2025 Public Health Goal Report

(covering 2022, 2023, and 2024)

Manhattan Beach

CITY OF MANHATTAN BEACH
2025 TRIENNIAL PUBLIC HEALTH GOAL REPORT

Background

Provisions of the California Health and Safety Code (HSC §116470(b)) specify that water utilities with greater than 10,000 service connections prepare a special Public Health Goal Report (Report) every three years if water quality measurements have exceeded any Public Health Goal (PHG); the latest Report is due by July 1, 2022. PHGs are non-enforceable goals established by the California Environmental Protection Agency (Cal-EPA) and the Office of Environmental Health Hazard Assessment (OEHAA). The regulation also requires that where OEHHA has not adopted a PHG for a constituent, the water suppliers are to use the Maximum Contaminant Level Goal (MCLG) adopted by the United States Environmental Protection Agency (U.S. EPA). Only constituents having a California primary drinking water standard, also known as a Maximum Contaminant Level (MCL), and either a PHG or MCLG are required to be addressed in the Report. The attached table contains a list of all relevant current PHGs, MCLGs, MCLs, and Detection Limits for purposes of Reporting (DLRs).

A few constituents are routinely detected in water systems at levels usually well below the drinking water standards for which OEHHA or U.S. EPA has not yet adopted a PHG or MCLG. As PHGs and MCLGs are updated, the City will include them in its evaluation in future Reports as applicable.

The Report addresses any contaminants that, as of December 31, 2024, have Primary Drinking Water Standards (PDWS) set by California or U.S. EPA *and* have an equivalent PHG or a MCLG. This includes all chemical, microbiological and radiological constituents detected above the DLR in the City of Manhattan Beach's (City's) water supply between 2022 and 2024 at a level exceeding any applicable PHG or MCLG, as required by the regulation. The Report includes the numerical public health risk associated with the MCL and the PHG or MCLG, the 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.

What are Public Health Goals (PHGs)?

PHGs are set by OEHHA and are based solely on public health risk considerations. None of the practical risk-management factors that are considered by the U.S. EPA or State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) in setting MCL drinking water standards 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 and likewise are non-enforceable.

What Water Quality Data are Considered?

All water quality data collected in the City’s water system between 2022 and 2024 for purposes of determining compliance with drinking water standards was considered. This data was all summarized in our

2022, 2023, and 2024 Consumer Confidence Reports (CCRs) which were posted on the City's website at https://www.manhattanbeach.gov/departments/public-works/utilities-division/water-systems/treatment/annual-water-quality-report. Copies are also available upon request by contacting the City's Utilities Division at 310-802-5304.

What Guidelines are Followed for this Report?

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

Best Available Treatment Technology and Cost Estimates:

Both the U.S. EPA 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 because it is not possible to verify by analytical means that the level has been lowered to zero. In some cases, installing treatment to try and further reduce very low levels of one constituent may adversely affect other aspects of water quality.

What Constituents were Detected that Exceed a PHG or MCLG?

Table 1 shows the constituents that were detected above the DLR that exceeded a PHG or MCLG. Following the table, there is a discussion of the constituents found in one or more of the City's drinking water sources at levels above the PHG, or if no PHG, above the MCLG. It should be noted that potable water is purchased to supplement the City's groundwater. The purchased water is from Metropolitan Water District (MWD) via a wholesaler (West Basin Municipal Water District).

Table 1

Parameter	Units	MCL	PHG or MCLG	State DLR	Manhattan Beach			MWD		
					Year of Highest Average [a]	Highest Average	2022-2024 Range	Year of Highest Average [a]	Highest Average	2022-2024 Range
Arsenic	µg/L	10	0.004	2	2023 and 2024	ND	ND	2022	ND	ND- 2.4
Bromate	µg/L	10	0.1	1	--	NS	NS	2023	7.6 [b]	ND- 15
Gross Alpha	pCi/L	15	MCLG=0	3	2023 and 2024	ND	ND	2023	ND	ND- 5
Gross Beta	pCi/L	50	MCLG=0	4	--	NS	NS	2022	4	ND- 9.0
Lead	µg/L	15 [c]	0.2	5	2022	4.4	ND- 50	2024	ND	ND [d]
Uranium	pCi/L	20	0.43	1	2024	ND	ND	2023	1	ND- 3

NOTES

Any data below the State's DLR is considered non-detect (ND).

