in the report.

However, individual MCLs and MCLGs for bromate and chlorite exist, so they must be included in the report if detected.

J. How should water utilities handle gross alpha and uranium?

When looking at the results of any radionuclide monitoring done in the 3-year period to be covered by the report, there are several things to keep in mind:

As indicated in C.1 of this Guidance, where averaging is done to determine compliance with MCLs, it should also be done in considering PHGs. This is important for radionuclides because compliance is often based on averaging.

Unlike most other constituents, laboratories doing radionuclides report some results that are LOWER than the state DLR. Title 22, 64442 (h)(3)(c) states: "If a sample result is LESS than the DLR in Table 64442, ZERO shall be used to calculate the annual average......." Also, it says for Gross Alpha: "......1/2 of the DLR shall be used to calculate the annual average."

Where Gross Alpha analyses are used in lieu of analyzing for uranium, Radium 226 or 228, the procedure outlined in Title 22, 64442(f) should be followed. (Note: The 95% confidence limit is often reported by labs as MDA95.)

K. Do utilities have to report detections of hexavalent chromium?

Water systems do NOT have to report anything on hexavalent chromium because there is no MCL. While there is an MCL and an MCLG for TOTAL chromium, systems will not have to report on it either since the MCLG (100 ppb) is much higher than the California MCL (50 ppb).

V. Disclosure of Numerical Public Health Risk Associated with PHGs/MCLs and Identification of Category of Risk

H&S Code, Section 116470(b)(2) requires the report to disclose the numerical public health risk associated with both the maximum contaminant level and public health goal for each contaminant detected in drinking water that exceeds the public health goal, and Section 116470(b)(3) requires an identification of the category of risk to public health associated with exposure to the contaminant. In February 2022, OEHHA prepared and published an updated "Health Risk Information for Public Health Goal Exceedance Reports" document. It is included as Attachment No. 2, and can be accessed at https://oehha.ca.gov/water/public-health-goal-report/health-risk-information-public-health-goal-exceedance-reports-2022.

V. Cost Estimates

The most difficult aspect of the required report is estimating the cost of treatment. Agencies are urged to keep in mind that because of the advisory nature of the report, the non-enforceable aspect of PHGs and MCLGs, and the highly speculative applicability of technology to achieve "zero" levels, only very preliminary cost estimating is appropriate and necessary.

Remember that a cost estimate is only required for a constituent if you determine that it was "detected" above the PHG or MCLG. If the MCLG is zero and the result (after approximation, averaging, rounding) is less than the DLR, no cost estimate is needed. (Remember that many DLRs are LOWER than the PHG, so "detection" above the DLR does not necessarily mean that it is above the PHG.)

The cost estimates should not be low estimates because that would give a mistaken impression that achieving “zero” levels would have a lower price tag when the amount of uncertainty and unknowns would be very high. Given the uncertainties, it might be appropriate to consider reporting a range of costs.

For the 2022 guidance, ACWA is providing a revision of its previous treatment cost information.

Attachment No. 3 to this guidance includes several tables which provide "ranges" of costs for installing and operating several treatment technologies. These data have been gathered from a variety of sources and represent estimates for different size systems, different sources, and different constituents targeted for reduction by the treatment.

Table 1 represents the results of a 2012 ACWA Survey of its member agencies. This has been revised using the average 2021 ENR Cost Index.

Table 2 includes data from several agencies that was gathered separately from the 2012 ACWA survey. This has been revised using the average 2021 ENR Cost Index.

Table 3 is treatment cost data from previous ACWA Guidance documents with the costs updated to 2021. This has been revised using the average 2021 ENR Cost Index.

The law specifies that the report should only “estimate the aggregate cost and the cost per customer of utilizing the technology” to reduce the level down to the PHG. There is no specification of what is to be estimated: initial construction cost, annualized costs of construction and O&M, or another way of expressing cost. It is suggested that each utility may do it the way they report other costs. (EXAMPLES: 1. Initial Cost of Construction, including % increases for each of design, planning, CEQA, permitting, contingency, etc. =$10 million, or $1000 per customer, plus an ongoing O&M cost of $1 million, or $100 per customer, forever; 2. Annualized Cost of Construction plus O&M = $2 million, or $200 per customer.)

All possible technologies do not have to be evaluated for each constituent to compare costs. For example, if granular activated carbon (GAC) and reverse osmosis (RO) are both possible treatment technologies to try to lower the level of a particular contaminant to the “zero” PHG/MCLG level, it is appropriate to specify and estimate costs for the technology that would likely be used, keeping in mind there are significant uncertainties based on a variety of factors. If the utility has multiple contaminants to address in the report, one technology (i.e., RO) may address them all, so a cost estimate for RO only could suffice.

General “order of magnitude” estimates are adequate. It is assumed that ALL costs including capital, land, construction, engineering, planning, environmental, contingency and operations and maintenance (O&M) costs should be included but general assumptions can be made for most of these items.

If a system chooses to do its own cost estimating rather than use the costs in Attachment No. 3, it is recommended that generally available cost estimating guides be used such as from U.S. EPA, WRF, AWWA, ASCE, or textbooks, manuals, journals.

The following is a list of references that might be used:

(1) Implementation of Arsenic Treatment Systems, Part 1. Process Selection; AWWA Research Foundation and U.S.E.P.A, Published by AWWA RF and AWWA, 2002,

(2) Implementation of Arsenic Treatment Systems, Part 2: Design Considerations, Operation and Maintenance, AWWA Research Foundation, Published by AWWA RF and AWWA, 2002,

(3) State-of-Science on Perchlorate Treatment Technologies, Final Report for Water Research Foundation project #4359, 2011,

(4) An Assessment of the State of Nitrate Treatment Alternatives, AWWA, June 2011, Chad Siedel and Craig Gorman, Jacobs Engineering Group, Inc.,

(5) Performance and Cost Analysis of Arsenic Treatment in California, October, 2009, JAWRA, UC Davis, Hilkert, Young, Green and Darby.

U.S. EPA includes cost data in the Federal Register for each regulation when it is proposed or adopted. (NOTE: U.S. EPA estimates generally do not consider state-specific concerns and some costs have been known to be underestimated in the past so costs should be increased appropriately and based on utility experience.) The experience of other utilities in your area that have installed treatment to meet MCLs or data reported in journals is valuable as well.

Utilities may also choose to have their engineering consultants prepare these very general cost estimates.

VI. Sample Hypothetical Report

Attachment No. 4 is a comparable attempt to show what a PHG-required report might look like for a "hypothetical" water system that serves more than 10,000 service connections and had one or more PHG/MCLG exceedances in the three-year period ending December 31, 2015, as an example. It is NOT the only way the report might be done. The sample is based on these guidelines. If there appears to be a conflict between the sample and the guidelines, the guidelines should be followed.

If you have any questions about these guidelines or any of the attachments, contact Nick Blair of ACWA at NickB@acwa.com or 916-669-2377.

MCLs, DLRs, and PHGs for Regulated Drinking Water Contaminants

(Units are in milligrams per liter (mg/L), unless otherwise noted.)

Last Update: September 14, 2021

This table includes:

California's maximum contaminant levels (MCLs)

Detection limits for purposes of reporting (DLRs)

Public health goals (PHGs) from the Office of Environmental Health Hazard Assessment (OEHHA)

Also, the PHG for NDMA (which is not yet regulated) is included at the bottom of this table.

Regulated Contaminant	MCL	DLR	PHG	Date of PHG
Chemicals with MCLs in 22 CCR §64431—Inorganic Chemicals				
Aluminum	1	0.05	0.6	2001
Antimony	0.006	0.006	0.001	2016
Arsenic	0.010	0.002	0.000004	2004
Asbestos (MFL = million fibers per liter; for fibers >10 microns long)	7 MFL	0.2 MFL	7 MFL	2003
Barium	1	0.1	2	2003
Beryllium	0.004	0.001	0.001	2003
Cadmium	0.005	0.001	0.00004	2006
Chromium, Total - OEHHA withdrew the 0.0025-mg/L PHG	0.05	0.01	withdrawn Nov. 2001	1999
Chromium, Hexavalent - 0.01-mg/L MCL & 0.001-mg/L DLR repealed September 2017	--	--	0.00002	2011
Cyanide	0.15	0.1	0.15	1997
Fluoride	2	0.1	1	1997
Mercury (inorganic)	0.002	0.001	0.0012	1999 (rev2005)*
Nickel	0.1	0.01	0.012	2001
Nitrate (as nitrogen, N)	10 as N	0.4	45 as NO3 (=10 as N)	2018
Nitrite (as N)	1 as N	0.4	1 as N	2018
Nitrate + Nitrite (as N)	10 as N	--	10 as N	2018
Perchlorate	0.006	0.004	0.001	2015
Selenium	0.05	0.005	0.03	2010
Thallium	0.002	0.001	0.0001	1999 (rev2004)
Copper and Lead, 22 CCR §64672.3				
Values referred to as MCLs for lead and copper are not actually MCLs; instead, they are called "Action Levels" under the lead and copper rule				
Copper	1.3	0.05	0.3	2008

