

July 8, 2019

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PUBLIC HEARING

REPORT ON WATER QUALITY RELATIVE TO PUBLIC HEALTH GOALS

SUMMARY:

The 2019 Report on Water Quality Relative to Public Health Goals is a triennial report required by the California Health and Safety Code summarizing constituents detected in the District's water supply at levels exceeding applicable Public Health Goals or Maximum Contaminant Level Goals during calendar years 2016, 2017 and 2018. A public hearing regarding the report will be held at this Board meeting to accept any public comments that may be provided regarding the report.

BACKGROUND:

The California Health and Safety Code, Section 116470, requires public water systems with more than 10,000 service connections to prepare a brief written report that provides information regarding the detection of any contaminants above the Public Health Goals adopted by the State Office of Environmental Health Hazard Assessment or the Maximum Contaminant Level Goals set by the United States Environmental Protection Agency. These reports are intended to provide information to the public in addition to the Consumer Confidence Report that is mailed annually to each customer. The California Department of Public Health does not require public water systems to take any action to reduce or eliminate any exceedance of a public health goal.

A public water system that is required to prepare a Public Health Goal Report is also required to hold a public hearing for the purpose of accepting and responding to public comments regarding the report. The public hearing may be part of any regularly scheduled meeting. Due to the detection of a number of contaminants detected in the IRWD potable water system above the Public Health Goals, the District is required to prepare a Public Health Goal Report and hold a public hearing at which time public comments may be provided regarding the report. Attached as Exhibit "A" is the District's 2019 Report on Water Quality Relative to Public Health Goals.

OUTLINE OF PROCEEDINGS

President: Declare this to be the time and place for the hearing on the Report on Water Quality Relative to Public Health Goals, and declare the hearing open.

Request the Secretary to report the manner by which the Notice of Hearing was given.

Secretary: The Notice of this hearing was published in the Orange County Register on June 23, 2019. A Notice was also posted in the District office on June 24, 2019. The Secretary presents an Affidavit of Posting and the Proof of Publication for the Board to receive and file.

Board: RECOMMENDATION: RECEIVE AND FILE THE AFFIDAVIT OF POSTING AND THE PROOF OF PUBLICATION PRESENTED BY THE SECRETARY.

President: Inquire of the Secretary whether there have been any written communications.

Secretary: Respond.

President: Request legal counsel to describe the nature of the proceeding.

Counsel: Describe the proceeding.

President: Inquire if staff would like to give a report.

Staff: Respond.

President: Inquire whether there is anyone present who wishes to address the Board concerning the Report on Water Quality Relative to Public Health Goals.

Inquire whether there are any comments or questions from members of the Board of Directors. State that the hearing will be closed and the Board is to receive and file the report.

Board: RECOMMENDATION: THAT THE HEARING BE CLOSED AND THAT THE 2019 REPORT ON WATER QUALITY RELATIVE TO PUBLIC HEALTH GOALS BE RECEIVED AND FILED.

FISCAL IMPACTS:

None.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

COMMITTEE STATUS:

The 2019 Report on Water Quality Relative to Public Health Goals was reviewed by the Engineering and Operations Committee on June 26, 2019.

LIST OF EXHIBITS:

Exhibit "A" – 2019 Report on Water Quality Relative to Public Health Goals PWS #3010092

EXHIBIT "A"

IRVINE RANCH WATER DISTRICT
REPORT ON WATER QUALITY
RELATIVE TO PUBLIC HEALTH GOALS
PWS #3010092
June 26, 2019

BACKGROUND:

Provisions of the California Health and Safety Code (Reference No. 1) specify that larger (>10,000 service connections) water utilities prepare a special report by July 1, 2019 if their water quality measurements have exceeded any Public Health Goals (PHGs). PHGs are non-enforceable goals established by the California Environmental Protection Agency's (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 Maximum Contaminant Level Goals (MCLGs) adopted by United States Environmental Protection Agency (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 Maximum Contaminant Levels (MCLs) and PHGs or MCLGs. Reference 3 is OEHHA's February 2019 Health Risk Information for Public Health Goal Report.

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 or MCLG has yet been adopted by OEHHA or USEPA. These will be addressed in a future required report after a PHG has been adopted.