[a] Data represents the highest average detected during the reporting period (2022-2024). This column shows the source year of the data displayed.

[b] Bromate compliance is determined using the Running Annual Average (RAA). RAAs are calculated as the average of all samples collected within a 12-month period per site. The highest RAA is shown in Table 1.

[c] There is no MCL for lead; there is an Action Level (AL). Compliance is based on the 90th percentile lead result measured at customer taps.

[d] As a wholesaler, Metropolitan has no retail customers and is not required to collect samples at consumers' taps. MWD data shown are from treatment plant effluents.

ACRONYMS

AL: Action Level
MCL: Maximum Contaminant Level
MCLG: Maximum Contaminant Level Goal
ND: Non-Detect
NL: Notification Level
NS: Not Sampled
PHG: Public Health Goal

Arsenic
Arsenic is a metalloid with properties of both metal and nonmetal elements. It's a natural component of Earth's crust, but some forms of it are also used in manufacturing or industrial processes like wood preservatives, pesticides, automobile batteries, and semiconductors.

The MCL for Arsenic is 10 micrograms per liter (µg/L). California's DLR is 2 µg/L and the PHG is 0.004 µg/L. Any data below the State's DLR is considered ND. The Office of Environmental Health Hazard Assessment (OEHHA) has developed a Public Health Goal for arsenic in drinking water based on its carcinogenicity. The numerical health risk at the MCL is $2.5x10^{-3}$. This means 2.5 cancer cases per 1,000 population. The numerical health risk at the PHG is $1x10^{-6}$. This means one cancer case per 1,000,000 population.

Manhattan Beach is not required to test for arsenic on an annual basis. It is part of a list of inorganic compounds that are tested once every three years. The groundwater wells were sampled in 2023 and 2024 to satisfy the requirements, and both results were non-detect (ND) as shown in Table 1. Metropolitan Water District took samples during all three years. In 2022, a single result was detected above the DLR. The annual average was ND, but the range shows one result above the PHG at 2.4 µg/L.

The BATs for treating arsenic are activated alumina, adsorption media, coagulation/filtration, ion exchange, oxidation/filtration, or reverse osmosis.

Bromate
Bromate is a byproduct of the disinfection process and occurs when bromide in the water reacts with the ozone disinfectant. Bromate consumed in drinking water in excess of the MCL over many years may cause an increased risk of cancer. Bromate is categorized as a haloacetic acid.

The MCL or State drinking water standard for bromate is 10 µg/L. The PHG is 0.1 µg/L. California's DLR is 1 µg/L. OEHHA has developed a Public Health Goal for bromate in drinking water, based on its carcinogenicity. The numerical health risk at the MCL is $1x10^{-4}$. This means one cancer cases per 10,000 population. The numerical health risk at the PHG is $1x10^{-6}$. This means one cancer case per 1,000,000 population.

Manhattan Beach does not use ozone, therefore it is not required to test for bromate. From 2022 through 2024, purchased water from MWD used to supplement the City's groundwater had detections of bromate. The highest running annual average (RAA) was 7.6 µg/L in 2023, which was below the MCL (Table 1).

Because bromate is a disinfection byproduct, the BAT for bromate involves control of the ozone treatment process to reduce its production.

Gross Alpha
There are radioactive materials naturally present in the Earth's crust. Over billions of years, these materials can change form and create decay products. During this change process, energy is released. Gross alpha radiation is one form of the released, and that is why it can be found in drinking water.

The drinking water MCL for gross alpha is 15 picoCuries per liter (pCi/L). Because gross alpha is associated with a group of radionuclides rather than a single constituent, OEHHA concluded that a PHG was not practical. Gross alpha is carcinogenic, so the MCLG set by the U.S. EPA is 0 pCi/L. California's DLR is 3 pCi/L. The numerical health risk at the MCL is 1x10-3. This means one cancer case per 1,000 population. The numerical health risk at the MCLG is 0.