Lead	0.015	0.005	0.0002	2009
Radionuclides with MCLs in 22 CCR §64441 and §64443—Radioactivity				
[units are picocuries per liter (pCi/L), unless otherwise stated; n/a = not applicable]				
Gross alpha particle activity - OEHHA concluded in 2003 that a PHG was not practical	15	3	none	n/a
Gross beta particle activity - OEHHA concluded in 2003 that a PHG was not practical	4 mrem/yr	4	none	n/a
Radium-226	--	1	0.05	2006
Radium-228	--	1	0.019	2006
Radium-226 + Radium-228	5	--	--	--
Strontium-90	8	2	0.35	2006
Tritium	20,000	1,000	400	2006
Uranium	20	1	0.43	2001
Chemicals with MCLs in 22 CCR §64444—Organic Chemicals				
(a) Volatile Organic Chemicals (VOCs)				
Benzene	0.001	0.0005	0.00015	2001
Carbon tetrachloride	0.0005	0.0005	0.0001	2000
1,2-Dichlorobenzene	0.6	0.0005	0.6	1997 (rev2009)
1,4-Dichlorobenzene (p-DCB)	0.005	0.0005	0.006	1997
1,1-Dichloroethane (1,1-DCA)	0.005	0.0005	0.003	2003
1,2-Dichloroethane (1,2-DCA)	0.0005	0.0005	0.0004	1999 (rev2005)
1,1-Dichloroethylene (1,1-DCE)	0.006	0.0005	0.01	1999
cis-1,2-Dichloroethylene	0.006	0.0005	0.013	2018
trans-1,2-Dichloroethylene	0.01	0.0005	0.05	2018
Dichloromethane (Methylene chloride)	0.005	0.0005	0.004	2000
1,2-Dichloropropane	0.005	0.0005	0.0005	1999
1,3-Dichloropropene	0.0005	0.0005	0.0002	1999 (rev2006)
Ethylbenzene	0.3	0.0005	0.3	1997
Methyl tertiary butyl ether (MTBE)	0.013	0.003	0.013	1999
Monochlorobenzene	0.07	0.0005	0.07	2014
Styrene	0.1	0.0005	0.0005	2010
1,1,2,2-Tetrachloroethane	0.001	0.0005	0.0001	2003
Tetrachloroethylene (PCE)	0.005	0.0005	0.00006	2001
Toluene	0.15	0.0005	0.15	1999
1,2,4-Trichlorobenzene	0.005	0.0005	0.005	1999
1,1,1-Trichloroethane (1,1,1-TCA)	0.2	0.0005	1	2006
1,1,2-Trichloroethane (1,1,2-TCA)	0.005	0.0005	0.0003	2006
Trichloroethylene (TCE)	0.005	0.0005	0.0017	2009
Trichlorofluoromethane (Freon 11)	0.15	0.005	1.3	2014

1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1.2	0.01	4	1997 (rev2011)
Vinyl chloride	0.0005	0.0005	0.00005	2000
Xylenes	1.75	0.0005	1.8	1997
(b) Non-Volatile Synthetic Organic Chemicals (SOCs)				
Alachlor	0.002	0.001	0.004	1997
Atrazine	0.001	0.0005	0.00015	1999
Bentazon	0.018	0.002	0.2	1999 (rev2009)
Benzo(a)pyrene	0.0002	0.0001	0.000007	2010
Carbofuran	0.018	0.005	0.0007	2016
Chlordane	0.0001	0.0001	0.00003	1997 (rev2006)
Dalapon	0.2	0.01	0.79	1997 (rev2009)
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00001	0.000003	2020
2,4-Dichlorophenoxyacetic acid (2,4-D)	0.07	0.01	0.02	2009
Di(2-ethylhexyl)adipate	0.4	0.005	0.2	2003
Di(2-ethylhexyl)phthalate (DEHP)	0.004	0.003	0.012	1997
Dinoseb	0.007	0.002	0.014	1997 (rev2010)
Diquat	0.02	0.004	0.006	2016
Endothal	0.1	0.045	0.094	2014
Endrin	0.002	0.0001	0.0003	2016
Ethylene dibromide (EDB)	0.00005	0.00002	0.00001	2003
Glyphosate	0.7	0.025	0.9	2007
Heptachlor	0.00001	0.00001	0.000008	1999
Heptachlor epoxide	0.00001	0.00001	0.000006	1999
Hexachlorobenzene	0.001	0.0005	0.00003	2003
Hexachlorocyclopentadiene	0.05	0.001	0.002	2014
Lindane	0.0002	0.0002	0.000032	1999 (rev2005)
Methoxychlor	0.03	0.01	0.00009	2010
Molinate	0.02	0.002	0.001	2008
Oxamyl	0.05	0.02	0.026	2009
Pentachlorophenol	0.001	0.0002	0.0003	2009
Picloram	0.5	0.001	0.166	2016
Polychlorinated biphenyls (PCBs)	0.0005	0.0005	0.00009	2007
Simazine	0.004	0.001	0.004	2001
Thiobencarb	0.07	0.001	0.042	2016
Toxaphene	0.003	0.001	0.00003	2003
1,2,3-Trichloropropane	0.000005	0.000005	0.0000007	2009
2,3,7,8-TCDD (dioxin)	$3x10^{-8}$	$5x10^{-9}$	$5x10^{-11}$	2010
2,4,5-TP (Silvex)	0.05	0.001	0.003	2014
Chemicals with MCLs in 22 CCR §64533—Disinfection Byproducts				
Total Trihalomethanes	0.080	--	--	--
Bromodichloromethane	--	0.0010	0.00006	2020

Bromoform	--	0.0010	0.0005	2020
Chloroform	--	0.0010	0.0004	2020
Dibromochloromethane	--	0.0010	0.0001	2020
Haloacetic Acids (five) (HAA5)	0.060	--	--	--
Monochloroacetic Acid	--	0.0020	--	--
Dichloroacetic Adic	--	0.0010	--	--
Trichloroacetic Acid	--	0.0010	--	--
Monobromoacetic Acid	--	0.0010	--	--
Dibromoacetic Acid	--	0.0010	--	--
Bromate	0.010	0.0050**	0.0001	2009
Chlorite	1.0	0.020	0.05	2009
Chemicals with PHGs established in response to DDW requests. These are not currently regulated drinking water contaminants.				
N-Nitrosodimethylamine (NDMA)	--	--	0.000003	2006
*OEHHA's review of this chemical during the year indicated (rev20XX) resulted in no change in the PHG.				
**The DLR for Bromate is 0.0010 mg/L for analysis performed using EPA Method 317.0 Revision 2.0, 321.8, or 326.0.				

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

Public Health Goals

Health Risk Information for Public Health Goal Exceedance Reports

February 2022

Pesticide and Environmental Toxicology Branch
Office of Environmental Health Hazard Assessment
California Environmental Protection Agency

Health Risk Information for Public Health Goal Exceedance Reports

Prepared by

Office of Environmental Health Hazard Assessment
California Environmental Protection Agency

February 2022

NEW for the 2022 Report: New in this document are an updated Public Health Goal(PHG) for 1,2-dibromo-3-chloropropane (DBCP) and newly established PHGs for the trihalomethanes bromodichloromethane, bromoform, chloroform, and dibromochloromethane.

Background: Under the Calderon-Sher Safe Drinking Water Act of 1996 (the Act), public water systems with more than 10,000 service connections are required to prepare a report every three years for contaminants that exceed their respective PHGs.[1]This document contains health risk information on regulated drinking water contaminants to assist public water systems in preparing these reports. A PHG is the concentration of a contaminant in drinking water that poses no significant health risk if consumed for a lifetime. PHGs are developed and published by the Office of Environmental Health Hazard Assessment (OEHHA) using current risk assessment principles, practices and methods.[2]

The water system's report is required to identify the health risk category (e.g., carcinogenicity or neurotoxicity) associated with exposure to each regulated contaminant in drinking water and to include a brief, plainly worded description of these risks. The report is also required to disclose the numerical public health risk, if available,associated with the California Maximum Contaminant Level (MCL) and with the PHG foreach contaminant. This health risk information document is prepared by OEHHA every three years to assist the water systems in providing the required information in their reports.

[1] Health and Safety Code Section 116470(b)
[2] Health and Safety Code Section 116365

Numerical health risks: Table 1 presents health risk categories and cancer risk valuesfor chemical contaminants in drinking water that have PHGs.

The Act requires that OEHHA publish PHGs based on health risk assessments using the most current scientific methods. As defined in statute, PHGs for non-carcinogenic chemicals in drinking water are set at a concentration “at which no known or anticipatedadverse health effects will occur, with an adequate margin of safety.” For carcinogens, PHGs are set at a concentration that “does not pose any significant risk to health.” PHGs provide one basis for revising MCLs, along with cost and technological feasibility.OEHHA has been publishing PHGs since 1997 and the entire list published to date is shown in Table 1.

