Public Health Goal Report
2019

Background:

Provisions of the California Health and Safety Code 116470 specify that Palmdale Water District, and other water utilities with more than 10,000 service connections, prepare a special report every three years by July 1st if their water quality measurements have exceeded any Public Health Goals (PHGs). PHGs are non-enforceable goals established by the Cal-EPA's Office of Environmental Health Hazard Assessment (OEHHA). The law also requires that where OEHHA has not adopted a PHG for a constituent, the water suppliers are to use the Maximum Contaminant Level Goal (MCLG) 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 (Attachment No.1).

There are a few constituents that are routinely detected in water systems at levels usually well below the drinking water standards for which no PHG nor MCLG has yet been adopted by OEHHA or USEPA, including Total Trihalomethanes. These will be addressed in a future required report after a PHG has been adopted.

California Health and Safety code section 116470 (b) requires water agencies to prepare a report and hold a public meeting for the purpose of accepting and responding to public comments on the report.

If a constituent was detected in the District's water supply between 2016 and 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 associated with the MCL and the PHG or MCLG, the category or type of risk to health that could be associated with each constituent (Attachment No.2), the best treatment technology available that could be used to reduce the constituent level (Attachment No.4), and an estimate of the cost to install that treatment if it is appropriate and feasible (Attachment No. 3).

What Are PHGs?

PHGs are set by the California Office of Environmental Health Hazard Assessment (OEHHA) which is part of Cal-EPA and are based solely on public health risk considerations. None of the practical risk-management factors that are considered by the USEPA or the California Division of Drinking Water (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 our water system between 2016 and 2018 for purposes of determining compliance with drinking water standards was considered. This data was all summarized in our 2016, 2017, and 2018 Annual Water Quality Reports which were made available to all of our customers by July 1st. of each year (Attachment No. 5).

Guidelines Followed:

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

Best Available Treatment Technology and Cost Estimates:

Both the USEPA and DDW adopt what are known as Best Available Technologies (BATs) which are the best-known methods of reducing contaminant levels to the MCL. Costs have been estimated for such technologies (Attachment No.3). However, since many PHGs and all MCLGs are set much lower than the MCL, it is not always possible nor feasible to determine what treatment is needed to further reduce a constituent downward to or near the PHG or MCLG, many of which are set at zero. Estimating the costs to reduce a constituent to zero is difficult, if not impossible, because it is not possible to verify by analytical means 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 our drinking water sources between 2016 and 2018 at levels above the PHG, or if no PHG, above the MCLG.

Aluminum:

The major sources of aluminum in drinking water are erosion of natural deposits and residue from some surface water treatment processes. The USEPA and California State MCL for aluminum is 1,000 µg/L and the California PHG is 600 µg/L.

Palmdale Water District collected and analyzed 34 samples for aluminum during 2016 – 2018 and only one sample result was detected above the PHG. Values ranged from non-detect (ND) to 690 µg/L, with an average value of ND. All sample results were below the MCL.

The category of health risk for aluminum is neurotoxicity and immunotoxicity, which means it harms the nervous and immune systems. Some people who drink water containing aluminum in excess of the MCL over many years may experience short-term gastrointestinal tract affects. The BAT for aluminum reduction (Attachment No.1: 64447.2 Table 64447.2-A) is optimizing treatment and reducing aluminum added. Since we are already optimizing treatment, no estimate of cost is included in this report.

Palmdale Water District is in full compliance with the MCL for aluminum.

Arsenic:

The major sources of arsenic in drinking water are erosion of natural deposits, runoff from orchards, glass and electronics production wastes. The USEPA and California State MCL for arsenic is 10 µg/L and the California PHG is 0.004 µg/L and USEPA MCLG is zero.

Palmdale Water District collected and analyzed 34 samples for arsenic during 2016 – 2018, with values ranges from non-detect (ND) to 3.9 µg/L, with an average value of ND. All sample results were below the MCL.

The category of health risk for arsenic is carcinogenicity. Carcinogenic risk means capable of producing cancer. Some people who drink water containing arsenic in excess of the MCL over many years may experience skin damage or circulatory system problems and may have an increased risk of getting cancer. The BATs for arsenic reduction (Attachment No.1: 64447.2 Table 64447.2-A) are listed as Activated Alumina, Coagulation/Filtration, Ion Exchange, Lime Softening, Reverse Osmosis, Electrodialysis and Oxidation/Filtration.

