Los Angeles Department of Water & Power

Drinking Water Public Health Goals Report

Los Angeles Department of Water and Power
Water System | Water Quality Division

2022

ladwp.com/waterquality

The mission of the Water System at the Los Angeles Department of Water and Power is to support the vitality and sustainability of the City, providing our customers and the communities we serve with reliable, high quality and competitively priced water services in a safe, publicly and environmentally responsible manner.

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TERMS USED IN THIS REPORT

Action Level (AL)	The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.
Best Available Technology (BAT)	BAT as identified by United States Environmental Protection Agency (USEPA) is a treatment technology that has high-removal efficiencies, is compatible with other types of water treatment processes, is commercially available, is not limited to use only in particular geographic regions, has integrity for a reasonable service life, is reasonably affordable by large MWD water systems, and can be mass-produced and put into service in time for implementation of regulations.
Cancer Risk	Cancer Risk is the upper bound estimate of excess cancer risk from lifetime exposure. Actual cancer risk may be lower or zero. Cancer risk is stated in terms of excess cancer cases per million (or fewer) population, e.g., 1×10^{-6} means one additional cancer case per million population exposed; 5×10^{-5} means five additional cancer cases per 100,000 population exposed.
Carcinogen	Carcinogen is a compound suspected or proven to cause cancer in humans. Research studies conducted to prove a constituent is a carcinogen are usually conducted on mice or rats. The compound is a ‘proven’ carcinogen when a percentage of the animals develop tumors, but it will be considered a “probable” or “possible” human carcinogen if limited or no human data are available.
Carcinogenic	Carcinogenic means capable of producing or initiating cancer.
Chloramine	A combination of chlorine and ammonia, which is used as a disinfectant. Chloramine is an approved disinfectant, which is less reactive with naturally occurring organic matter in water, forming fewer byproducts.
DDW	State Water Resources Control Board – Division of Drinking Water

Detection Limit for Purposes of Reporting (DLR)
Detection limit for purposes of reporting is established by DDW for each contaminant that is regulated. This is the lowest detection level that all water laboratories in California are expected to meet. The DLR factors the measuring precision that can be obtained by standard tests methods and laboratory instrumentation.

Disinfection Byproducts (DBPs)
Compounds that form when naturally occurring organic matter combines with chemicals used to disinfect drinking water, such as chlorine. The most common disinfection by-products are trihalomethanes, which are created when chlorine reacts with humic compounds in drinking water.

Gastrointestinal
Relating to, affecting, or including both the stomach and intestines.

Granular Activated Carbon (GAC)
This material is generally made from coal or other organic matter, such as wood, peat, or coconut shells. GAC has a high surface area (up to about 1000 square meters per gram), which attracts organics present in the water. GAC is placed in a structure, much like a filter, and the water is passed through the media to remove the organic components. After time, the capacity of GAC to remove organic materials is used up and GAC must be replaced or regenerated. Regeneration entails heating GAC up to about 850°C and adding steam to remove the accumulated organics.

High-Rate Clarification
Clarification is a process which uses a chemical coagulant with or without an aid to bind particulate matter into "flocs" and then removes the flocs from the water by settling. "High-rate" modifications, such as a floc blanket or addition of micro-sand reduce the cost and footprint of the process. Clarification is effective at removing microbial contaminants and organic precursors to disinfection by-products. When used with a ferric salt as the primary coagulant, clarification has been shown to be very effective at arsenic removal.

Maximum Contaminant Level (MCL)
The enforceable drinking water standard set by either the USEPA or the DDW. MCLs are based on the lowest observed health effects level plus a margin of safety and the current technology available to detect and treat the constituent. USEPA can set a treatment technique in lieu of MCL for compounds that are difficult to monitor or are affected by conditions in the distribution system.

Maximum Contaminant Level Goal (MCLG)
The level at which no observable adverse effect to health is demonstrated. MCLGs are similar to the California equivalent of PHGs, but not equivalent. MCLGs are non-enforceable goals established by USEPA based solely on health considerations for non-carcinogenic constituents. For all carcinogenic constituents (i.e., those compounds known or suspected of causing cancer), USEPA's policy is to set the MCLG at zero.