Table 2 presents health risk information for contaminants that do not have PHGs but have state or federal regulatory standards. The Act requires that, for chemical contaminants with California MCLs that do not yet have PHGs, water utilities use the federal Maximum Contaminant Level Goal (MCLG) for the purpose of complying with the requirement of public notification. MCLGs, like PHGs, are strictly health based and include a margin of safety. One difference, however, is that the MCLGs for carcinogensare set at zero because the US Environmental Protection Agency (US EPA) assumes there is no absolutely safe level of exposure to such chemicals. PHGs, on the other hand, are set at a level considered to pose no *significant* risk of cancer; this is usually no more than a one-in-one-million excess cancer risk (1×10^{-6}) level for a lifetime of exposure. In Table 2, the cancer risks shown are based on the US EPA’s evaluations.

For more information on health risks: The adverse health effects for each chemicalwith a PHG are summarized in a PHG technical support document. These documentsare available on the OEHHA website (https://oehha.ca.gov/water/public-health-goals- phgs).

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Alachlor	carcinogenicity (causes cancer)	0.004	NA[5,6]	0.002	NA
Aluminum	neurotoxicity and immunotoxicity (harms the nervous and immune systems)	0.6	NA	1	NA
Antimony	hepatotoxicity (harms the liver)	0.001	NA	0.006	NA
Arsenic	carcinogenicity (causes cancer)	0.000004 (4×10^{-6})	1×10^{-6} (one per million)	0.01	2.5×10^{-3} (2.5 per thousand)
Asbestos	carcinogenicity (causes cancer)	7 MFL[7] (fibers >10 microns in length)	1×10^{-6}	7 MFL (fibers >10 microns in length)	1×10^{-6} (one per million)
Atrazine	carcinogenicity (causes cancer)	0.00015	1×10^{-6}	0.001	7×10^{-6} (seven per million)

[1] Based on the OEHHA PHG technical support document unless otherwise specified. The categories are the hazard traits defined by OEHHA for California's Toxics Information Clearinghouse (online at: https://oehha.ca.gov/media/downloads/risk-assessment//gcregtext011912.pdf).
[2] mg/L = milligrams per liter of water or parts per million (ppm)
[3] Cancer Risk = Upper bound estimate of excess cancer risk from lifetime exposure. Actual cancer risk may be lower or zero. 1×10^{-6} means one excess cancer case per million people exposed.
[4] MCL = maximum contaminant level.
[5] NA = not applicable. Cancer risk cannot be calculated.
[6] The PHG for alachlor is based on a threshold model of carcinogenesis and is set at a level that is believed to be without any significant cancer risk to individuals exposed to the chemical over a lifetime.
[7] MFL = million fibers per liter of water.

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Barium	cardiovascular toxicity (causes high blood pressure)	2	NA	1	NA
Bentazon	hepatotoxicity and digestive system toxicity (harms the liver, intestine, and causes body weight effects[8])	0.2	NA	0.018	NA
Benzene	carcinogenicity (causes leukemia)	0.00015	1×10^{-6}	0.001	7×10^{-6} (seven per million)
Benzo[a]pyrene	carcinogenicity (causes cancer)	0.000007 (7×10^{-6})	1×10^{-6}	0.0002	3×10^{-5} (three per hundred thousand)
Beryllium	digestive system toxicity (harms the stomach or intestine)	0.001	NA	0.004	NA
Bromate	carcinogenicity (causes cancer)	0.0001	1×10^{-6}	0.01	1×10^{-4} (one per ten thousand)
Cadmium	nephrotoxicity (harms the kidney)	0.00004	NA	0.005	NA
Carbofuran	reproductive toxicity (harms the testis)	0.0007	NA	0.018	NA

[8] Body weight effects are an indicator of general toxicity in animal studies.

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Carbon tetrachloride	carcinogenicity (causes cancer)	0.0001	1×10^{-6}	0.0005	5×10^{-6} (five per million)
Chlordane	carcinogenicity (causes cancer)	0.00003	1×10^{-6}	0.0001	3×10^{-6} (three per million)
Chlorite	hematotoxicity (causes anemia) neurotoxicity (causes neurobehavioral effects)	0.05	NA	1	NA
Chromium, hexavalent	carcinogenicity (causes cancer)	0.00002	1×10^{-6}	none	NA
Copper	digestive system toxicity (causes nausea, vomiting, diarrhea)	0.3	NA	1.3 (AL[9])	NA
Cyanide	neurotoxicity (damages nerves) endocrine toxicity (affects the thyroid)	0.15	NA	0.15	NA
Dalapon	nephrotoxicity (harms the kidney)	0.79	NA	0.2	NA
Di(2-ethylhexyl) adipate (DEHA)	developmental toxicity (disrupts development)	0.2	NA	0.4	NA

[9] AL = action level. The action levels for copper and lead refer to a concentration measured at the tap. Much of the copper and lead in drinking water is derived from household plumbing (The Lead and Copper Rule, Title 22, California Code of Regulations [CCR] section 64672.3).

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Di(2-ethylhexyl) phthalate (DEHP)	carcinogenicity (causes cancer)	0.012	1×10^{-6}	0.004	3×10^{-7} (three per ten million)
1,2-Dibromo-3-chloropropane (DBCP)	carcinogenicity (causes cancer)	0.000003 ($3x10^{-6}$)	1×10^{-6}	0.0002	7×10^{-5} (seven per hundred thousand)
1,2-Dichloro-benzene (*o*-DCB)	hepatotoxicity (harms the liver)	0.6	NA	0.6	NA
1,4-Dichloro-benzene (*p*-DCB)	carcinogenicity (causes cancer)	0.006	1×10^{-6}	0.005	8×10^{-7} (eight per ten million)
1,1-Dichloro-ethane (1,1-DCA)	carcinogenicity (causes cancer)	0.003	1×10^{-6}	0.005	2×10^{-6} (two per million)
1,2-Dichloro-ethane (1,2-DCA)	carcinogenicity (causes cancer)	0.0004	1×10^{-6}	0.0005	1×10^{-6} (one per million)
1,1-Dichloro-ethylene (1,1-DCE)	hepatotoxicity (harms the liver)	0.01	NA	0.006	NA
1,2-Dichloro-ethylene, cis	nephrotoxicity (harms the kidney)	0.013	NA	0.006	NA
1,2-Dichloro-ethylene, trans	immunotoxicity (harms the immune system)	0.05	NA	0.01	NA

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Dichloromethane (methylene chloride)	carcinogenicity (causes cancer)	0.004	1×10^{-6}	0.005	1×10^{-6} (one per million)
2,4-Dichloro-phenoxyacetic acid (2,4-D)	hepatotoxicity and nephrotoxicity (harms the liver and kidney)	0.02	NA	0.07	NA
1,2-Dichloro-propane (propylene dichloride)	carcinogenicity (causes cancer)	0.0005	1×10^{-6}	0.005	1×10^{-5} (one per hundred thousand)
1,3-Dichloro-propene (Telone II®)	carcinogenicity (causes cancer)	0.0002	1×10^{-6}	0.0005	2×10^{-6} (two per million)
Dinoseb	reproductive toxicity (harms the uterus and testis)	0.014	NA	0.007	NA
Diquat	ocular toxicity (harms the eye) developmental toxicity (causes malformation)	0.006	NA	0.02	NA
Endothall	digestive system toxicity (harms the stomach or intestine)	0.094	NA	0.1	NA
Endrin	neurotoxicity (causes convulsions) hepatotoxicity (harms the liver)	0.0003	NA	0.002	NA
Ethylbenzene (phenylethane)	hepatotoxicity (harms the liver)	0.3	NA	0.3	NA

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Ethylene dibromide (1,2-Dibromoethane)	carcinogenicity (causes cancer)	0.00001	1×10^{-6}	0.00005	5×10^{-6} (five per million)
Fluoride	musculoskeletal toxicity (causes tooth mottling)	1	NA	2	NA
Glyphosate	nephrotoxicity (harms the kidney)	0.9	NA	0.7	NA
Heptachlor	carcinogenicity (causes cancer)	0.000008 (8×10^{-6})	1×10^{-6}	0.00001	1×10^{-6} (one per million)
Heptachlor epoxide	carcinogenicity (causes cancer)	0.000006 (6×10^{-6})	1×10^{-6}	0.00001	2×10^{-6} (two per million)
Hexachloroben-zene	carcinogenicity (causes cancer)	0.00003	1×10^{-6}	0.001	3×10^{-5} (three per hundred thousand)
Hexachloro-cyclopentadiene (HCCPD)	digestive system toxicity (causes stomach lesions)	0.002	NA	0.05	NA
Lead	developmental neurotoxicity (causes neurobehavioral effects in children) cardiovascular toxicity (causes high blood pressure) carcinogenicity (causes cancer)	0.0002	$<1\times10^{-6}$ (PHG is not based on this effect)	0.015 (AL[9])	2×10^{-6} (two per million)