The law specifies what information is to be provided in the report. (See Reference No. 1)

If a constituent was detected in Irvine Ranch Water District's (IRWD) water supply in 2016, 2017 or 2018 at a level exceeding an applicable PHG or MCLG, this report provides the information required by the law. Included is the numerical public health risk for 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.

What Are PHGs?

PHGs are set by the 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 State Water Resources Control Board Division of Drinking Water (DDW) 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 the IRWD system from 2016 to 2018 for purposes of determining compliance with drinking water standards was considered. This data was summarized in IRWD's Annual Consumer Confidence Reports which were distributed to all of IRWD's customers in 2017, 2018 and 2019.

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 this report and the cost estimates. 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 Best Available Technologies (BATs) 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 or 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 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 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 the IRWD's drinking water sources at levels above the PHG, or if no PHG, above the MCLG. Table 1 summarizes the information in this section.

Arsenic:

The PHG for arsenic is 0.004 parts per billion (ppb). The MCL, or drinking water standard, for arsenic is 10 ppb. We have detected arsenic in four of IRWD's 18 Dyer Road Well Field (DRWF) wells at the following levels: 3.0 ppb in DRWF Well 2, 3.2 ppb in DRWF Well 4, 6.6 ppb in DRWF Well 5, and 4.1 ppb in DRWF Well 6. The water from all DRWF wells in operation is blended prior to entering the IRWD's drinking water distribution system. The highest concentration of arsenic measured at the entry point was 3.6 ppb. We have detected arsenic in five of IRWD's five Irvine Desalter Project (IDP) wells at the following levels: 3.6 ppb in IDP Well 76, 3.7 ppb in IDP Well 77, 3.4 ppb in IDP Well 107, 5.0 ppb in IDP Well 110 and 4.1 ppb in IDP Well 115. The highest concentration of arsenic detected in product water from the IDP Potable

Treatment Plant (IDP/PTP) was 3.3 ppb. These levels were below the MCL. The category of health risk associated with arsenic, and the reason that a drinking water standard was adopted for it, is that some people who drink water containing arsenic above the MCL over many years may experience skin damage or circulatory system problems, and may have an increased risk of cancer. The numerical health risk for cancer at a PHG of 0.004 ppb is 1×10^{-6} (1 in 1,000,000). The numerical health risk for cancer at a MCL of 10 ppb is 2.5×10^{-3} (2.5 in 1,000). The BATs for arsenic to lower the level below the MCL are Reverse Osmosis (RO), Ion Exchange (IE), activated alumina, lime softening, electrodialysis reversal, oxidation/filtration or coagulation/filtration. RO or IE would be required to attempt to lower the arsenic levels to below the PHG. The IDP Potable Treatment Plant (PTP) is an RO facility which reduces arsenic levels in water from the IDP wells, though the plant would probably need to be operated with 0% bypass to meet the PHG. The estimated cost to install and operate such a treatment system on DRWF Wells 2, 4, 5 and 6 that would reliably reduce the arsenic levels to below the PHG would be approximately \$19,424,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of \$157 per year.

Bromate:

The PHG for bromate is 0.1 ppb. The MCL, or drinking water standard, for bromate is 10 ppb. Bromate was detected in imported water purchased from the MWD, the highest level detected was 4.7 ppb. These levels were below the MCL. The category of health risk associated with bromate, and the reason that a drinking water standard was adopted for it, is that people who drink water containing bromate above the MCL throughout their lifetime could experience an increased risk of cancer. The numerical health risk for a PHG of 0.1 ppb is 1×10^{-6} (1 in 1,000,000). The numerical health risk for a MCL of 10 ppb is 1×10^{-4} (1 in 10,000). The BATs for bromate to lower the level below the MCL is to control ozone dosage at the point of application in the treatment process. RO or IE would be required to attempt to lower the bromate level to below the PHG. The estimated cost to install and operate such a treatment system at each MWD turnout that would reliably reduce the bromate level to the PHG would be approximately \$230,322,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of \$1,857 per year.