Palmdale Water District is in full compliance with the MCL for arsenic.

Estimated cost for arsenic removal using reverse osmosis, the most efficient technology is listed in Attachment No.3.

Lead and/or Copper:

The major sources of copper in drinking water are internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives. There is no MCL for Lead or Copper. Instead the 90th percentile value of all samples from household taps in the distribution system cannot exceed an Action Level of 0.015 mg/L for lead and 1.3 mg/l for copper. The PHG for lead is 0.0002 mg/L and the PHG for copper is 0.3 mg/L.

Based on the triennial sampling of residences within our distribution system in 2018, our 90th percentile value for copper was 0.42 mg/L which exceeded the PHG. The 90th percentile value for lead was below the DLR and therefore considered to be non-detect, or zero.

The category of health risk for copper is digestive system toxicity (causes nausea, vomiting, diarrhea). Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time may experience gastrointestinal distress. Numerical health risk data on copper have not yet been provided by OEHHA, the State agency responsible for providing that information.

Our water system is in full compliance with the Federal and State Lead and Copper Rule. To reduce the potential that lead or copper values at consumer taps would exceed the PHG, corrosion control treatment was installed at our treated surface water source.

Based on our extensive sampling, it was determined that according to State Regulatory Requirements, we meet the Action Levels for Lead and Copper. Therefore, we are deemed by DDW to have “optimized corrosion control” for our system.

In general, optimizing corrosion control is considered to be the best available technology to deal with corrosion issues and with any lead or copper findings.
We continue to monitor our water quality parameters that relate to corrosiveness, such as the pH, hardness, alkalinity, total dissolved solids, and will take action if necessary, to maintain our system in an “optimized corrosion control” condition.

Since we are meeting the "optimized corrosion control" requirements, additional corrosion control treatment is not necessary. Therefore, no estimate of cost is included in this report.

While our system did not exceed the Lead PHG or Lead Action Level, it is possible that there may be high lead levels in your home as a result of materials in your home plumbing. Lead can cause serious health problems, especially for pregnant women and children 6 and under. If you are concerned about high lead levels in your home's water, run your water for 30 seconds to 2 minutes before using tap water and have your water tested. Additional information is available from the Safe Drinking Water Hotline at 1-800-426-4791 or at http://www.epa.gov/lead.

Gross Alpha Particle Activity:

The major source of gross alpha particle activity in drinking water is from the erosion of natural deposits. Certain minerals are radioactive and may emit alpha radiation. The MCL for gross alpha particle activity is 15 pCi/L and the MCLG is 0 pCi/L.

Palmdale Water District collected and analyzed 26 samples for gross alpha particle activity during 2010 – 2018, with values that ranged from non-detect (ND) to 5.7 pCi/L, with an average value of ND. Since individual sites are sampled for gross alpha particle activity once every 6 years or once every 9 years, the most recent results for all sources have been included in this report. All sample results were below the MCL.

The category of health risk for gross alpha particle activity is carcinogenicity. Carcinogenic risk means capable of producing cancer. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer. Cancer risk at the MCLG is 0 and at the California MCL it is 1×10^{-3}. The BAT for gross alpha particle activity reduction is reverse osmosis (Attachment No.1: 64447.3 Table 64447.3-A).

Palmdale Water District is in full compliance with the MCL for gross alpha particle activity.

Gross Beta Particle Activity:

The major source of beta particles in drinking water is from decay of natural and man-made deposits. Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. The MCL for gross beta particles is 50 pCi/L and the MCLG is 0 pCi/L.

Palmdale Water District collected and analyzed 26 samples for gross beta particles during 2016 – 2018, with values that ranged from non-detect (ND) to 7.8 pCi/L, with an average value of ND. All sample results were below the MCL.

The category of health risk for beta particles is carcinogenicity. Carcinogenic risk means capable of producing cancer. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer. Cancer risk at the MCLG is 0 and at California MCL it is 2×10^{-3}. The BATs for gross beta reduction are ion exchange and reverse osmosis (Attachment No.1: 64447.3 Table 64447.3-A).