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Lindane (γ-BHC)	carcinogenicity (causes cancer)	0.000032	1×10^{-6}	0.0002	6×10^{-6} (six per million)
Mercury (inorganic)	nephrotoxicity (harms the kidney)	0.0012	NA	0.002	NA
Methoxychlor	endocrine toxicity (causes hormone effects)	0.00009	NA	0.03	NA
Methyl tertiary-butyl ether (MTBE)	carcinogenicity (causes cancer)	0.013	1×10^{-6}	0.013	1×10^{-6} (one per million)
Molinate	carcinogenicity (causes cancer)	0.001	1×10^{-6}	0.02	2×10^{-5} (two per hundred thousand)
Monochloro-benzene (chlorobenzene)	nephrotoxicity (harms the kidney)	0.07	NA	0.07	NA
Nickel	developmental toxicity (causes increased neonatal deaths)	0.012	NA	0.1	NA
Nitrate	hematotoxicity (causes methemoglobinemia)	45 as nitrate	NA	10 as nitrogen (=45 as nitrate)	NA
Nitrite	hematotoxicity (causes methemoglobinemia)	3 as nitrite	NA	1 as nitrogen (=3 as nitrite)	NA

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Nitrate and Nitrite	hematotoxicity (causes methemoglobinemia)	10 as nitrogen[10]	NA	10 as nitrogen	NA
N-nitroso-dimethyl-amine (NDMA)	carcinogenicity (causes cancer)	0.000003 (3×10^{-6})	1×10^{-6}	none	NA
Oxamyl	general toxicity (causes body weight effects)	0.026	NA	0.05	NA
Pentachloro-phenol (PCP)	carcinogenicity (causes cancer)	0.0003	1×10^{-6}	0.001	3×10^{-6} (three per million)
Perchlorate	endocrine toxicity (affects the thyroid) developmental toxicity (causes neurodevelop-mental deficits)	0.001	NA	0.006	NA
Picloram	hepatotoxicity (harms the liver)	0.166	NA	0.5	NA
Polychlorinated biphenyls (PCBs)	carcinogenicity (causes cancer)	0.00009	1×10^{-6}	0.0005	6×10^{-6} (six per million)
Radium-226	carcinogenicity (causes cancer)	0.05 pCi/L	1×10^{-6}	5 pCi/L (combined $Ra^{226+228}$)	1×10^{-4} (one per ten thousand)

[10] The joint nitrate/nitrite PHG of 10 mg/L (10 ppm, expressed as nitrogen) does not replace the individual values, and the maximum contribution from nitrite should not exceed 1 mg/L nitrite-nitrogen.

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Radium-228	carcinogenicity (causes cancer)	0.019 pCi/L	1×10^{-6}	5 pCi/L (combined $Ra^{226+228}$)	3×10^{-4} (three per ten thousand)
Selenium	integumentary toxicity (causes hair loss and nail damage)	0.03	NA	0.05	NA
Silvex (2,4,5-TP)	hepatotoxicity (harms the liver)	0.003	NA	0.05	NA
Simazine	general toxicity (causes body weight effects)	0.004	NA	0.004	NA
Strontium-90	carcinogenicity (causes cancer)	0.35 pCi/L	1×10^{-6}	8 pCi/L	2×10^{-5} (two per hundred thousand)
Styrene (vinylbenzene)	carcinogenicity (causes cancer)	0.0005	1×10^{-6}	0.1	2×10^{-4} (two per ten thousand)
1,1,2,2-Tetrachloro-ethane	carcinogenicity (causes cancer)	0.0001	1×10^{-6}	0.001	1×10^{-5} (one per hundred thousand)
2,3,7,8-Tetra-chlorodibenzo-*p*-dioxin (TCDD, or dioxin)	carcinogenicity (causes cancer)	5×10^{-11}	1×10^{-6}	3×10^{-8}	6×10^{-4} (six per ten thousand)

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Tetrachloro-ethylene (perchloro-ethylene, or PCE)	carcinogenicity (causes cancer)	0.00006	1×10^{-6}	0.005	8×10^{-5} (eight per hundred thousand)
Thallium	integumentary toxicity (causes hair loss)	0.0001	NA	0.002	NA
Thiobencarb	general toxicity (causes body weight effects) hematotoxicity (affects red blood cells)	0.042	NA	0.07	NA
Toluene (methylbenzene)	hepatotoxicity (harms the liver) endocrine toxicity (harms the thymus)	0.15	NA	0.15	NA
Toxaphene	carcinogenicity (causes cancer)	0.00003	1×10^{-6}	0.003	1×10^{-4} (one per ten thousand)
1,2,4-Trichloro-benzene	endocrine toxicity (harms adrenal glands)	0.005	NA	0.005	NA
1,1,1-Trichloro-ethane	neurotoxicity (harms the nervous system), reproductive toxicity (causes fewer offspring) hepatotoxicity (harms the liver) hematotoxicity (causes blood effects)	1	NA	0.2	NA

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
1,1,2-Trichloro-ethane	carcinogenicity (causes cancer)	0.0003	1×10^{-6}	0.005	2×10^{-5} (two per hundred thousand)
Trichloro-ethylene (TCE)	carcinogenicity (causes cancer)	0.0017	1×10^{-6}	0.005	3×10^{-6} (three per million)
Trichlorofluoro-methane (Freon 11)	accelerated mortality (increase in early death)	1.3	NA	0.15	NA
1,2,3-Trichloro-propane (1,2,3-TCP)	carcinogenicity (causes cancer)	0.0000007 (7×10^{-7})	1×10^{-6}	0.000005 (5×10^{-6})	7×10^{-6} (seven per million)
1,1,2-Trichloro-1,2,2-trifluoro-ethane (Freon 113)	hepatotoxicity (harms the liver)	4	NA	1.2	NA
Trihalomethanes: Bromodichloro-methane	carcinogenicity (causes cancer)	0.00006	1×10^{-6}	0.080*	1.3×10^{-3} (1.3 per thousand)[11]
Trihalomethanes: Bromoform	carcinogenicity (causes cancer)	0.0005	1×10^{-6}	0.080*	2×10^{-4} (two per ten thousand)[12]

* For total trihalomethanes (the sum of bromodichloromethane, bromoform, chloroform, and dibromochloromethane). There are no MCLs for individual trihalomethanes.

[11] Based on 0.080 mg/L bromodichloromethane; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.

[12] Based on 0.080 mg/L bromoform; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.

Table 1: Health Risk Categories and Cancer Risk Values for Chemicals with California Public Health Goals (PHGs)

Chemical	Health Risk Category[1]	California PHG (mg/L)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Trihalomethanes: Chloroform	carcinogenicity (causes cancer)	0.0004	1×10^{-6}	0.080*	2×10^{-4} (two per ten thousand)[13]
Trihalomethanes: Dibromochloro-methane	carcinogenicity (causes cancer)	0.0001	1×10^{-6}	0.080*	8×10^{-4} (eight per ten thousand)[14]
Tritium	carcinogenicity (causes cancer)	400 pCi/L	1×10^{-6}	20,000 pCi/L	5×10^{-5} (five per hundred thousand)
Uranium	carcinogenicity (causes cancer)	0.43 pCi/L	1×10^{-6}	20 pCi/L	5×10^{-5} (five per hundred thousand)
Vinyl chloride	carcinogenicity (causes cancer)	0.00005	1×10^{-6}	0.0005	1×10^{-5} (one per hundred thousand)
Xylene	neurotoxicity (affects the senses, mood, and motor control)	1.8 (single isomer or sum of isomers)	NA	1.75 (single isomer or sum of isomers)	NA

* For total trihalomethanes (the sum of bromodichloromethane, bromoform, chloroform, and dibromochloromethane). There are no MCLs for individual trihalomethanes.

13 Based on 0.080 mg/L chloroform; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.

14 Based on 0.080 mg/L dibromochloromethane; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.

Table 2: Health Risk Categories and Cancer Risk Values for Chemicals without California Public Health Goals

Chemical	Health Risk Category[1]	US EPA MCLG[2] (mg/L)	Cancer Risk[3] at the MCLG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Disinfection byproducts (DBPs)					
Chloramines	acute toxicity (causes irritation) digestive system toxicity (harms the stomach) hematotoxicity (causes anemia)	4[5,6]	NA[7]	none	NA
Chlorine	acute toxicity (causes irritation) digestive system toxicity (harms the stomach)	4[5,6]	NA	none	NA
Chlorine dioxide	hematotoxicity (causes anemia) neurotoxicity (harms the nervous system)	0.8[5,6]	NA	none	NA
Disinfection byproducts: haloacetic acids (HAA5)					
Monochloroacetic acid (MCA)	general toxicity (causes body and organ weight changes[8])	0.07	NA	none	NA

[1] Health risk category based on the US EPA MCLG document or California MCL document unless otherwise specified.
[2] MCLG = maximum contaminant level goal established by US EPA.
[3] Cancer Risk = Upper estimate of excess cancer risk from lifetime exposure. Actual cancer risk may be lower or zero. 1×10^{-6} means one excess cancer case per million people exposed.
[4] California MCL = maximum contaminant level established by California.
[5] Maximum Residual Disinfectant Level Goal, or MRDLG.
[6] The federal Maximum Residual Disinfectant Level (MRDL), or highest level of disinfectant allowed in drinking water, is the same value for this chemical.
[7] NA = not available.
[8] Body weight effects are an indicator of general toxicity in animal studies.