Chlorite:

The PHG for chlorite is 0.05 parts per million (ppm). The MCL, or drinking water standard, for chlorite is 1.0 ppm. Chlorite was detected in imported water produced at the Baker Water Treatment Plant (BWTP), the highest level detected was 0.60 ppm. These levels were below the MCL. The category of health risk associated with chlorite, and the reason that a drinking water standard was adopted for it, is that people who drink water containing chlorite above the MCL throughout their lifetime could experience an increased risk of anemia (hemotoxicity) or neuro-behavioral effects (neurotoxicity). The numerical health risk for cancer at a PHG of 0.05 ppb is not applicable. The numerical health risk for cancer at a MCL of 10 ppb is not applicable. The BATs for chlorite to

lower the level below the MCL is to control chlorine dioxide dosage at the point of application in the treatment process. The most cost effective means to control chlorite levels to meet the PHG would be to discontinue chlorine dioxide application at the BWTP. So, no cost estimate has been prepared, but this would eliminate the Santiago Reservoir as an emergency source of raw water supply to the BWTP facility.

Coliform Bacteria:

In the month of July 2017, we collected 281 samples from our distribution system for coliform analysis. Of these samples, 0.7% were positive for coliform bacteria.

The MCL for coliform is 5% positive samples of all samples per month and the MCLG is zero. The reason for the coliform drinking water standard is to minimize the possibility of the water containing pathogens which are organisms that cause waterborne disease. Because coliform is only a surrogate indicator of the potential presence of pathogens, it is not possible to state a specific numerical health risk. While the USEPA normally sets MCLGs “at a level where no known or anticipated adverse effects on persons would occur”, they indicate that they cannot do so with coliforms.

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. If a positive sample is found, it indicates a potential problem that needs to be investigated and follow up sampling done. It is not at all unusual for a system to have an occasional positive sample. It is difficult, if not impossible, to assure that a system will never get a positive sample.

We add chloramine at our sources to assure that the water served is microbiologically safe. The chloramine residual levels are carefully controlled to provide the best health protection without causing the water to have undesirable taste and odor or increasing the Disinfection Byproduct (DBP) level. The one single action that would most likely decrease the possibility of a system having positive coliform results would be to significantly increase the disinfectant residual. This would likely result in increased DBPs which have adverse health consequences. 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 (D/DBPR). This careful balance of treatment processes is essential to continue supplying our customers with safe drinking water.

Other equally important measures that we have implemented include: an effective cross-connection control program, maintenance of a disinfectant residual 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 coliform bacteria in Section 64447, Title 22, California Code of Regulations.

Fluoride:

The PHG for fluoride is 1 ppm. The MCL, or drinking water standard, for fluoride is 2 ppm. We have detected fluoride above the PHG in one of IRWD's 27 wells at a level 1.5 ppm in DRWF Well C9. The level detected was below the MCL. The category of health risk associated with fluoride, and the reason that a drinking water standard was adopted for it, is that people who drink water containing fluoride above the MCL throughout their lifetime could experience an increased risk of musculoskeletal disease and tooth mottling. The numerical health risk for cancer at a PHG of 1 ppm is not applicable. The numerical health risk for cancer at a MCL of 2 ppm is not applicable. Following blending with water from 1 other well and treatment for color removal at the Deep Aquifer Treatment System (DATS) the water is blended with water pumped from up to 16 other wells located in the DRWF prior to delivery to the drinking water distribution system. The highest level of fluoride detected in the blended DRWF water was 1.0 ppm and the average level of fluoride in the blended DRWF was 0.60 ppm. Since the fluoride level in the blended DRWF water consistently does not exceed the PHG and the optimal level of fluoride in drinking water to prevent dental caries (or cavities) is 0.7 ppm no further treatment is necessary, so no cost estimate has been prepared.

Gross Alpha Activity (excluding Uranium):