Manhattan Beach is not required to test for radionuclides on an annual basis. As shown in Table 1, the groundwater wells were sampled in 2023 and 2024 to satisfy the requirements, and both results were ND. Metropolitan Water District was required to sample quarterly during 2023. The average was ND, but there were detections of gross alpha above the MCLG of 0 pCi/L. Results ranged from ND to 5 pCi/L, ultimately falling below the MCL.

The BAT for removal of gross alpha is reverse osmosis (RO).

Gross Beta

The radioactive materials naturally present in Earth's crust can decay over time. Beta particles are a type of radiation released as this decay process occurs. Gross beta can be naturally-occurring, but it can also come from man-made sources.

The drinking water MCL for gross beta is 50 picoCuries per liter (pCi/L). Similar to gross alpha, gross beta is also associated with a group of radionuclides rather than a single constituent, so OEHHA did not establish a PHG. Gross beta is a carcinogen, so the MCLG set by the U.S. EPA is 0 pCi/L. California's DLR is 4 pCi/L. The numerical health risk at the MCL is $2x10^{-3}$. This means two cancer cases per 1,000 population. The numerical health risk at the MCLG is 0.

Manhattan Beach follows requirements stated in Section 64442, Title 22, California Code of Regulations and is not currently required to test for gross beta. MWD samples quarterly for Gross Beta. The highest results were from 2022. Results of the purchased water had detections of gross beta above the MCLG as shown in Table 1. Gross beta levels ranging from ND to 9.0 pCi/L were detected in the drinking water which exceed the MCLG but fall well under the MCL.

The BAT for removal of gross beta is reverse osmosis (RO) and ion exchange (IX).

Lead

Lead is a heavy metal that can originate from the internal corrosion of household water plumbing systems. Lead can also potentially come from industrial manufacturer discharges. It enters drinking water primarily through the leaching of lead-containing materials in household plumbing such as lead-based solder used to join copper pipes, brass and/or chrome-plated brass faucets, lead pipe connections from homes to water mains, and brass/bronze meters and valves.

There is no MCL for lead. Instead, taps in homes that are at higher risk for lead exposure are targeted for sampling every three years. The 90^{th} percentile value from this sampling cannot exceed the Action Level (AL) of 15 µg/L. The most recent sampling at customers taps was in 2022. Two of the thirty-three samples exceeded the AL, but the 90^{th} percentile value was 4.4 µg/L as shown in Table 1. Lead levels from MWD's imported water and the levels of lead in the City's groundwater wells were all ND during the reporting period.

OEHHA has developed a Public Health Goal for bromate in drinking water, based on its developmental Neurotoxicity, cardiovascular toxicity, and carcinogenicity. The numerical health risk at the AL is $2x10^{-6}$. This means two cancer cases per 1,000,000 people. The numerical health risk at the PHG is less than $1x10^{-6}$. This means one cancer case per 1,000,000 population.

The BAT for lead removal is optimal corrosion control and pH adjustment. Although not classified as a BAT, it's also important to identify and replace lead service lines.

Uranium

Uranium is a naturally occurring radioactive element present in the earth's crust. Uranium is found in both groundwater and surface water due to its natural occurrence in geological formations.

The drinking water MCL for uranium is 20 picoCuries per liter (pCi/L). The PHG is 0.43 pCi/L. California's DLR is 1 pCi/L. Any data below the State's DLR is considered ND. OEHHA developed a PHG in drinking water based on its carcinogenicity and kidney toxicity. The numerical health risk at the MCL is $5x10^{-5}$. This means five cancer cases per 100,000 population. The numerical health risk at the PHG is $1x10^{-6}$. This means one cancer case per 1,000,000 population.

Manhattan Beach is not required to test the groundwater for radionuclides on an annual basis. Table 1 shows there was a single result from within the 2022-2024 time period, and it was ND. MWD was required to sample quarterly during 2023. The annual average was 1.0 pCi/L with a range of ND to 3 pCi/L. All results fell below the MCL, but there were detections of gross alpha above the MCLG of 0 pCi/L.

The BAT for uranium removal includes reverse osmosis (RO), ion exchange (IX), lime softening, and coagulation/filtration.