Neurotoxic	Capable of destroying or adversely affecting the nervous system or interfering with nerve signal transmission. Effects may be reversible (for example, effects on chemicals that carry nerve signals across gaps between nerve cells) or irreversible (destruction of nerve cells).
OEHHA	California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, that is responsible for developing Public Health Goals.
Public Health Goal (PHG)	The concentration of a contaminant in drinking water that poses no significant health risk if consumed in a lifetime. PHGs are developed and published by OEHHA using current risk assessment, principles, and practices. This is usually no more than a one-in-one million excess cancer risk (1x 10^{-6}) level for a lifetime of exposure.
Reverse Osmosis (RO)	RO is similar to nanofiltration, but the pore diameter is about ten times smaller. There is very little that remains in the water after RO Treatment. For that reason, the waste stream is even more difficult to dispose of than that of nanofiltration. Another downside of RO is the amount of the waste stream. This is typically about 10 percent of the water that is treated by the system.
Treatment Technique	A required practice intended to reduce the level of a contaminant in drinking water that is set by USEPA for contaminants that are difficult or costly to measure. For these contaminants, USEPA may choose a specific water treatment practice (such as filtration or corrosion control) to reduce these contaminants. The treatment technique is used instead of setting an MCL for these contaminants.

EXECUTIVE SUMMARY

The Los Angeles Department of Water and Power (LADWP) provides water that meets all drinking water standards and requirements. LADWP strives to provide the highest quality water at an affordable cost to our customers. This Public Health Goals Report (Report) identifies the contaminants in the Los Angeles water supplies that are within drinking water standards but above their respective state Public Health Goal (PHG) or federal Maximum Contaminant Level Goal (MCLG). The contaminants were identified during calendar years 2019 to 2021. Both the PHGs and MCLGs represent non-enforceable goals, at which a theoretical minimal risk to public health is expected. These goals can be useful for establishing drinking water standards that water supplies must meet.

The Report explains the following three important realities of drinking water safety:

- There is no established treatment method for some of the constituents.
- There are significant costs and resources required to build and operate additional water treatment facilities needed to achieve the PHG thresholds.
    - LADWP estimates it would require an additional $6.2 billion in capital investments and $520 million in annual operations and maintenance costs, and additional staffing.
- There are environmental tradeoffs to the additional treatment, such as energy usage, chemical usage, and water loss.

LADWP routinely monitors its water supplies for over 148 substances, of which 91 have a Maximum Contaminant Level (MCL) and eight have treatment techniques, making a total of 99 that have enforceable health-based standards. During the 2019 to 2021 monitoring period, 24 regulated contaminants were detected in at least one of the City of Los Angeles' (City) major water supplies. Although seven were at levels above a PHG or MCLG, all were at levels far below enforceable drinking water standards and each represented a very small health risk (see Appendix, Tables 1 and 2).

Treating the City's drinking water to PHG and MCLG standards will require significant investment and new LADWP treatment facilities. The estimated cost using current Best Available Technology (BAT), is over $6 billion (B) in capital investments coupled with an increased budget for annual operations and maintenance of about $520 million (M). These additional treatment costs would cause the typical residential bill to increase by 64% (see Appendix, Table 3).

Currently, LADWP's ten-year capital plan is $9.4B in the FY 2022-23 Water System Budget This does not include investments needed to achieve the PHG's and MCLG's described in this report.

LADWP must carefully evaluate any additional actions beyond the planned capital programs for water quality. At this time, it is unclear how much additional public health benefit would be realized by improving the quality of drinking water to PHG levels. However, efforts should be made to reduce risks in the most efficient manner possible.

BACKGROUND

The California Safe Drinking Water Act of 1996 added requirements for the PHG reporting to the California Code of Regulations (CCR). Since 1997, water agencies are required to prepare a PHG report once every three years. Under the CCR Section 116470(b), public water systems with more than 10,000 service connections must prepare a PHG report if one or more detected constituents in water exceed a PHG.

The California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) is required to adopt PHGs for all regulated drinking water contaminants and for any new contaminant that will be considered for regulation. The first 27 PHGs were adopted by OEHHA on December 31, 1997. PHGs represent non-enforceable goals based solely on public health considerations. The PHGs are developed using the best available health effects data in current scientific literature. Since 1997 a total of 95 PHGs have been adopted by OEHHA.

The process of developing drinking water standards begins by calculating a theoretical level at which a contaminant may be present in drinking water without causing adverse health effects. This level, which assumes minimal to zero risk, is called a “goal” and often is not practically achievable because the technology may not exist to remove a contaminant to that level. Also, the costs to remove a contaminant may be prohibitive. Nevertheless, the goals are useful tools for assessing risk when determining standards, or MCLs, that water suppliers are required to meet. The federal Safe Drinking Water Act requires regulators to establish an MCL as close as feasible to the MCLG, taking into consideration among many factors, cost, and technical feasibility.

This Report is intended to provide decision makers and our customers with specific information regarding drinking water safety and what actions are needed to move water quality closer to these goals.