OEHHA has not established a PHG for gross alpha activity. The MCLG for gross alpha activity is 0 picocuries per liter (pCi/l). The MCL, or drinking water standard, for gross alpha activity is 15 pCi/l. We have detected gross alpha activity in one of IRWD's 27 wells at a level of 4.0 pCi/l in IDP Well 115. Gross alpha activity was detected in imported water purchased from the MWD and the highest level was 4 pCi/l. Gross alpha activity was detected in BWTP product water and the highest level was 6.2 pCi/l. All levels were below the MCL. The category of health risk associated with gross alpha activity, and the reason that a drinking water standard was adopted for it, is that people who drink water containing gross alpha activity above the MCL throughout their lifetime could experience an increased risk of cancer. The numerical health risk for a MCLG of 0 pCi/l is 0. Since gross alpha activity is not a specific chemical contaminant, but rather a group of radioactive elements the numeric health risk at the MCL of 15 pCi/l depends on the specific alpha emitting radionuclides present and is estimated to range from 1.0×10^{-3} (1 in 1,000) to 1.9×10^{-4} (1.9 in 10,000). The BATs for gross alpha activity to lower the level below the MCL are RO, IE, lime softening or coagulation/filtration. RO or IE would be required to attempt to lower the gross alpha activity level to the MCLG. The IDP PTP is an RO facility which reduces gross alpha activity levels in water from the IDP wells, though the plant would probably need to be operated with 0% bypass to meet the PHG. The estimated cost to install and operate such a treatment system at the BWTP that would reliably reduce the gross alpha activity level to the MCLG would be approximately \$8,707,000 per year including annualized capital and O&M costs. The estimated cost to install and operate such a treatment system at each MWD turnout that would reliably reduce the gross alpha activity level to the MCLG would be approximately \$230,322,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of \$1,857 per year.

Gross Beta Activity:

OEHHA has not established a PHG for gross beta activity. The MCLG for gross beta activity is 0 pCi/l. The MCL or drinking water standard for gross beta activity is 50 pCi/l. Gross beta activity was detected in imported water purchased from the MWD and the highest level detected was 6 pCi/l. All levels were below the MCL. The category of health risk associated with gross beta activity, and the reason that a drinking water standard was adopted for it, is that people who drink water containing gross beta activity above the MCL throughout their lifetime could experience an increased risk of cancer. The numerical health risk for a MCLG of 0 pCi/l is 0. Since gross beta activity is not a specific chemical contaminant, but rather a group of radioactive elements the numeric health risk at the MCL of 50 pCi/l depends on the specific beta emitting radionuclides present and is estimated to range from 2.3×10^{-3} (2.3 in 1,000) to 4.5×10^{-4} (4.5 in 10,000). The BATs for gross beta activity to lower the level below the MCL are RO, IE, lime softening or coagulation/filtration. RO or IE would be required to attempt to lower the gross beta activity level to the MCLG. The estimated cost to install and operate such a treatment system at each MWD turnout that would reliably reduce the gross beta activity level to the MCLG would be approximately \$230,322,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of \$1,857 per year.

Nitrate/Nitrite Nitrogen and Nitrate Nitrogen:

The PHG and the MCL, or drinking water standard, for nitrate/nitrite nitrogen is 10 ppm. The PHG and the MCL, or drinking water standard, for nitrate nitrogen is 10 ppm. We have detected nitrate/nitrite nitrogen and nitrate nitrogen in one of IRWD's 27 wells at levels of 13 ppm nitrate/nitrite nitrogen and 13 ppm nitrate nitrogen in Well 21. The 21-22 Desalter is an RO facility which reduces nitrate/nitrite nitrogen and nitrate nitrogen levels in the water from Well 21. Nitrate/nitrite nitrogen and nitrate nitrogen were detected in the 21-22 Desalter product water. The highest level detected for nitrate/nitrite nitrogen was 9.8 ppm and the average level was 3.6 ppm. The highest level detected for nitrate nitrogen was 9.8 ppm and the average level was 3.6 ppm. The levels detected in the treated water were below the MCL. The category of health risk associated with nitrate/nitrite nitrogen and nitrate as nitrate, and the reason that a drinking water standard was adopted for it, is that people who drink water containing nitrate/nitrite nitrogen or nitrate as nitrate above the MCL could experience an acute risk of hemotoxicity causing methemoglobinemia. The numerical health risk for cancer at a PHG and a MCL of 10 ppm is not applicable. Since the nitrate/nitrite nitrogen and nitrate nitrogen levels in the treated water are consistently below the PHG no further treatment is necessary, so no cost estimate has been prepared.