Palmdale Water District is in full compliance with the MCL for gross beta particle activity.

Uranium

The major source of uranium in drinking water is from erosion of natural deposits. The MCL for uranium is 20 pCi/L and the PHG for uranium is 0.43 pCi/L.

Palmdale Water District collected and analyzed 1 sample for uranium during 2016 – 2018, with a result of 1.1 pCi/L, which is below the MCL.

The category of health risk for uranium is carcinogenicity. Carcinogenic risk means capable of producing cancer. Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer. Cancer risk at the MCLG is 0 and at the California MCL it is 5×10^{-5}. The BATs for uranium reduction are ion exchange, reverse osmosis, lime softening, and coagulation/filtration (Attachment No.1: 64447.3 Table 64447.3-A).

Palmdale Water District is in full compliance with the MCL for uranium.

RECOMMENDATIONS FOR FURTHER ACTION:

The drinking water quality of the Palmdale Water District meets all State of California, DDW and USEPA drinking water standards set to protect public health. To further reduce the levels of the constituents identified in this report that are already significantly below the health-based Maximum Contaminant Levels established to provide "safe drinking water", additional costly treatment processes would be required. The effectiveness of the treatment processes to provide any significant reductions in constituent levels at these already low values is uncertain. The health protection benefits of these further hypothetical reductions are not at all clear and may not be quantifiable. Therefore, no action is proposed.

ATTACHMENTS:

No.1 Table of Regulated Constituents with MCLs, PHGs or MCLGs

No.2 Health Risk Information for Public Health Goal Exceedance Reports (Table 1 and Table 2)

No.3 Cost Estimates for Treatment Technologies (Table 1, Table 2 and Table 3)

No.4 Excerpt from Title 22 California Code of Regulations: Best Available Technologies (BAT)

No.5 Palmdale Water District's 2016, 2017 and 2018 Water Quality Data

No.6 Glossary of terms and abbreviations used in the report

ATTACHMENT NO. 1

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				
Values referred to as MCLs for lead and copper are not actually MCLs; instead, they are called "Action Levels" under the lead and copper rule				
Copper	1.3	0.05	0.3	2008

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

1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	1.2	0.01	4	1997 (rev2011)
Vinyl chloride	0.0005	0.0005	0.00005	2000
Xylenes	1.75	0.0005	1.8	1997
(b) Non-Volatile Synthetic Organic Chemicals (SOCs)				
Alachlor	0.002	0.001	0.004	1997
Atrazine	0.001	0.0005	0.00015	1999
Bentazon	0.018	0.002	0.2	1999 (rev2009)
Benzo(a)pyrene	0.0002	0.0001	0.000007	2010
Carbofuran	0.018	0.005	0.0007	2016
Chlordane	0.0001	0.0001	0.00003	1997 (rev2006)
Dalapon	0.2	0.01	0.79	1997 (rev2009)
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00001	0.0000017	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

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 Adic	--	0.0010	--	--
Trichloroacetic Acid	--	0.0010	--	--
Monobromoacetic Acid	--	0.0010	--	--
Dibromoacetic Acid	--	0.0010	--	--
Bromate	0.010	0.0050**	0.0001	2009
Chlorite	1.0	0.020	0.05	2009
Chemicals with PHGs established in response to DDW requests. These are not currently regulated drinking water contaminants.				
N-Nitrosodimethylamine (NDMA)	--	--	0.000003	2006

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

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

ATTACHMENT NO. 2

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-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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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)

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)
Hexachloroben-zene	carcinogenicity (causes cancer)	0.00003	1×10^{-6}	0.001	3×10^{-5} (three per hundred thousand)
Hexachloro-cyclopentadiene (HCCPD)	digestive system toxicity (causes stomach lesions)	0.002	NA	0.05	NA
Lead	developmental neurotoxicity (causes neurobehavioral effects in children) cardiovascular toxicity (causes high blood pressure) carcinogenicity (causes cancer)	0.0002	$<1\times10^{-6}$ (PHG is not based on this effect)	0.015 (AL[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)
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[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 neurodevelop-mental deficits)	0.001	NA	0.006	NA
Picloram	hepatotoxicity (harms the liver)	0.166	NA	0.5	NA
Polychlorinated biphenyls (PCBs)	carcinogenicity (causes cancer)	0.00009	1×10^{-6}	0.0005	6×10^{-6} (six per million)
Radium-226	carcinogenicity (causes cancer)	0.05 pCi/L	1×10^{-6}	5 pCi/L (combined $Ra^{226+228}$)	1×10^{-4} (one per ten thousand)
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-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