LADWP MAJOR WATER SOURCES

The City's water supply comes from three major water sources, each of varying water quality with different levels of constituents and contaminants. To manage a citywide water quality program, it is necessary to treat these source waters to varying degrees depending on the types and levels of contaminants found in each source. For consistency, the monitoring points chosen for comparison to the PHGs (or the MCLGs) are the same as those found in LADWP's annual Drinking Water Quality Report available at www.ladwp.com/waterquality. These monitoring points represent our three major supply sources. These three sources are shown in Figure 1, and are discussed as follows:

Los Angeles Aqueduct Filtration Plant

The Los Angeles Aqueduct Filtration Plant (LAAFP) provided an average of 41 percent of the City's water supply from 2019 to 2021, which represents the quality of treated water from the plant in Sylmar, CA. LAAFP receives untreated water from the eastern Sierra Nevada via the Los Angeles Aqueduct (LAA) and untreated water from the Sacramento-San Joaquin River Delta via the Californian Aqueduct supplied by the Metropolitan Water District of Southern California (MWD). LAAFP treats the water by ozonation, filtration and ultra-violet light (UV). Chloramine, which is also used for disinfection, is added before the water is distributed to customers. LAAFP serves most of the San Fernando Valley and the Western portion of the City (as far south as the Los Angeles International Airport). Some of LAAFP water is also blended with local well water, which is the second major water source. A portion of the LAAFP water is stored in the Los Angeles Reservoir prior to being served to customers.