Perchlorate:

The PHG for perchlorate is 1 ppb. The MCL, or drinking water standard, for perchlorate is 6 ppb. We have detected perchlorate in two of IRWD's 27 wells at the following

levels: 4.6 ppb in DRWF Well 3 and 5.0 ppb in Well 21. All levels were below the MCL. The category of health risk associated with perchlorate, and the reason that a drinking water standard was adopted for it, is that people who drink water containing perchlorate above the MCL throughout their lifetime could experience an increased risk of thyroid effects (endocrine toxicity) or neurological developmental defects (neurodevelopment toxicity). The numerical health risk for cancer at a PHG of 1 ppb is not applicable. The numerical health risk for cancer at a MCL of 6 ppb is not applicable. The water from all DRWF wells in operation is blended prior to entering the IRWD's drinking water distribution system. Perchlorate was not detected at the entry point to the distribution system. The 21-22 Desalter is an RO facility which reduces perchlorate levels in the water from Well 21. Perchlorate was not detected in the product water from the 21-22 Desalter facility. Since the perchlorate levels in the treated water are consistently below the PHG no further treatment is necessary, so no cost estimate has been prepared.

Tetrachloroethylene:

The PHG for tetrachloroethylene is 0.06 ppb. The MCL, or drinking water standard, for tetrachloroethylene is 5 ppb. We have detected tetrachloroethylene in one of IRWD's 27 wells at a level of 0.5 ppb, the detection limit for reporting, in DRWF Well 3. All levels were below the MCL. The category of health risk associated with tetrachloroethylene, and the reason that a drinking water standard was adopted for it, is that people who drink water containing tetrachloroethylene above the MCL throughout their lifetime could experience an increased risk of cancer. The numerical health risk for a PHG of 0.05 ppb is 1×10^{-6} (1 in 1,000,000). The numerical health risk for a MCL of 5 ppb is 8×10^{-5} (8 in 100,000). The water from all DRWF wells in operation is blended prior to entering the IRWD's drinking water distribution system. Tetrachloroethylene was not detected at the entry point to the distribution system. Since the tetrachloroethylene levels in the treated water are consistently below the PHG no further treatment is necessary, so no cost estimate has been prepared.

Uranium:

The PHG for uranium is 0.43 pCi/l. The MCL, or drinking water standard, for uranium is 20 pCi/l. We have detected uranium in one of IRWD's 27 wells at a level of 6.8 pCi/l in IDP Well 115. The IDP/PTP is an RO facility which reduces uranium levels in water from the IDP wells. Uranium was detected in the IDP/PTP product water at a level of 2.8 pCi/l. Uranium was detected in product water from the BWTP, the highest level detected was 2.8 pCi/l. Uranium was detected in imported water purchased from the MWD, the highest level detected was 3 pCi/l. These levels were below the MCL. The category of health risk associated with uranium, and the reason that a drinking water standard was adopted for it, is that people who drink water containing uranium above the MCL throughout their lifetime could experience kidney problems or an increased risk of cancer. The numerical health risk for cancer at a PHG of 0.43 pCi/l is 1×10^{-6} (1 in 1,000,000). The numerical health risk for cancer at a MCL of 20 pCi/l is 5×10^{-5} (5 in 100,000). The BATs for uranium to lower the level below the MCL are RO, IE, lime

softening or coagulation/filtration. RO or IE would be required to attempt to lower the uranium level to below the PHG. The IDP PTP is an RO facility which reduces uranium levels in water from the IDP wells, though the plant would probably need to be operated with 0% bypass to meet the PHG. The estimated cost to install and operate such a treatment system at the BWTP that would reliably reduce the uranium level to the MCLG would be approximately \$8,707,000 per year including annualized capital and O&M costs. The estimated cost to install and operate such a treatment system at each MWD turnout that would reliably reduce the uranium level to the MCLG would be approximately \$230,322,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of \$1,928 per year.

Combined Treatment Cost

Since the same technology is utilized to treat all of the constituents included in this report each of the locations above would only require a single treatment facility each to reduce levels of all of these constituents to below the PHG or MCLG. The estimated cost to install and operate such a treatment system on DRWF Wells 2, 4, 5 and 6 that would reliably reduce the levels of arsenic to levels below the PHG or MCLG would be approximately \$19,424,000 per year including annualized capital and O&M costs. The estimated cost to install and operate such a treatment system at the BWTP that would reliably reduce the gross alpha activity and uranium levels (and also chlorite levels) to the PHG or MCLG would be approximately \$8,707,000 per year including annualized capital and O&M costs. The estimated cost to install and operate such a treatment system at each MWD turnout that would reliably reduce the bromate, gross alpha activity, gross beta activity and uranium levels to the PHG or MCLG would be approximately \$230,322,000 per year including annualized capital and O&M costs. This would result in an assumed increased cost for each customer of \$2,084 per year to lower the levels of Arsenic, gross alpha activity, gross beta activity, hexavalent chromium and uranium to levels below the PHG or MCLG.