Table 2: Health Risk Categories and Cancer Risk Values for Chemicals without California Public Health Goals

Chemical	Health Risk Category[1]	US EPA MCLG[2] (mg/L)	Cancer Risk[3] at the MCLG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Dichloroacetic acid (DCA)	Carcinogenicity (causes cancer)	0	0	none	NA
Trichloroacetic acid (TCA)	hepatotoxicity (harms the liver)	0.02	NA	none	NA
Monobromoacetic acid (MBA)	NA	none	NA	none	NA
Dibromoacetic acid (DBA)	NA	none	NA	none	NA
Total haloacetic acids (sum of MCA, DCA, TCA, MBA, and DBA)	general toxicity, hepatotoxicity and carcinogenicity (causes body and organ weight changes, harms the liver and causes cancer)	none	NA	0.06	NA
Radionuclides					
Gross alpha particles[9]	carcinogenicity (causes cancer)	0 (^{210}Po included)	0	15 pCi/L[10] (includes radium but not radon and uranium)	up to $1x10^{-3}$ (for ^{210}Po, the most potent alpha emitter)

[9] MCLs for gross alpha and beta particles are screening standards for a group of radionuclides. Corresponding PHGs were not developed for gross alpha and beta particles. See the OEHHA memoranda discussing the cancer risks at these MCLs at http://www.oehha.ca.gov/water/reports/grossab.html.
[10] pCi/L = picocuries per liter of water.

Chemical	Health Risk Category[1]	US EPA MCLG[2] (mg/L)	Cancer Risk[3] at the MCLG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Beta particles and photon emitters[9]	carcinogenicity (causes cancer)	0 (^{210}Pb included)	0	50 pCi/L (judged equiv. to 4 mrem/yr)	up to 2×10^{-3} (for ^{210}Pb, the most potent beta-emitter)

ATTACHMENT NO. 3
Table 1
Reference: 2012 ACWA PHG Survey

COST ESTIMATES FOR TREATMENT TECHNOLOGIES
(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	Estimated Unit Cost 2012 ACWA Survey Indexed to 2021* ($/1,000 gallons treated)
1	Ion Exchange	Coachella Valley WD, for GW, to reduce Arsenic concentrations. 2011 costs.	2.40
2	Ion Exchange	City of Riverside Public Utilities, for GW, for Perchlorate treatment.	1.16
3	Ion Exchange	Carollo Engineers, anonymous utility, 2012 costs for treating GW source for Nitrates. Design souce water concentration: 88 mg/L NO_3. Design finished water concentration: 45 mg/L NO_3. Does not include concentrate disposal or land cost.	0.88
4	Granular Activated Carbon	City of Riverside Public Utilities, GW sources, for TCE, DBCP (VOC, SOC) treatment.	0.58
5	Granular Activated Carbon	Carollo Engineers, anonymous utility, 2012 costs for treating SW source for TTHMs. Design souce water concentration: 0.135 mg/L. Design finished water concentration: 0.07 mg/L. Does not include concentrate disposal or land cost.	0.42
6	Granular Activated Carbon, Liquid Phase	LADWP, Liquid Phase GAC treatment at Tujunga Well field. Costs for treating 2 wells. Treament for 1,1 DCE (VOC). 2011-2012 costs.	1.78
7	Reverse Osmosis	Carollo Engineers, anonymous utility, 2012 costs for treating GW source for Nitrates. Design souce water concentration: 88 mg/L NO_3. Design finished water concentration: 45 mg/L NO_3. Does not include concentrate disposal or land cost.	0.94
8	Packed Tower Aeration	City of Monrovia, treatment to reduce TCE, PCE concentrations. 2011-12 costs.	0.52
9	Ozonation+ Chemical addition	SCVWD, STWTP treatment plant includes chemical addition + ozone generation costs to reduce THM/HAAs concentrations. 2009-2012 costs.	0.11

COST ESTIMATES FOR TREATMENT TECHNOLOGIES

(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	Estimated Unit Cost 2012 ACWA Survey Indexed to 2021* ($/1,000 gallons treated)
10	Ozonation+ Chemical addition	SCVWD, PWTP treatment plant includes chemical addition + ozone generation costs to reduce THM/HAAs concentrations, 2009-2012 costs.	0.23
11	Coagulation/Filtration	Soquel WD, treatment to reduce manganese concentrations in GW. 2011 costs.	0.88
12	Coagulation/Filtration Optimization	San Diego WA, costs to reduce THM/Bromate, Turbidity concentrations, raw SW a blend of State Water Project water and Colorado River water, treated at Twin Oaks Valley WTP.	1.00
13	Blending (Well)	Rancho California WD, GW blending well, 1150 gpm, to reduce fluoride concentrations.	0.83
14	Blending (Wells)	Rancho California WD, GW blending wells, to reduce arsenic concentrations, 2012 costs.	0.68
15	Blending	Rancho California WD, using MWD water to blend with GW to reduce arsenic concentrations. 2012 costs.	0.81
16	Corrosion Inhibition	Atascadero Mutual WC, corrosion inhibitor addition to control aggressive water. 2011 costs.	0.10

*Costs were adjusted from date of original estimates to present, where appropriate, using the Engineering News Record (ENR) annual average Construction Cost Index of 12,1332021

ATTACHMENT NO. 3
Table 2
Reference: Other Agencies

COST ESTIMATES FOR TREATMENT TECHNOLOGIES

(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	**Estimated 2012 Unit Cost Indexed to 2021*** ($/1,000 gallons treated)
1	Reduction - Coagulation-Filtration	Reference: February 28, 2013, Final Report Chromium Removal Research, City of Glendale, CA. 100-2000 gpm. Reduce Hexavalent Chromium to 1 ppb.	1.91 - 11.96
2	IX - Weak Base Anion Resin	Reference: February 28, 2013, Final Report Chromium Removal Research, City of Glendale, CA. 100-2000 gpm. Reduce Hexavalent Chromium to 1 ppb.	1.96 – 8.19
3	IX	Golden State Water Co., IX w/disposable resin, 1 MGD, Perchlorate removal, built in 2010.	0.60
4	IX	Golden State Water Co., IX w/disposable resin, 1000 gpm, perchlorate removal (Proposed; O&M estimated).	1.31
5	IX	Golden State Water Co., IX with brine regeneration, 500 gpm for Selenium removal, built in 2007.	8.57
6	GFO/Adsorption	Golden State Water Co., Granular Ferric Oxide Resin, Arsenic removal, 600 gpm, 2 facilities, built in 2006.	2.24 - 2.39
7	RO	Reference: Inland Empire Utilities Agency : Chino Basin Desalter. RO cost to reduce 800 ppm TDS, 150 ppm Nitrate (as NO3); approx. 7 mgd.	2.93
8	IX	Reference: Inland Empire Utilities Agency : Chino Basin Desalter. IX cost to reduce 150 ppm Nitrate (as NO3); approx. 2.6 mgd.	1.63

9	Packed Tower Aeration	Reference: Inland Empire Utilities Agency : Chino Basin Desalter. PTA-VOC air stripping, typical treated flow of approx. 1.6 mgd.	0.49
10	IX	Reference: West Valley WD Report, for Water Recycling Funding Program, for 2.88 mgd treatment facility. IX to remove Perchlorate, Perchlorate levels 6-10 ppb. 2008 costs.	0.68 - 0.97
11	Coagulation Filtration	Reference: West Valley WD, includes capital, O&M costs for 2.88 mgd treatment facility- Layne Christensen packaged coagulation Arsenic removal system. 2009-2012 costs.	0.45
12	FBR	Reference: West Valley WD/Envirogen design data for the O&M + actual capitol costs, 2.88 mgd fluidized bed reactor (FBR) treatment system, Perchlorate and Nitrate removal, followed by multimedia filtration & chlorination, 2012. NOTE: The capitol cost for the treatment facility for the first 2,000 gpm is $23 million annualized over 20 years with ability to expand to 4,000 gpm with minimal costs in the future. $17 million funded through state and federal grants with the remainder funded by WVWD and the City of Rialto.	2.02 – 2.13

* Costs were adjusted from date of original estimates to present, where appropriate, using the Engineering News Record (ENR) annual average Construction Cost Index of 12,133 for 2021. .