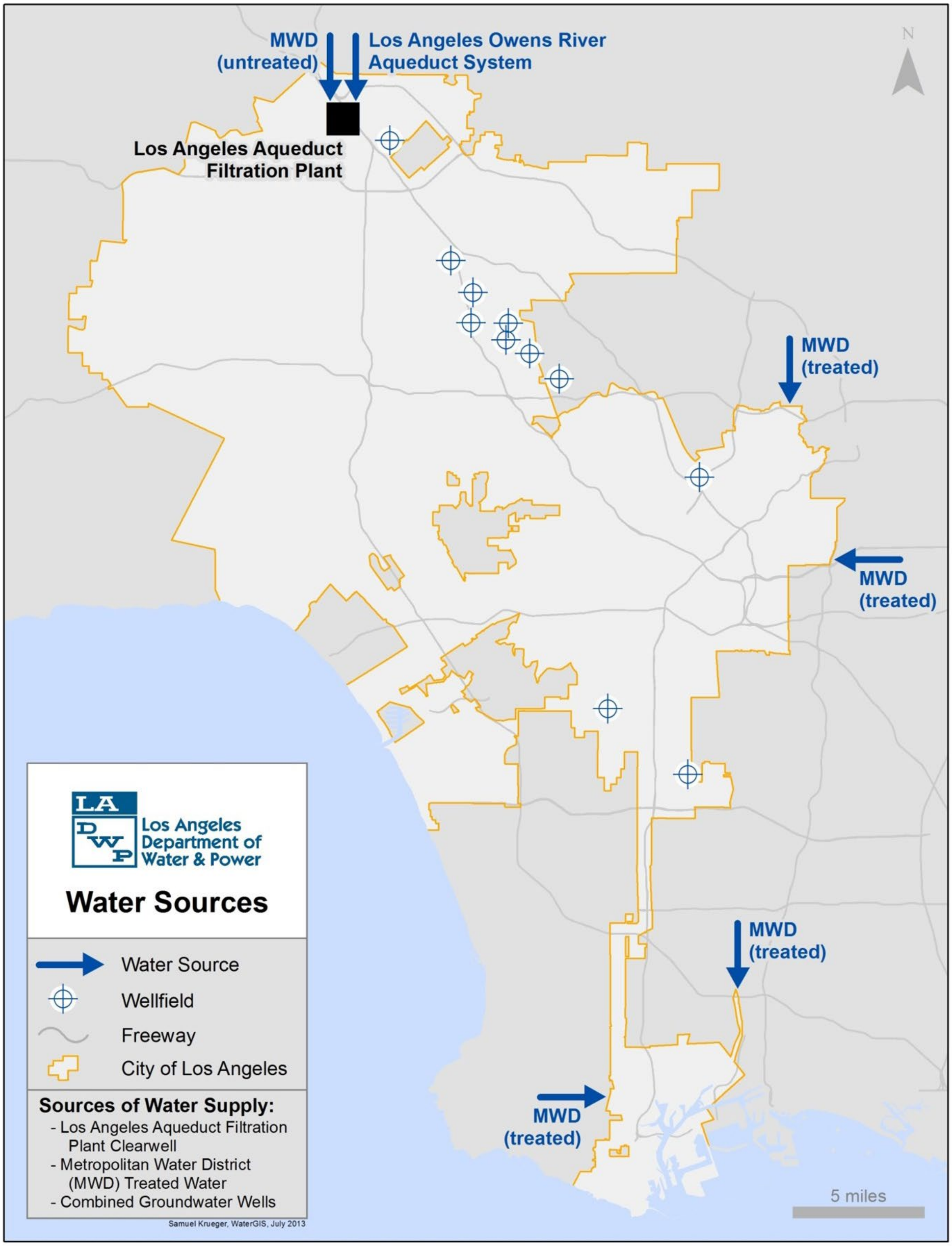
Combined Groundwater Wells

All the wells combined provided an average of 9 percent of the City's water supply from 2019 to 2021. This represents a composite of groundwater from various well fields in the San Fernando Valley and wellfields in Central Los Angeles. Some groundwater in the San Fernando Valley is treated to reduce volatile organic compounds. Groundwater from six wellfields - Mission, Tujunga, Rinaldi-Toluca, North Hollywood, Pollock, and Manhattan - is disinfected with chloramine. A large pipeline conveys water from most of the wellfields in the San Fernando Valley southerly, where it combines with treated LAAFP water to serve customers in the Central and portions of the Eastern areas of the City. Water from Central Basin well (Manhattan) supplies the local areas. Customers in these areas receive varying blends of the three major supply sources.

MWD Treated Water

Water purchased from MWD serves as LADWP's third major source of supply and provided an average of 48 percent of the City's water supply from 2019 to 2021. Untreated MWD water is purchased at LAAFP. Disinfected with chloramine, treated purchased water is the only source of supply to the Harbor and Eastern Los Angeles service areas. This water is from the Colorado River and the California Aqueducts, which are treated at MWD's Jensen, Weymouth, and Diemer Filtration Plants.

Figure 1. Major Water Sources for the City of Los Angeles



RISK ASSOCIATED WITH MAJOR WATER SOURCES

For the purpose of this Report, the data used for comparison are from the 2019, 2020, and 2021 Drinking Water Quality Reports. LADWP routinely collects over 27,000 water quality samples annually and tests and reports on more than 148 contaminants in each of the City's major sources. A total of 24 contaminants with enforceable drinking water MCLs were detected in one or more major water source. None of the detected contaminants exceeded the enforceable drinking water MCLs. This means that 99 contaminants, regulated by federal regulatory and state health agencies, such as the United States Environmental Protection Agency (USEPA) and the State Water Resources Control Board - Division of Drinking Water (DDW) were not detected above the MCL during the three-year reporting period for this report. Seven of the detected contaminants were at or above a PHG or MCLG (See Appendix Table 1). The data for lead and copper used in this report are the result of residential tap sampling as required by the Lead and Copper Rule (LCR). Lead and copper were not detected in any LADWP water sources.

In this section, each of the seven contaminants are listed. Each contaminant includes a brief explanation regarding its current drinking water standard and the level detected in LADWP's drinking water sources. The contaminants are grouped by chemical characteristics. The three groups are:

1) inorganic compounds

2) disinfection byproducts

3) radionuclides

No contaminant under the organic compounds or microbiological group exceeded a PHG or MCLG.

INORGANICS

ARSENIC

The PHG for arsenic is 0.004 ppb. USEPA issued a revised regulation for arsenic in January 2001. The regulation set the arsenic MCL at 10 ppb and MCLG at 0 ppb effective January 2006. The acute effects of arsenic are well known. Arsenic at high concentrations can be lethal. At low levels, arsenic is known to cause skin cancer in humans. Recent studies suggest that arsenic may play a key role in initiating many other types of cancers as well.

Level in LADWP Drinking Water

LAA supply is the main source of arsenic in LADWP water. Arsenic in the LAA is a naturally occurring contaminant found in the otherwise pristine water source from the eastern Sierra Nevada watershed. It originates from geothermal springs, such as the one that feeds Hot Creek, at levels of around 250 ppb. This concentration level is substantially reduced as the water blends with snow melt and other sources as it moves south to the City. Historical average levels of arsenic in the untreated LAA supply have ranged from 10 to 62 ppb. From 2019 to 2021, the highest average arsenic levels after treatment were 2 ppb, which is 80% below the regulatory MCL.

Status

LADWP's continuing efforts to reduce arsenic in the LAA water supply enables us to reduce the level in treated water to below 5 ppb. There are two major treatment facilities that reduce the arsenic level prior to conveyance to the City. The first treatment facility along the LAA is at the Cottonwood Polymer Plant. In conjunction with the Haiwee Reservoirs, Cottonwood settles out most of the arsenic and brings the level down to around 7 ppb. The second is the treatment process at LAAFP in Sylmar where arsenic range from 2 to 4 ppb.

The LADWP plans to construct the Fairmont Sedimentation Plant within the Fairmont Reservoir property to pretreat source water to the LAAFP and eliminate the use of the Cottonwood Polymer Plant. The project will cost approximately $548M. The Fairmont Plant will treat raw water from the first and second Los Angeles Aqueducts as well as the State Water Project East Branch, and will reduce turbidity, arsenic, and Total Organic Carbon levels using the proposed flocculation and sedimentation processes. The Fairmont Sedimentation project will reduce the arsenic levels to between 3 to 5 ppb. Even after this treatment plant is constructed and operating, the arsenic levels at the LAAFP will not meet PHG levels.