Table 1: Summary of PHG Exceedences

CONTAMINANT	UNITS	PHG [MCLG]	MCL	Level of Detection	Status
Arsenic	ppb	0.004	10	ND – 6.6	1
Bromate	ppb	0.1	10	ND – 4.7	2
Chlorite	ppm	0.05	1.0	ND – 0.60	2
Fluoride	ppm	1	2	ND – 1.5	1
Gross Alpha Activity	pCi/L	[0]	15	ND – 6.2	1
Gross Beta Activity	pCi/L	[0]	50	ND – 6	1
Nitrate/Nitrite Nitrogen	ppm	10	10	ND – 13	1
Nitrate Nitrogen	ppm	10	10	ND – 13	1
Perchlorate	ppb	1	6	ND – 5.0	2
Tetrachloroethylene	ppb	0.06	5	ND – 0.5	2
Coliform Bacteria	% Present	0	5	0 – 0.7	2
Uranium	pCi/L	0.43	20	ND – 6.8	1

Notes: Hexavalent Chromium was reported in 2016 PHG report, but is not required to be reported in 2019 PHG report.

Status: 1 – Reported in 2016 PHG report

2 – Not reported in 2016 PHG report

RECOMMENDATIONS FOR FURTHER ACTION:

The drinking water quality of the Irvine Ranch Water District meets all 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.

REFERENCES:

- No.1 Excerpt from California Health & Safety Code: Section 116470 (b)
- No.2 Table of Regulated Constituents with MCLs, PHGs or MCLGs
- No.3 Health Risk Information for Public Health Goal Report, February 2019

CALIFORNIA PUBLIC HEALTH GOAL REQUIREMENTS
REFERENCE NO. 1

California Health and Safety Code
Section 116470

(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).

MCLs, DLRs, and PHGs for Regulated Drinking Water Contaminants

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

Last Update: December 26, 2018

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				
<i>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</i>				
Copper	1.3	0.05	0.3	2008

Reference No. 2
2019 PHG Triennial Report: Calendar Years 2016-2017-2018

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

Reference No. 2
2019 PHG Triennial Report: Calendar Years 2016-2017-2018

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	0.0000017	1999
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	2018 draft

Reference No. 2
2019 PHG Triennial Report: Calendar Years 2016-2017-2018

Bromoform	--	0.0010	0.0005	2018 draft
Chloroform	--	0.0010	0.0004	2018 draft
Dibromochloromethane	--	0.0010	0.0001	2018 draft
Haloacetic Acids (five) (HAA5)	0.060	--	--	--
Monochloroacetic Acid	--	0.0020	--	--
Dichloroacetic Acid	--	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.				

Public Health Goals

Health Risk Information for Public Health Goal Exceedance Reports

February 2019



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 2019

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 Public Health Goals (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 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.

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

¹ Health and Safety Code Section 116470(b)

² Health and Safety Code Section 116365

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 (<http://www.oehha.ca.gov>). Also, technical fact sheets on most of the chemicals having federal MCLs can be found at <http://www.epa.gov/your-drinking-water/table-regulated-drinking-water-contaminants>.

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	digestive system toxicity (causes vomiting)	0.02	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: http://oehha.ca.gov/multimedia/green/pdf/GC_Regtext011912.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
Diethylhexyl-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).

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
1,2-Dibromo-3-chloropropane (DBCP)	carcinogenicity (causes cancer)	0.0000017 (1.7×10 ⁻⁶)	1×10 ⁻⁶	0.0002	1×10 ⁻⁴ (one per ten thousand)
1,2-Dichlorobenzene (o-DCB)	hepatotoxicity (harms the liver)	0.6	NA	0.6	NA
1,4-Dichlorobenzene (p-DCB)	carcinogenicity (causes cancer)	0.006	1×10 ⁻⁶	0.005	8×10 ⁻⁷ (eight per ten million)
1,1-Dichloroethane (1,1-DCA)	carcinogenicity (causes cancer)	0.003	1×10 ⁻⁶	0.005	2×10 ⁻⁶ (two per million)
1,2-Dichloroethane (1,2-DCA)	carcinogenicity (causes cancer)	0.0004	1×10 ⁻⁶	0.0005	1×10 ⁻⁶ (one per million)
1,1-Dichloroethylene (1,1-DCE)	hepatotoxicity (harms the liver)	0.01	NA	0.006	NA
1,2-Dichloroethylene, cis	nephrotoxicity (harms the kidney)	0.013	NA	0.006	NA
1,2-Dichloroethylene, 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)