ATTACHMENT NO. 3
Table 3
Reference: Updated 2012 ACWA Cost of Treatment Table

COST ESTIMATES FOR TREATMENT TECHNOLOGIES

(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	Estimated 2012 Unit Cost Indexed to 2021* ($/1,000 gallons treated)
1	Granular Activated Carbon	Reference: Malcolm Pirnie estimate for California Urban Water Agencies, large surface water treatment plants treating water from the State Water Project to meet Stage 2 D/DBP and bromate regulation, 1998	0.69 - 1.31
2	Granular Activated Carbon	Reference: Carollo Engineers, estimate for VOC treatment (PCE), 95% removal of PCE, Oct. 1994,1900 gpm design capacity	0.32
3	Granular Activated Carbon	Reference: Carollo Engineers, est. for a large No. Calif. surf. water treatment plant (90 mgd capacity) treating water from the State Water Project, to reduce THM precursors, ENR construction cost index = 6262 (San Francisco area) - 1992	1.51
4	Granular Activated Carbon	Reference: CH2M Hill study on San Gabriel Basin, for 135 mgd central treatment facility for VOC and SOC removal by GAC, 1990	0.59 - 0.86
5	Granular Activated Carbon	Reference: Southern California Water Co. - actual data for "rented" GAC to remove VOCs (1,1-DCE), 1.5 mgd capacity facility, 1998	2.71
6	Granular Activated Carbon	Reference: Southern California Water Co. - actual data for permanent GAC to remove VOCs (TCE), 2.16 mgd plant capacity, 1998	1.75
7	Reverse Osmosis	Reference: Malcolm Pirnie estimate for California Urban Water Agencies, large surface water treatment plants treating water from the State Water Project to meet Stage 2 D/DBP and bromate regulation, 1998	2.036 – 3.89
8	Reverse Osmosis	Reference: Boyle Engineering, RO cost to reduce 1000 ppm TDS in brackish groundwater in So. Calif., 1.0 mgd plant operated at 40% of design flow, high brine line cost, May 1991	4.80
9	Reverse Osmosis	Reference: Boyle Engineering, RO cost to reduce 1000 ppm TDS in brackish groundwater in So. Calif., 1.0 mgd plant operated at 100% of design flow, high brine line cost, May 1991	2.96
10	Reverse Osmosis	Reference: Boyle Engineering, RO cost to reduce 1000 ppm TDS in brackish groundwater in So. Calif., 10.0 mgd plant operated at 40% of design flow, high brine line cost, May 1991	3.20

COST ESTIMATES FOR TREATMENT TECHNOLOGIES

(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	Estimated 2012 Unit Cost Indexed to 2021* ($/1,000 gallons treated)
11	Reverse Osmosis	Reference: Boyle Engineering, RO cost to reduce 1000 ppm TDS in brackish groundwater in So. Calif., 10.0 mgd plant operated at 100% of design flow, high brine line cost, May 1991	2.48
12	Reverse Osmosis	Reference: Arsenic Removal Study, City of Scottsdale, AZ - CH2M Hill, for a 1.0 mgd plant operated at 40% of design capacity, Oct. 1991	8.04
13	Reverse Osmosis	Reference: Arsenic Removal Study, City of Scottsdale, AZ - CH2M Hill, for a 1.0 mgd plant operated at 100% of design capacity, Oct. 1991	4.75
14	Reverse Osmosis	Reference: Arsenic Removal Study, City of Scottsdale, AZ - CH2M Hill, for a 10.0 mgd plant operated at 40% of design capacity, Oct. 1991	3.55
15	Reverse Osmosis	Reference: Arsenic Removal Study, City of Scottsdale, AZ - CH2M Hill, for a 10.0 mgd plant operated at 100% of design capacity, Oct. 1991	2.20
16	Reverse Osmosis	Reference: CH2M Hill study on San Gabriel Basin, for 135 mgd central treatment facility with RO to remove nitrate, 1990	2.22 - 3.89
17	Packed Tower Aeration	Reference: Analysis of Costs for Radon Removal... (AWWARF publication), Kennedy/Jenks, for a 1.4 mgd facility operating at 40% of design capacity, Oct. 1991	1.27
18	Packed Tower Aeration	Reference: Analysis of Costs for Radon Removal... (AWWARF publication), Kennedy/Jenks, for a 14.0 mgd facility operating at 40% of design capacity, Oct. 1991	0.68
19	Packed Tower Aeration	Reference: Carollo Engineers, estimate for VOC treatment (PCE) by packed tower aeration, without off-gas treatment, O&M costs based on operation during 329 days/year at 10% downtime, 16 hr/day air stripping operation, 1900 gpm design capacity, Oct. 1994	0.34
20	Packed Tower Aeration	Reference: Carollo Engineers, for PCE treatment by Ecolo-Flo Enviro-Tower air stripping, without off-gas treatment, O&M costs based on operation during 329 days/year at 10% downtime, 16 hr/day air stripping operation, 1900 gpm design capacity, Oct. 1994	0.35
21	Packed Tower Aeration	Reference: CH2M Hill study on San Gabriel Basin, for 135 mgd central treatment facility - packed tower aeration for VOC and radon removal, 1990	0.55 - 0.90

COST ESTIMATES FOR TREATMENT TECHNOLOGIES

(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	Estimated 2012 Unit Cost Indexed to 2021* ($/1,000 gallons treated)
22	Advanced Oxidation Processes	Reference: Carollo Engineers, estimate for VOC treatment (PCE) by UV Light, Ozone, Hydrogen Peroxide, O&M costs based on operation during 329 days/year at 10% downtime, 24 hr/day AOP operation, 1900 gpm capacity, Oct. 1994	0.67
23	Ozonation	Reference: Malcolm Pirnie estimate for CUWA, large surface water treatment plants using ozone to treat water from the State Water Project to meet Stage 2 D/DBP and bromate regulation, *Cryptosporidium* inactivation requirements,1998	0.15 - 0.32
24	Ion Exchange	Reference: CH2M Hill study on San Gabriel Basin, for 135 mgd central treatment facility - ion exchange to remove nitrate, 1990	0.73 - 0.97

* Costs were adjusted from date of original estimates to present, where appropriate, using the Engineering News Record (ENR) annual average Construction Cost Index of 12,133 for 2021.

ATTACHMENT NO. 4

SAMPLE "HYPOTHETICAL" PUBLIC HEALTH GOAL REPORT AND TRANSMITTAL MEMORANDUM

NOTE: It is suggested that the Report take the form of a communication to the utility's Governing Board or management since the report does not have to be submitted to any government oversight agency. It is suggested that a transmittal memo from staff to the Board should succinctly summarize the report and indicate what action is needed, which as a minimum includes the scheduling of a public hearing and the formal public notice of the hearing.

SAMPLE MEMORANDUM TRANSMITTING REPORT TO GOVERN1NG BOARD:

TO: Governing Board, SoftWater Public Water Utility District

FROM: Betty Bestwater, General Manager

SUBJECT: Required Report on Public Health Goals

Attached for your approval is the final draft of a report prepared by staff comparing our district's drinking water quality with public health goals (PHGs) adopted by California EPA's Office of Environment al Health Hazard Assessment (OEHHA) and with maximum contaminant level goals (MCLGs) adopted by the USEPA. PHGs and MCLGs are not enforceable standards and no action to meet them is mandated.

SB 1307 (Calderone-Sher; effective 1-1-97) added new provisions to the California Health and Safety Code which mandate that a report be prepared by July 1, 1998, and every three years thereafter. The attached report is intended to provide information to the public in addition to the annual Consumer Confidence Report (CCR) mailed to each customer.

Our water system complies with all of the health-based drinking water standards and maximum contaminant levels (MCLs) required by the California Division of Drinking Water and the USEPA. No additional actions are recommended. *(If staff plans to recommend any action to further lower constituent levels, these actions should be noted here.)*

The new law requires that a public hearing be held (which can be part of a regularly scheduled public meeting) for the purpose of accepting and responding to public comment on the report. This public hearing will be scheduled as part of our regular board (or council, etc) meeting scheduled for_______________and will be noticed as required for public hearings.

Signed ______________________________ General Manager

SOFTWATER PUBLIC WATER UTILITY DISTRICT REPORT ON DISTRICT'S WATER QUALITY RELATIVE TO PUBLIC HEALTH GOALS

(Note: The names, data, and analytical values cited in this sample report are hypothetical and each utility would need to substitute its own data and adjust the comments accordingly. The constituents discussed are only examples of some that water utilities may have to address in this report. This is not the only way the report can be structured)

Background:

Provisions of the California Health and Safety Code (Reference No. I) specify that larger (> I0,000 service connections) water utilities prepare a special report by July I, 2016 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 law also requires that where OEHHA has not adopted a PHG for a constituent, the water suppliers are to use the MCLGs adopted by 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. (Reference No. 2 is a list of all regulated constituents with the MCLs and PHGs or MCLGs.)

There are a few 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 including Total Trihalomethanes. These will be addressed in a future required report after a PHG has been adopted.

The new law specifies what information is to be provided in the report. (See Reference No. I)

If a constituent was detected in the District's water supply between 2013 and 2015 at a level exceeding an applicable PHG or MCLG, this repo11 provides the information required by the law. Included 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 treatment technology available 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.

(Note: If "numerical health risk" data is not available from OEHHA, insert the following: "OEHHA is required to provide numerical health risk information, but has not done so in time to include it in this report").

What Are PHGs?