LEAD (At-the-Tap)

PHG for lead is 0.2 ppb at the tap. The PHG is based on observations and studies related to the neurological effects of lead on children and its hypertensive effect on adults. Low levels of lead have also been shown to cause cancer and kidney damage. Acute effects of lead range from colic to encephalopathy to death. USEPA classified lead as a probable human carcinogen and established an MCLG of 0 ppb. Lead, unlike most water constituents, can increase within the distribution system and in customers' homes, especially if the homes were plumbed with copper pipes joined with lead solder. It is more accurately measured by At-the-Tap sampling rather than sampling in the distribution system, as required by the LCR.

Lead is regulated by the results of At-the-Tap samples collected from homes under conditions that are most likely to yield high lead levels. Most customers in the City will have no detectable lead at their tap. As such, they are not comparable to the PHG, which is based upon the average intake level. If the lead level of At-the-Tap samples exceeds the federal action level (AL) of 15 ppb at the 90th percentile, or stated another way, if more than 10 percent of the samples are above 15 ppb, then the water agency must install corrosion control treatment. Since LADWP began conducting LCR sampling in customers' homes in 1991, the federal action level has never been exceeded.

Level in LADWP Drinking Water

In 2020, At-the-Tap samplings were conducted at over 100 homes throughout the City. These homes were selected because they represented plumbing conditions that were most likely to leach lead and copper into their drinking water. The 90th percentile for lead was 5.0 ppb, with a range of less than non-detect to 21.3 ppb. The 90th percentile lead level is 67% below the regulatory AL of 15 ppb.

Status

In 2019, LADWP submitted to DDW an updated Corrosion Control Strategy report conducted by independent corrosion control experts. As of the date of this report, DDW determined that LADWP has optimized corrosion control with a minimum pH value of 7.1 throughout the distribution system. Maintaining the pH value will assist LADWP with controlling corrosion within its distribution system thus minimizing the levels of lead and copper at the customer tap. Due to the system optimization LADWP is no longer implementing ZOP corrosion control treatment.

COPPER (At-the-Tap)

PHG for copper is 300 ppb. This PHG is based on the observed effects for small children with a safety factor of ten. Copper, like lead but unlike most other water constituents, can increase within the distribution system and in customers' premise plumbing. Therefore, At-the-Tap sampling is a more accurate measurement of copper levels rather than the routine sampling conducted in the distribution system.

Copper is regulated by results of customer tap sampling. These At-the-Tap samples are collected from homes under conditions that are most likely to result in high copper and lead. As such, they are not comparable to the PHG, which is based on the average intake level. If the 90th percentile copper level of the At-the-Tap samples exceeds the AL of 1,300 ppb or stated another way, if more than 10 percent of the samples are above 1,300 ppb, then the system is required to install corrosion control treatment.

Level in LADWP Drinking Water

In 2020, At-the-Tap sampling was conducted at over 100 households. These households were selected because they represented plumbing conditions that were likely to leach lead and copper into their drinking water. Most customers in the City will have low levels of copper at their tap. The 90th percentile for copper was 394 ppb, with a range of 3 ppb to 1060 ppb. The 90th percentile copper level is 70% below the regulatory MCL of 1,300 ppb.

Status

Studies have been conducted to determine the optimum corrosion control strategy for the LADWP water system. Please refer to the previous section under Lead (At-the-Tap).

DISINFECTION BY-PRODUCTS

Disinfection By-Products (DBPs) are ubiquitous in all drinking water that contains a disinfectant residual. Treated water is chloraminated before entering the water distribution system to ensure the microbial safety of the water all the way to the customer's tap. Any naturally occurring organic matter that is not completely removed by LAAFP has the potential to form DBPs. Unlike other contaminants, DBPs form after initial disinfection and filtration and within the distribution system.

BROMATE

OEHHA established a PHG of 0.1 ppb for bromate in 2009 based on carcinogenicity. Bromate is an inorganic disinfection byproduct that is formed when naturally occurring bromide in water is exposed to ozone. The federal MCL for bromate is 10 ppb and the MCLG is 0 ppb.

Level in LADWP Drinking Water

Bromide levels are highest in the MWD supply from the California Aqueduct, which is prone to seawater intrusion when less fresh water passes through the Sacramento-San Joaquin Delta.

Status

Bromide levels in surface water fluctuate depending on the amount of untreated California Aqueduct water that is treated at the LAAFP. In 2021, purchased water provided 48 percent of the City's annual water needs. In drought years, LADWP relies more heavily on purchased water to supplement the City's needs. Unfortunately, during drought periods, bromide levels tend to increase in the water from the California Aqueduct.