Estimated Costs

Accurate cost estimates are difficult, if not impossible, and are highly speculative and theoretical. Levels of the constituents listed above are already below the MCLs. Furthermore, all but one of the detections above PHGs and MCLGs come from the purchased water, not the City's groundwater. Therefore, the City's opinion is that cost calculations are not required. It should be noted that MWD's potable water meets all State of California, DDW and U.S. EPA drinking water standards set to protect public health.

Recommendations for Further Action

The Manhattan Beach drinking water quality meets all State of California, DDW and U.S. EPA 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 MCLs 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. Additionally, because the constituents are present in the purchased drinking water, actions taken by the City may have little to no effect. Therefore, no action is proposed.

References:

California Health & Safety Code: Section 116470

California Code of Regulations. Title 22. Section 64442

California State Water Resources Control Board. Drinking Water Section. Hexavalent Chromium https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Chromium6.html

Office of Environmental Health Hazard Assessment: Public Health Goals

https://oehha.ca.gov/water/public-health-goals-phgs

United States Environmental Protection Agency: National Primary Drinking Water Regulations https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations

Attachments

1. Table of Regulated Constituents with MCLs, PHGs or MCLGs
2. Health Risk Information for Public Health Goal Exceedance Reports

ATTACHMENT 1

2025 Regulated Constituents for PHG Triennial Report (2022-2024)

Sourced from: Association of California Water Agencies (ACWA) PHG Report Guidelines

MCLs, DLRs, and PHGs for Regulated Drinking Water Contaminants

Last Update: November 2024

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)
- The PHGs for NDMA, PFOA and PFOS (which are not yet regulated in California) are included at the bottom of this table.
- The Federal MCLs for PFOA and PFOS are also listed at the end of this table.

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

Chemicals with MCLs in 22 CCR §64431 – Inorganic Chemicals

Regulated Contaminant	MCL	DLR	PHG	Date of PHG
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	0.05	0.01	withdrawn Nov. 2001	1999
Chromium, Hexavalent	0.01	0.0001	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)

*OEHHA's review of this chemical during the year indicated (rev20XX) resulted in nochange in the PHG.

Radionuclides with MCLs in 22 CCR §64441 and §64443 – Radioactivity

Units are picocuries per liter (pCi/L), unless otherwise stated; n/a = not applicable

Regulated Contaminant	MCL	DLR	PHG	Date of PHG
Gross alpha particle activity - OEHHA concluded in 2003 that a PHG was notpractical	15	3	none	n/a
Gross beta particle activity - OEHHA concluded in 2003 that a PHG was notpractical	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)

Regulated Contaminant	MCL	DLR	PHG	Date of PHG
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)

Regulated Contaminant	MCL	DLR	PHG	Date of PHG
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

Copper and Lead, 22 CCR §64672.3

Values referred to as MCLs for lead and copper are not actually MCLs; instead, they arecalled "Action Levels" under the lead and copper rule

Regulated Contaminant	MCL	DLR	PHG	Date of PHG
Copper	1.3	0.05	0.3	2008
Lead	0.015	0.005	0.0002	2009

Chemicals with MCLs in 22 CCR §64533 – Disinfection Byproducts

Regulated Contaminant	MCL	DLR	PHG	Date of PHG
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

**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.

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

Regulated Contaminant	MCL	DLR	PHG	Date of PHG
N-Nitrosodimethylamine (NDMA)	--	--	0.000003	2006
Perfluorooctanoic acid (PFOA)***	--	--	0.00000007	2024
Perfluorooctane sulfonic acid (PFOS)***	--	--	0.000001	2024

***PFOA and PFOS have US EPA MCLGs and MCLs.

PFOA – MCLG is zero. MCL is 4 ng/L

PFOS – MCLG is zero. MCL is 4 ng/L

ATTACHMENT 2

2025 Health Risk Information for Public Health Goal Exceedance Reports

Sourced from: Association of California Water Agencies (ACWA) PHG Report Guidelines

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

Public Health Goals

Health Risk Information for Public Health Goal Exceedance Reports

February 2025

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 2025

NEW for the 2025 Report: New in this document are newly established Public Health Goals(PHGs)for perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), and five haloacetic acids: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid.