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. None of the practical risk-management factors that are considered by the USEPA or the California Division of Drinking Water in setting drinking water standards (MCLs) are considered in setting the PHGs. These factors include analytical detection capability, treatment technology available, benefits and costs. The PHGs are not enforceable and are not required to be met by any public water system. MCLGs are the federal equivalent to PHGs.

Water Quality Data Considered:

All of the water quality data collected by our water system between 2013 and 2015 for purposes of determining compliance with drinking water standards was considered. This data was all summarized in our 2013, 2014, and 2015 Consumer Confidence Reports which were mailed to all of our customers in _ . (Reference No. 3)

Guidelines Followed:

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

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 thatthe 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.

Constituents Detected That Exceed a PHG or a MCLG:

The following is a discussion of constituents that were detected in one or more of our drinking water sources at levels above the PHG, or if no PHG, above the MCLG.

Trichloroethylene (TCE): There is no PHG for TCE but the MCLG set by the USEPA is zero. The MCL or drinking water standard for TCE is 0.005 mg/I. We have detected TCE in 2 of our 20 wells at a level of 0.002 mg/I in Well No. I and at 0.003 mg/I in Well No. 8. The levels detected were below the MCLs at all times. The category of health risk associated with TCE, and the reason that a drinking water standard was adopted for it, is that people who drink water containing TCE above the MCL throughout their lifetimecould experience an increased risk of getting cancer. DDW says that "Drinking water which meets this standard (the MCL) is associated with little to none of this risk and should be considered safe with respect to TCE." *(NOTE: This language is taken ji-om the DDW Blue Book of drinking water law and regulations, Section 64468.2, Title 22, CCR.)* The numerical health risk for a MCLG of zero is zero. The BAT for TCE to lower the level below the MCL is either Granular Activated Carbon (GAC)or Packed Tower Aeration (PTA). Since the TCE level in these two wells is already below the MCL, GAC with a long empty bed contact time (EBCT) would likely be required to attempt to lower the TCE level to zero. The estimated cost to install and operate such a treatment system on both Wells No. I and No. 8 that would reliably reduce the TCE level to zero would be approximately $ initial construction cost with additional O&M cost of $ per year. This would result in an assumed increased cost for each customer of $, ear.

E. coli:

In July 2021, the California Revised Total Coliform Rule became effective. The revisions included the new Coliform Treatment Technique requirement replacing the Total Coliform MCL, and a new *E. coli* MCL regulatory limit. The purpose for the revisions was to provide the public with increased protection against microbial pathogens in drinking water served by public water systems. A water system is in violation of the *E. coli* MCL if any of the following trigger levels occur:

1. *E. coli*-positive repeat sample following total coliform-positive routine sample
2. Total coliform-positive repeat sample following an *E. coli* routine sample
3. Failure to collect all required repeat samples following an *E. coli*-positive routine sample
4. Failure to test for *E. coli* when any repeat sample is total coliform-positive

Coliform bacteria are an indicator organism that are ubiquitous in nature and are not generally considered harmful. They are used because of the ease in monitoring and analysis. However, the presence of *E.* coli bacteria indicates that the water may be contaminated with human or animal wastes. These bacteria can make people sick and are a particular concern for those with weakened immune systems.
In the month of October 2021, we collected 120 samples from our distribution system for coliform analysis. One of these samples had tested positive for total coliform bacteria and was absent for *E. coli* bacteria. However, the repeat sample we had conducted tested positive for both total coliform bacteria and *E. coli* bacteria; we had exceeded the *E. coli* MCL. In coordinating with our local regulating agency, we initiated a Tier 1 public notification (Boil Water Order) and conducted a Level 2 assessment to identify the cause of the *E .coli*-positive sample. The cause was determined to be (*insert cause of contamination)* and the following corrective actions were taken…(*insert corrective actions taken).*

Alternative No. 1: "We are working closely with our regional water supplier and have instituted new disinfection procedures to provide for a slightly higher disinfectant residua l. Our disinfectant is chloramines. This increase has been carefully studied before it was implemented. This careful balance of treatment processes used is essential to continue supplying our customers with safe drinking water."

Alternative No. 2: "We add chlorine at our sources to assure that the water served is microbiologically safe. The chlorine 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 withsafe drinking water."

Other equally important measures that we have implemented include: an effective cross-connection control program, maintenance of a disinfectant residua l throughout our system, an effective monitoring and surveillance program and maintaining positive pressures in our distribution system. Our system has already taken all of the steps described by DDW as "best available technology" for colifom1 bacteria inSection 64447, Title 22, CCR.

(Note: Jf a utility is planning to initiate different treatment or new programs, these should be described and cost estimates could be included.)

Lead and/or Copper:

There is no MCL for Lead or Copper. Instead the 90th percentile value of all samples from house hold taps in the distribution system cannot exceed an Action Level of 0.015 mg/I for lea d and 1.3 mg/I for copper. The PHG for lead is 0.002 mg/I. The PH G for copper is 0.17 mg/I.

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. *(Note: If OEHHA provides this information prior to completion of a utility's report, it should be inserted here.)*

All of our source water samples for lead and copper in 200 were less than the PHG. Based on extensive sampling of our distribution system in 200, our 90th percentile value for lead was 0.006 mg/I and for copper was 0.18 mg/ I.

Our water system is in full compliance with the Federal and State 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 DDW to have "optimized corrosion control" for our system.

In general, optimizing corrosion control is considered to be the best available techno logy to deal with corrosion issues and with any lead or copper findings. We continue to monitor our wa ter quality parameters that relate to corrosivity, such as the pH, hardness, alkalinity, total dissolved solids, and will take action if necessary to maintain our sys tem in an "optimized corrosion control" condition.

Alternative No. 1: Since we are meeting the "optimized corrosion control" requirements, 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.

Alternative No. 2: To further reduce the potential that lead (or copper) values at consumer taps would exceed the PHO, corrosion control treatment could be installed at all of our sources at an estimated initial cost of $____ and an ongoing annual O&M cost of $_ _ _ _ _ which would be equivalent to $ per service connection.

RECOMMENDATIONS FOR FURTHER ACTION:

The drinking water quality of the SoftWater Public Water Utility District meets all State of California, DDW and USEPA 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.

Optional additional language: "The money that would be required for these additional treatment processes might provide greater public health protection benefits if spent on other water system operation, surveillance, and monitoring programs."

REFERENCES:

No.I Excerpt from Calif Health & Safety Code: Section 116470 (b)No.2
Table of Regulated Constituents with MCLs, PHGs or MCLGs
No.3 SoftWater Public Water Utility District's 2013, 2014 and 2015 Water Quality Reports
No.4 Glossary of terms and abbreviations used in report *(Optional)*

APPENDIX 7

MCLs, DLRs, PHGs, for Regulated Drinking Water Contaminants

(Units are in milligrams per liter (mg/L), unless otherwise noted.)

Last Update: January 3, 2023

The following tables includes California’s maximum contaminant levels (MCLs), detection limits for purposes of reporting (DLRs), public health goals (PHGs) from the Office of Environmental Health Hazard Assessment (OEHHA). For comparison, Federal MCLs and Maximum Contaminant Level Goals (MCLGs) (USEPA) are also displayed.

Inorganic Chemicals Table, Chemicals with MCLs in 22 CCR §64431

State Regulated Inorganic Chemical Contaminant	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Aluminum	1	0.05	0.6	2001	--	--
Antimony	0.006	0.006	0.001	2016	0.006	0.006
Arsenic	0.010	0.002	0.000004	2004	0.010	zero
Asbestos (MFL = million fibers per liter; for fibers >10 microns long)	7 MFL	0.2 MFL	7 MFL	2003	7 MFL	7 MFL
Barium	1	0.1	2	2003	2	2
Beryllium	0.004	0.001	0.001	2003	0.004	0.004
Cadmium	0.005	0.001	0.00004	2006	0.005	0.005
Chromium, Total - OEHHA withdrew the 0.0025-mg/L PHG	0.05	0.01	withdrawn Nov. 2001	1999	0.1	0.1

State Regulated Inorganic Chemical Contaminant	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Chromium, Hexavalent - 0.01-mg/L MCL & 0.001-mg/L DLR repealed September 2017	--	--	0.00002	2011	--	--
Cyanide	0.15	0.1	0.15	1997	0.2	0.2
Fluoride	2	0.1	1	1997	4.0	4.0
Mercury (inorganic)	0.002	0.001	0.0012	1999 (rev2005)*	0.002	0.002
Nickel	0.1	0.01	0.012	2001	--	--
Nitrate (as nitrogen, N)	10 as N	0.4	45 as NO3 (=10 as N)	2018	10	10
Nitrite (as N)	1 as N	0.4	1 as N	2018	1	1
Nitrate + Nitrite (as N)	10 as N	--	10 as N	2018	--	--
Perchlorate	0.006	0.002	0.001	2015	--	--
Selenium	0.05	0.005	0.03	2010	0.05	0.05
Thallium	0.002	0.001	0.0001	1999 (rev2004)	0.002	0.0005

Copper and Lead Table, 22 CCR §64672.3

Values referred to as MCLs for lead and copper are not actually MCLs; instead, they are called “Action Levels” under the lead and copper rule.