Compliance with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2) requires LADWP to cover, treat, or remove from service its remaining uncovered distribution system reservoirs, and to monitor bromate in these reservoirs until then. The Dr. Pankaj Parekh Ultraviolet (UV) Disinfection Facility at the LAAFP was completed in 2013, which reduced the use of ozone as a disinfectant and thus reducing the formation of bromate.

In January 2022, LADWP met compliance with the LT2 for the Los Angeles Reservoir with the commissioning of the second UV disinfection plant.

From 2019 to 2021 the highest running annual bromate average was 3 ppb, which is 70% below the regulatory MCL of 10 ppb.

RADIONUCLIDES

Radionuclides were detected in all City sources of supply and can be naturally occurring or man-made.

Radionuclides detected in the treated purchased water supply are naturally occurring; although some radioactivity may be attributed to the abandoned mine tailings near the Colorado River in Moab, Utah.

GROSS ALPHA AND GROSS BETA ACTIVITY

OEHHA has examined the practicality of proposing a PHG for gross alpha and gross beta but concluded that it would not be practical to develop because the results are used as a screening tool to categorize alpha and beta emitters. The MCLGs for all radionuclides are set at 0 pCi/L. Gross alpha and gross beta radioactivity are classified as carcinogenic. The MCL for gross alpha activity (including radium 226, but excluding radon and uranium) is 15 pCi/L. The MCL for gross beta particle activity is 50 pCi/L.

Level in LADWP Drinking Water

From 2019 to 2021, the highest average level of gross alpha particle activity was 2 pCi/L in the Combined Wells. This level was 87% below the regulatory MCL. The highest average level of gross beta particle activity was 5 pCi/L in the Combined Wells. This level was 90% below the regulatory MCL.

Status

No treatment for gross alpha or gross beta particle is currently provided. LADWP continues to monitor for radiological compounds as required in the treated LADWP water, at entry points into the distribution system, and at individual wells.

URANIUM

The radiological contaminant uranium is naturally occurring and was detected in all sources of the City's water supply. Uranium was also detected in the treated purchased water supply. Uranium from this source is naturally occurring.

PHG for uranium is 0.43 pCi/L based on carcinogenicity. State MCL for uranium is 20 pCi/L, which is approximately equal to 30 ppb. Federal MCL is 30 ppb and the MCLG is 0 ppb for uranium.

Level in LADWP Drinking Water

From 2019 to 2021, the average level of uranium was 3 pCi/L in LADWP and 1 pCi/L in MWD water sources. These levels were 85% and 95% below the regulatory MCL, respectively in LADWP and MWD water sources.

Status

No treatment for uranium is currently provided. LADWP continues to monitor for uranium as required in the treated LADWP water, at entry points into the distribution system, and at individual wells. MWD conducts monitoring of their sources and provides the results to LADWP.

TREATMENT OPTIONS AND COSTS

For each contaminant identified in this Report, a summary of treatment options and costs is presented in Table 3 of the Appendix.

To approach the levels of PHGs and MCLGs for all detected contaminants, using current BAT, LADWP estimates it would require approximately $6.2B in additional capital investments coupled with an increased budget for annual operations and maintenance of approximately $520M. Such an investment would increase customers' bills. This would be in addition to the existing level of treatment being provided to all City water sources.

It should be noted that all cost estimates for treatment in this Report do not include the cost of brine disposal, water replacement, and auxiliary facilities. The cost of replacing water lost to treatment processes, such as reverse osmosis, could not be estimated at this time, but is expected to be significant.

Implementing treatment to meet PHGs or MCLGs would result in an additional annualized (capital and operations) cost of $1B (see Appendix Table 3). For the average residential customer this would result in an increased cost of approximately $830 per year or $70 per month. This would cause the typical residential bill to increase by 64%.

LADWP has an ongoing water system capital program to improve reliability and safeguard water for Los Angeles. LADWP will invest approximately $9.4B in this program over the next 10 years. This will fund water quality improvements and compliance with existing drinking water regulations, such as LT2, Groundwater Rule, Total Coliform Rule, Disinfection By-products Rule, and Lead and Copper Rule Revisions. LADWP also invests in the replacement and improvement of infrastructure, such as trunk lines, main pipes, meters, and service lines. Aging facilities such as pumping, chlorination, and regulator stations will also be upgraded or replaced.

Concurrently, LADWP is investigating new treatment technologies, through research partnerships and collaborations with other water agencies and water associations, which will significantly improve water quality at substantially lower costs.