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 toprepare a report every three years for contaminants that exceed their respective PHGs.[1] This document contains health risk information on drinking water contaminantsto 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 contaminant in drinking water that has a PHG and to include a brief, plainly worded description of these risks. There port is also required to disclose the numerical public health risk, if available, associated with the California Maximum Contaminant Level (MCL) and with the PHG for each 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

Office of Environmental Health Hazard Assessment
Water Toxicology Section
February 2025

Numerical health risks: Table 1 presents health risk categories and cancer risk values for 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 anticipated adverse 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 carcinogens are 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 chemical with a PHG are summarized in a PHG technical support document. These documents are available on the OEHHA website (https://oehha.ca.gov/water/public-health-goals-phgs).

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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)	7MFL[7] (fibers>10 microns in length)	1×10^{-6}	7MFL (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)
Barium	cardiovascular toxicity (causes high blood pressure)	2	NA	1	NA

[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, equivalent to 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.

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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
Bentazon	hepatotoxicity and digestive system toxicity (harms the liver, intestine, and causes body weight effects[8])	0.2	NA	0.018	NA
Benzene	carcinogenicity (causesleukemia)	0.00015	1×10^{-6}	0.001	7×10^{-6} (seven per million)
Benzo[a]pyrene	carcinogenicity (causescancer)	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
Carbon tetrachloride	carcinogenicity (causes cancer)	0.0001	1×10^{-6}	0.0005	5×10^{-6} (five per million)

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

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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
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}	0.010	5×10^{-4} (five per ten thousand)
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
Di(2-ethylhexyl) phthalate (DEHP)	carcinogenicity (causes cancer)	0.012	1×10^{-6}	0.004	3×10^{-7} (three per ten million)

[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).

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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
1,2-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
Dichloromethane (methylene chloride)	carcinogenicity (causes cancer)	0.004	$1×10^{-6}$	0.005	$1×10^{-6}$ (one per million)

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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
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
Ethylene dibromide (1,2-Dibromoethane)	carcinogenicity (causes cancer)	0.00001	1×10^{-6}	0.00005	5×10^{-6} (five per million)

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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
Fluoride	musculoskeletal toxicity (causes tooth mottling)	1	NA	2	NA
Glyphosate	nephrotoxicity (harms the kidney)	0.9	NA	0.7	NA
Haloaceticacids: dibromoacetic acid	carcinogenicity (causes cancer)	0.00003	1×10^{-6}	0.06*	2×10^{-3} (two per thousand)[10]
Haloaceticacids: dichloroacetic acid	carcinogenicity (causes cancer)	0.0002	1×10^{-6}	0.06*	3×10^{-4} (three per ten thousand)[11]
Haloaceticacids :monobromo-acetic acid	musculoskeletal toxicity (causes muscular degeneration)	0.025	NA	0.06*	NA
Haloaceticacids :monochloro-acetic acid	general toxicity (causes body and organ weightchanges[8])	0.053	NA	0.06*	NA
Haloaceticacids: trichloroacetic acid	carcinogenicity (causes cancer)	0.0001	1×10^{-6}	0.06*	6×10^{-4} (six per ten thousand)[12]
Heptachlor	carcinogenicity (causes cancer)	0.000008 (8×10^{-6})	1×10^{-6}	0.00001	1×10^{-6} (one per million)

* For total haloacetic acids (the sum of dibromoacetic acid, dichloroaceticacid, monobromoaceticacid, monochloroacetic acid, and trichloroacetic acid). There are no MCLs for individual haloacetic acids.

[10] Basedon0.060 mg/L dibromoacetic acid; the risk will vary with different combinations and ratios of the other haloacetic acids in a particular sample.

[11] Basedon0.060 mg/L dichloroacetic acid; the risk will vary with different combinations and ratios of the other haloacetic acids in a particular sample.

[12] Basedon0.060 mg/L trichloroacetic acid; the risk will vary with different combinations and ratios of the other haloacetic acids in a particular sample.

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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
Heptachlor epoxide	carcinogenicity (causes cancer)	0.000006 (6×10^{-6})	1×10^{-6}	0.00001	2×10^{-6} (two per million)
Hexachloro-benzene	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 neuro behavioral 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)
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
Methyltertiary-butyl ether (MTBE)	carcinogenicity (causes cancer)	0.013	1×10^{-6}	0.013	1×10^{-6} (one per million)

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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
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
Nitrate and Nitrite	hematotoxicity (causes methemoglobinemia)	10 as nitrogen[13]	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

[13] 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.