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-Dichlorophenoxyacetic acid (2,4-D)	hepatotoxicity and nephrotoxicity (harms the liver and kidney)	0.02	NA	0.07	NA
1,2-Dichloropropane (propylene dichloride)	carcinogenicity (causes cancer)	0.0005	1×10 ⁻⁶	0.005	1×10 ⁻⁵ (one per hundred thousand)
1,3-Dichloropropene (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)

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
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)
Hexachlorobenzene	carcinogenicity (causes cancer)	0.00003	1×10 ⁻⁶	0.001	3×10 ⁻⁵ (three per hundred thousand)
Hexachlorocyclopentadiene (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	<1×10 ⁻⁶ (PHG is not based on this effect)	0.015 (AL ⁸)	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

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
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)
Monochlorobenzene (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 ¹⁰	NA	10 as nitrogen	NA

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
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 neurodevelopmental 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)
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

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}	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-Tetrachloroethane	carcinogenicity (causes cancer)	0.0001	1×10^{-6}	0.001	1×10^{-5} (one per hundred thousand)
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD, or dioxin)	carcinogenicity (causes cancer)	5×10^{-11}	1×10^{-6}	3×10^{-8}	6×10^{-4} (six per ten thousand)
Tetrachloroethylene (perchloroethylene, 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

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
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-Trichlorobenzene	endocrine toxicity (harms adrenal glands)	0.005	NA	0.005	NA
1,1,1-Trichloroethane	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-Trichloroethane	carcinogenicity (causes cancer)	0.0003	1×10^{-6}	0.005	2×10^{-5} (two per hundred thousand)
Trichloroethylene (TCE)	carcinogenicity (causes cancer)	0.0017	1×10^{-6}	0.005	3×10^{-6} (three 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
Trichlorofluoromethane (Freon 11)	accelerated mortality (increase in early death)	1.3	NA	0.15	NA
1,2,3-Trichloropropane (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-trifluoroethane (Freon 113)	hepatotoxicity (harms the liver)	4	NA	1.2	NA
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

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 @ MCLG	California MCL ⁴ (mg/L)	Cancer Risk @ 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
Dichloroacetic acid (DCA)	carcinogenicity (causes cancer)	0	0	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.

Office of Environmental Health Hazard Assessment
Water Toxicology Section
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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)	Cancer Risk ³ @ MCLG	California MCL ⁴ (mg/L)	Cancer Risk @ California MCL
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
Disinfection byproducts: trihalomethanes (THMs)					
Bromodichloromethane (BDCM)	carcinogenicity (causes cancer)	0	0	none	NA
Bromoform	carcinogenicity (causes cancer)	0	0	none	NA
Chloroform	hepatotoxicity and nephrotoxicity (harms the liver and kidney)	0.07	NA	none	NA
Dibromo-chloromethane (DBCM)	hepatotoxicity, nephrotoxicity, and neurotoxicity (harms the liver, kidney, and nervous system)	0.06	NA	none	NA

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 @ MCLG	California MCL ⁴ (mg/L)	Cancer Risk @ California MCL
Total trihalomethanes (sum of BDCM, bromoform, chloroform and DBCM)	carcinogenicity (causes cancer), hepatotoxicity, nephrotoxicity, and neurotoxicity (harms the liver, kidney, and nervous system)	none	NA	0.08	NA
Radionuclides					
Gross alpha particles ⁹	carcinogenicity (causes cancer)	0 (²¹⁰ Po included)	0	15 pCi/L ¹⁰ (includes ²²⁶ Ra but not radon and uranium)	up to 1x10 ⁻³ (for ²¹⁰ Po, the most potent alpha emitter)
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 2x10 ⁻³ (for ²¹⁰ Pb, the most potent beta-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.