A PERSPECTIVE ON RISK

Providing water that is safe to drink is the primary goal of LADWP. Waterborne outbreaks of infectious diseases, such as cholera, were decreased in the late nineteenth century with the introduction of chlorine disinfection. Since then, other microbial contaminants that affect health have been reduced through advances in treatment technology for drinking water. Since LADWP first began water disinfection treatment over 100 years ago, the risk factors for getting waterborne diseases has been substantially reduced.

State regulators such as DDW and OEHHA use drinking water risk assessments to determine the public health impacts to populations by determining MCLs and PHGs. MCLs are health protective drinking water standards to be met by public water systems. MCLs consider not only chemicals' health risks but also factors such as their detectability and treatability, as well as costs of treatment. Health & Safety Code §116365(a) requires a contaminant's MCL to be established at a level as close to its PHG as is technologically and economically feasible, placing primary emphasis on the protection of public health. Along with the MCL, a regulated chemical also has a detection limit for purposes of reporting (DLR), the level at which the we are confident about quantification being reported.

MCLs are reviewed every five years for three criteria: (1) The relationship between the PHG and both federal and state MCLs; (2) any changes in technology or treatment techniques that permit a materially greater protection of public health or attainment of the public health goal; and (3) any new scientific evidence indicating that the substance might present a materially different risk to public health than was previously determined. In addition, occurrence is assessed for each regulated contaminant in drinking water sources using the four most recent years of analytical data from DDW's Water Quality Monitoring database.

PHGs established by OEHHA are concentrations of drinking water contaminants that pose no significant health risk if consumed for a lifetime, based on current risk assessment principles, practices, and methods. OEHHA establishes PHGs pursuant to Health & Safety Code §116365(c) for contaminants with MCLs, and for those for which MCLs will be adopted.

It is equally important to have a clear perspective about the theoretical nature of the numerical risk presented in this Report. OEHHA understandably assesses risk in a very conservative manner and often with limited scientific data. So, there is often a need for additional scientific research to substantiate the established goals. Even more important, is the need to balance the risk associated with exposure to drinking water to the risk from other environmental factors and human behavior. According to OEHHA, present methodology does not allow a numerical determination of public health risk from non- carcinogens. However, non-carcinogenic risk determinations are essential if the objective is to achieve a well-balanced approach to risk reduction.

LADWP’s APPROACH TO MANAGING RISK

While this Report is in response to requirements of the California Health and Safety Code, LADWP places a priority on understanding the issues that drive regulations and future regulatory trends. This is a vital component of prioritizing the treatment to effectively reduce or eliminate contaminants that are found in LADWP water supplies.

As noted from the health assessments presented in this Report, there are seven contaminants that can be enumerated for theoretical cancer risk. Among these, LADWP considers arsenic to be the prime contaminant to target for further reduction. The process of determining risks from contaminants, even if theoretical, offers a valuable tool to decision makers when addressing public health improvements in drinking water supplies. This more holistic and integrated approach to risk management will achieve the greatest risk reduction per cost of treatment by presenting decision makers with the information to prioritize treatment selection based on the amount of risk reduction afforded rather than a contaminant-by-contaminant approach subject to media and politics. As LADWP selects treatment technologies based on this integrated approach, public health benefits, as well as state and federal standards, are considered. This approach provides the greatest benefit for LADWP customers as efficient treatment processes are implemented.

Advancements in analytical technology, greater knowledge of health effects, and further scientific research will continue to create new drinking water quality regulations. To ensure continued improvement in water quality, LADWP completed a 10-year capital budget (2019-2028) for its water system totaling nearly $9.4B. An additional investment of approximately $6.2B would be needed to improve water quality to levels approaching PHGs and MCLGs.

The LADWP will use the information from this report to continue its strategic planning process and public engagement on water quality issues. The LADWP is committed to working with its customers and the community to optimize public health protection, affordability, environmentally preferred treatments, and sustainability.

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APPENDIX

PUBLIC HEALTH GOALS REPORT SUMMARY

TABLE 1 LEVELS OF CONTAMINANTS DETECTED IN TREATED WATER IN 2019-2021

CONTAMINANT	State PHG or Federal (MCLG)	State MCL or (AL)	State DLR	Level in Water Sources[1] (2019 – 2021)		
				LAAFP Effluent	Combined Wells	Purchased MWD Water
DISINFECTION BY-PRODUCTS (µg/L)						
Distribution System						
Bromate	0.1	10	5	Citywide HLRAA = 3		
INORGANICS (µg/L)						
Arsenic	0.004	10	2	2	1	0
Lead (At-the-Tap)[2]	0.2	(15)	5	90th Percentile = 5		
Copper (At-the-Tap)[2]	300	(1300)	50	90th Percentile = 394		
RADIONUCLIDES (pCi/L)						
Gross Alpha Particle Activity	(0)	15	3	0	2	0
Gross Beta Particle Activity	(0)	50	4	4	5	3
Uranium	0.43	20	1	3	3	1

Footnotes

[1] A contaminant is considered detected if its compliance average value of test results in 2019 to 2021 is equal to or above its state Detection Limit for Reporting Purposes (DLRs). Values listed here are based on the Consumer Confidence Reports (CCRs) between 2019 – 2021. Values for purchased water are the averages of effluents from three MWD treatment plants: Weymouth, Diemer, and Jensen.