State Regulated Copper and Lead Contaminant	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Copper	1.3	0.05	0.3	2008	1.3	1.3
Lead	0.015	0.005	0.0002	2009	0.015	zero

Radiological Table, Radionuclides with MCLs in 22 CCR §64441 and §64443

[units are picocuries per liter (pCi/L), unless otherwise state; n/a = not applicable]

State Regulated Radionuclides Contaminant	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Gross alpha particle activity - OEHHA concluded in 2003 that a PHG was not practical	15	3	none	n/a	15	zero
Gross beta particle activity - OEHHA concluded in 2003 that a PHG was not practical	4 mrem/yr	4	none	n/a	4 mrem/yr	zero
Radium-226	--	1	0.05	2006		
Radium-228	--	1	0.019	2006		
Radium-226 + Radium-228	5	--	--	--	5	zero

State Regulated Radionuclides Contaminant	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Strontium-90	8	2	0.35	2006	--	--
Tritium	"20,000"	"1,000"	400	2006	--	--
Uranium	20	1	0.43	2001	30 µg/L	zero

Organic Chemicals Table, Chemicals with MCLs in 22 CCR §64444

Volatile Organic Chemicals (VOCs)

State Regulated Volatile Organic Contaminants	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Benzene	0.001	0.0005	0.00015	2001	0.005	zero
Carbon tetrachloride	0.0005	0.0005	0.0001	2000	0.005	zero
1,2-Dichlorobenzene	0.6	0.0005	0.6	1997 (rev2009)	0.6	0.6
1,4-Dichlorobenzene (p-DCB)	0.005	0.0005	0.006	1997	0.075	0.075
1,1-Dichloroethane (1,1-DCA)	0.005	0.0005	0.003	2003	--	--
1,2-Dichloroethane (1,2-DCA)	0.0005	0.0005	0.0004	1999 (rev2005)	0.005	zero
1,1-Dichloroethylene (1,1-DCE)	0.006	0.0005	0.01	1999	0.007	0.007

State Regulated Volatile Organic Contaminants	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
cis-1,2-Dichloroethylene	0.006	0.0005	0.013	2018	0.07	0.07
trans-1,2-Dichloroethylene	0.01	0.0005	0.05	2018	0.1	0.1
Dichloromethane (Methylene chloride)	0.005	0.0005	0.004	2000	0.005	zero
1,2-Dichloropropane	0.005	0.0005	0.0005	1999	0.005	zero
1,3-Dichloropropene	0.0005	0.0005	0.0002	1999 (rev2006)	--	--
Ethylbenzene	0.3	0.0005	0.3	1997	0.7	0.7
Methyl tertiary butyl ether (MTBE)	0.013	0.003	0.013	1999	--	--
Monochlorobenzene	0.07	0.0005	0.07	2014	0.1	0.1
Styrene	0.1	0.0005	0.0005	2010	0.1	0.1
1,1,2,2-Tetrachloroethane	0.001	0.0005	0.0001	2003	0.1	0.1
Tetrachloroethylene (PCE)	0.005	0.0005	0.00006	2001	0.005	zero
Toluene	0.15	0.0005	0.15	1999	1	1
1,2,4-Trichlorobenzene	0.005	0.0005	0.005	1999	0.07	0.07

State Regulated Volatile Organic Contaminants	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
1,1,1-Trichloroethane (1,1,1-TCA)	0.200	0.0005	1	2006	0.2	0.2
1,1,2-Trichloroethane (1,1,2-TCA)	0.005	0.0005	0.0003	2006	0.005	0.003
Trichloroethylene (TCE)	0.005	0.0005	0.0017	2009	0.005	zero
Trichlorofluoromethane (Freon 11)	0.15	0.005	1.3	2014	--	--
"1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)"	1.2	0.01	4	1997 (rev2011)	--	--
Vinyl chloride	0.0005	0.0005	0.00005	2000	0.002	zero
Xylenes	1.750	0.0005	1.8	1997	10	10

Non-Volatile Synthetic Organic Chemicals (SOCs)

State Regulated Non-Volatile Synthetic Organic Contaminants	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Alachlor	0.002	0.001	0.004	1997	0.002	zero
Atrazine	0.001	0.0005	0.00015	1999	0.003	0.003
Bentazon	0.018	0.002	0.2	1999 (rev2009)	--	--

State Regulated Non-Volatile Synthetic Organic Contaminants	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Benzo(a)pyrene	0.0002	0.0001	0.000007	2010	0.0002	zero
Carbofuran	0.018	0.005	0.0007	2016	0.04	0.04
Chlordane	0.0001	0.0001	0.00003	1997 (rev2006)	0.002	zero
Dalapon	0.2	0.01	0.79	1997 (rev2009)	0.2	0.2
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00001	0.000003	2020	0.0002	zero
2,4-Dichlorophenoxyacetic acid (2,4-D)	0.07	0.01	0.02	2009	0.07	0.07
Di(2-ethylhexyl)adipate	0.4	0.005	0.2	2003	0.4	0.4
Di(2-ethylhexyl)phthalate (DEHP)	0.004	0.003	0.012	1997	0.006	zero
Dinoseb	0.007	0.002	0.014	1997 (rev2010)	0.007	0.007
Diquat	0.02	0.004	0.006	2016	0.02	0.02
Endothal	0.1	0.045	0.094	2014	0.1	0.1

State Regulated Non-Volatile Synthetic Organic Contaminants	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Endrin	0.002	0.0001	0.0003	2016	0.002	0.002
Ethylene dibromide (EDB)	0.00005	0.00002	0.00001	2003	0.00005	zero
Glyphosate	0.7	0.025	0.9	2007	0.7	0.7
Heptachlor	0.00001	0.00001	0.000008	1999	0.0004	zero
Heptachlor epoxide	0.00001	0.00001	0.000006	1999	0.0002	zero
Hexachlorobenzene	0.001	0.0005	0.00003	2003	0.001	zero
Hexachlorocyclopentadiene	0.05	0.001	0.002	2014	0.05	0.05
Lindane	0.0002	0.0002	0.000032	1999 (rev2005)	0.0002	0.0002
Methoxychlor	0.03	0.01	0.00009	2010	0.04	0.04
Molinate	0.02	0.002	0.001	2008	--	--
Oxamyl	0.05	0.02	0.026	2009	0.2	0.2
Pentachlorophenol	0.001	0.0002	0.0003	2009	0.001	zero
Picloram	0.5	0.001	0.166	2016	0.5	0.5

State Regulated Non-Volatile Synthetic Organic Contaminants	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Polychlorinated biphenyls (PCBs)	0.0005	0.0005	0.00009	2007	0.0005	zero
Simazine	0.004	0.001	0.004	2001	0.004	0.004
Thiobencarb	0.07	0.001	0.042	2016	--	--
Toxaphene	0.003	0.001	0.00003	2003	0.003	zero
1,2,3-Trichloropropane	0.000005	0.000005	0.0000007	2009	--	--
2,3,7,8-TCDD (dioxin)	3x10-8	5x10-9	5x10-11	2010	3x10-8	zero
2,4,5-TP (Silvex)	0.05	0.001	0.003	2014	0.05	0.05

Disinfection Byproducts Table, Chemicals with MCLs in 22 CCR §64533

State Regulated Disinfection Byproducts Contaminants	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Total Trihalomethanes	0.080	--	--	--	0.080	--
Bromodichloromethane	--	0.0010	0.00006	2020	--	zero
Bromoform	--	0.0010	0.0005	2020	--	zero

State Regulated Disinfection Byproducts Contaminants	State MCL	State DLR	State PHG	State Date of PHG	Federal MCL	Federal MCLG
Chloroform	--	0.0010	0.0004	2020	--	0.07
Dibromochloromethane	--	0.0010	0.0001	2020	--	0.06
Haloacetic Acids (five) (HAA5)	0.060	--	--	--	0.060	--
Monochloroacetic Acid	--	0.0020	0.053	2022	--	0.07
Dichloroacetic Acid	--	0.0010	0.0002	2022	--	zero
Trichloroacetic Acid	--	0.0010	0.0001	2022	--	0.02
Monobromoacetic Acid	--	0.0010	0.025	2022	--	--
Dibromoacetic Acid	--	0.0010	0.00003	2022	--	--
Bromate	0.010	0.0050**	0.0001	2009	0.01	zero
Chlorite	1.0	0.020	0.05	2009	1	0.8

Chemicals with PHGs established in response to DDW requests. These are not currently regulated drinking water contaminants.

State Regulated Disinfection Byproducts Contaminants	**State MCL**	**State DLR**	**State PHG**	**State Date of PHG**	**Federal MCL**	**Federal MCLG**
N-Nitrosodimethylamine (NDMA)	--	--	0.000003	2006	--	--

*OEHHA's review of this chemical during the year indicated (rev20XX) resulted in no change in the PHG.

**The DLR for Bromate is 0.0010 mg/L for analysis performed using EPA Method 317.0 Revision 2.0, 321.8, or 326.0.