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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
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 neurodevelopmental deficits)	0.001	NA	0.006	NA
Perfluorooctane-sulfonic acid (PFOS)	carcinogenicity (causes cancer)	1×10^{-6}	1×10^{-6}	NA	NA
Perfluoro-octanoi-cacid (PFOA)	carcinogenicity (causes cancer)	7×10^{-9}	1×10^{-6}	NA	NA
Picloram	hepatotoxicity (harms the liver)	0.166	NA	0.5	NA
Polychlorinatedbi-phenyls (PCBs)	carcinogenicity (causes cancer)	0.00009	1×10^{-6}	0.0005	6×10^{-6} (six per million)
Radium-226	carcinogenicity (causes cancer)	0.05pCi/L	1×10^{-6}	5 pCi/L (combined $Ra^{226+228}$)	1×10^{-4} (one per ten thousand)
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

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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
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}	8pCi/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)
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

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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
Thiobencarb	general toxicity (causes body weight effects) hematotoxicity (affects red blood cells)	0.042	NA	0.07	NA
Toluene (methylbenzene)	hepatotoxicity (harms the liver) endocrne 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
1,1,2-Trichloro-ethane	carcinogenicity causes cancer)	0.0003	$1x10^{-6}$	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)

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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
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})	$1x10^{-6}$	0.000005 (5×10^{-6})	7×10^{-6} (seven per million)
1,1,2-Trichloro-1,2,2-trifluoro-ethane (Freon113)	hepatotoxicity (harms the liver)	4	NA	1.2	NA
Trihalomethanes: Bromodichloro-methane	carcinogenicity (causes cancer)	0.00006	$1x10^{-6}$	0.080#	1.3×10^{-3} (1.3 per thousand)[14]
Trihalomethanes: Bromoform	carcinogenicity (causes cancer)	0.0005	$1x10^{-6}$	0.080#	2×10^{-4} (two per ten thousand)[15]
Trihalomethanes: Chloroform	carcinogenicity (causes cancer)	0.0004	$1x10^{-6}$	0.080#	2×10^{-4} (two per ten thousand)[16]

For total trihalomethanes (the sum of bromodichloromethane, bromoform, chloroform, and dibromochloromethane). There are no MCLs for individual trihalomethanes.
[14] Based on 0.080 mg/L bromodichloromethane; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.
[15] Based on 0.080 mg/L bromoform; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.
[16] Based on 0.080 mg/L chloroform; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.

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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: Dibromochloro-methane	carcinogenicity (causes cancer)	0.0001	$1x10^{-6}$	0.080[#]	$8×10^{-4}$ (eight per ten thousand)[17]
Tritium	carcinogenicity (causes cancer)	400pCi/L	$1x10^{-6}$	20,000 pCi/L	$5×10^{-5}$ (five per hundred thousand)
Uranium	carcinogenicity (causes cancer)	0.43pCi/L	$1×10^{-6}$	20pCi/L	$5×10^{-5}$ (five per hundred thousand)
Vinylchloride	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 dibromochloro-methane). There are no MCLs for individual trihalomethanes.
[17] Based on 0.080 mg/L dibromochloromethane; the risk will vary with different combinations and ratios of the other trihalomethanes in a particular sample.

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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)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Disinfection by products (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
Radionuclides					

[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.

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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)[2]	Cancer Risk[3] at the PHG	California MCL[4] (mg/L)	Cancer Risk at the California MCL
Gross alpha particles[8]	carcinogenicity (causes cancer)	0 (^{210}Po included)	0	15 pCi/L[9] (includes radium but not radon and uranium)	up to $1x10^{-3}$ (for ^{210}Po, the most potent alpha emitter)
Beta particles and photon emitters[8]	carcinogenicity (causes cancer)	0 (^{210}Pb included)	0	50 pCi/L (judged equiv. to 4 mrem/yr)	up to $2x10^{-3}$ (for ^{210}Pb, the most potent beta-emitter)

[8] 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.
[9] pCi/L= picocuries per liter of water.

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