[2] Results are based on 90th percentile from at-the-tap sampling conducted city-wide in 2020.

HLRAA = Highest Locational Running Annual Average

TABLE 2 HEALTH EFFECTS OF CONTAMINANTS AT VARIOUS LEVELS

CONTAMINANTS	Health Risk Category	Health Goal	Cancer Risk at Health Goal	California MCL	Cancer Risk at California MCL	Highest Level in LADWP Drinking Water[1]	Cancer Risk at Level in LADWP Drinking Water
		PHG or (MCLG)	Per Million People Exposed		Per Million People Exposed		Per Million People Exposed
DISINFECTION BY-PRODUCTS (µg/L)							
Distribution System							
Bromate	Carcinogenicity	0.1	1	10	100	HLRAA = 3	30
INORGANICS (µg/L)							
Arsenic	Carcinogenicity	0.004	1	10	2500	2	500
Lead (At-the-Tap)	Developmental Neurotoxicity/ Cardiovascular Toxicity/ Carcinogenicity	0.2	$<1 \times 10^{-6}$	AL=15	2	5	Less than five
Copper (At-the-Tap)	Digestive System Toxicity	300	NC	AL=1300	NC	394	NC
RADIONUCLIDES (pCi/L)							
Alpha Particles	Carcinogenicity	(0)	0	15	1000*	2	133
Beta Particles	Carcinogenicity	(0)	0	50	2000**	5	200
Uranium	Carcinogenicity	0.43	1	20	50	3	7

* For ^{210}Po, the most powerful alpha emitter. OEHHA indicates that cancer risk could be up to these values, depending upon which isotopes are present.

** For ^{210}Pb, the most powerful beta emitter. OEHHA indicates that cancer risk could be up to these values, depending upon which isotopes are present.

Footnotes

[1] Highest level in LADWP drinking water is the highest of the annual average of each treated water source.

AL = federal Action Level (At-the-Tap)

HLRAA = Highest Locational Running Annual Average

NA = Not Available – carcinogenic data unavailable

NC = Non-carcinogenic

Cancer Risk – Upper bound estimate of excess cancer risk from lifetime exposure. Actual cancer risk may be lower or zero. Cancer risk is stated in terms of excess cancer cases per million (or fewer) population, e.g., 1×10^{-6} means one additional cancer case per million population exposed.

TABLE 3 TREATMENT OPTIONS AND ESTIMATED COSTS TO MEET PUBLIC HEALTH GOALS

Treatment Options (BAT)	Contaminants	Capital Cost	Annualized Capital	Annual O&M	Annualized Capital and O&M	Increased Water Cost of water Rate per HCF*	Increased Annual Cost for Average Residential Customer*	Increased Monthly Cost for Average Residential Customer*
Corrosion Inhibitors**	Lead & Copper (At the Tap) System Wide	$10,463,000	$829,000	$879,000	$1,708,000	$0.01	$1.39	$0.12
Reverse Osmosis LAAFP**	Arsenic, DBPs, Radionuclides	$4,647,866,000	$368,087,000	$388,592,000	$756,679,000	$3.98	$617.75	$51.48
Reverse Osmosis Groundwater Wells**	Radionuclides	$1,530,681,000	$121,222,000	$128,646,000	$249,868,000	$1.31	$203.99	$17.00
Total		$6,189,010,000	$490,138,000	$518,117,000	$1,008,255,000	$5.30	$823.14	$68.60

* The following assumptions are used to compute the potential increase to the typical single dwelling residential water bill. In the 2021 calendar year, the average residential use in Los Angeles was 155.19 hundred-cubic-feet (HCF). In total, including nonresidential use, 190.09 million HCF of water was sold. The typical water bill for residential customers was $106.67 per month. Treatment costs to reduce all contaminant levels to the PHG or detection limit would increase the typical residential bill to approximately $ 180 per month.

** Cost estimates for Reverse Osmosis are based on cost estimates from the Hyperion Project. System-wide Corrosion Control Capital and O&M treatment costs are based on 2015 estimates in the Capital Improvement Plan and have been escalated to 2022 costs using the March 2022 Construction Cost Index and February 2022 Consumer Price Index respectively.

Note: Capital cost is annualized over a 20-year period at 5 percent interest rate compounded monthly.