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-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)

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
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 (Freon 113)	hepatotoxicity (harms the liver)	4	NA	1.2	NA
Tritium	carcinogenicity (causes cancer)	400 pCi/L	$1x10^{-6}$	20,000 pCi/L	$5x10^{-5}$ (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.

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)					
Bromodichloro-methane (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.

ATTACHMENT NO. 3

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

COST ESTIMATES FOR TREATMENT TECHNOLOGIES

(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	Estimated Unit Cost 2012 ACWA Survey Indexed to 2018* ($/1,000 gallons treated)
1	Ion Exchange	Coachella Valley WD, for GW, to reduce Arsenic concentrations. 2011 costs.	2.19
2	Ion Exchange	City of Riverside Public Utilities, for GW, for Perchlorate treatment.	1.06
3	Ion Exchange	Carollo Engineers, anonymous utility, 2012 costs for treating GW source for Nitrates. Design souce water concentration: 88 mg/L NO_3. Design finished water concentration: 45 mg/L NO_3. Does not include concentrate disposal or land cost.	0.80
4	Granular Activated Carbon	City of Riverside Public Utilities, GW sources, for TCE, DBCP (VOC, SOC) treatment.	0.53
5	Granular Activated Carbon	Carollo Engineers, anonymous utility, 2012 costs for treating SW source for TTHMs. Design souce water concentration: 0.135 mg/L. Design finished water concentration: 0.07 mg/L. Does not include concentrate disposal or land cost.	0.38
6	Granular Activated Carbon, Liquid Phase	LADWP, Liquid Phase GAC treatment at Tujunga Well field. Costs for treating 2 wells. Treament for 1,1 DCE (VOC). 2011-2012 costs.	1.62
7	Reverse Osmosis	Carollo Engineers, anonymous utility, 2012 costs for treating GW source for Nitrates. Design souce water concentration: 88 mg/L NO_3. Design finished water concentration: 45 mg/L NO_3. Does not include concentrate disposal or land cost.	0.86
8	Packed Tower Aeration	City of Monrovia, treatment to reduce TCE, PCE concentrations. 2011-12 costs.	0.47
9	Ozonation+ Chemical addition	SCVWD, STWTP treatment plant includes chemical addition + ozone generation costs to reduce THM/HAAs concentrations. 2009-2012 costs.	0.10

COST ESTIMATES FOR TREATMENT TECHNOLOGIES

(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	Estimated Unit Cost 2012 ACWA Survey Indexed to 2018* ($/1,000 gallons treated)
10	Ozonation+ Chemical addition	SCVWD, PWTP treatment plant includes chemical addition + ozone generation costs to reduce THM/HAAs concentrations, 2009-2012 costs.	0.21
11	Coagulation/Filtration	Soquel WD, treatment to reduce manganese concentrations in GW. 2011 costs.	0.80
12	Coagulation/Filtration Optimization	San Diego WA, costs to reduce THM/Bromate, Turbidity concentrations, raw SW a blend of State Water Project water and Colorado River water, treated at Twin Oaks Valley WTP.	0.91
13	Blending (Well)	Rancho California WD, GW blending well, 1150 gpm, to reduce fluoride concentrations.	0.76
14	Blending (Wells)	Rancho California WD, GW blending wells, to reduce arsenic concentrations, 2012 costs.	0.62
15	Blending	Rancho California WD, using MWD water to blend with GW to reduce arsenic concentrations. 2012 costs.	0.74
16	Corrosion Inhibition	Atascadero Mutual WC, corrosion inhibitor addition to control aggressive water. 2011 costs.	0.09

*Costs were adjusted from date of original estimates to present, where appropriate, using the Engineering News Record (ENR) annual average building costs of 2018 and 2012. The adjustment factor was derived from the ratio of 2018 Index/2012 Index, or 1.188.
For the indexed 2015 costs, please refer to the ACWA PHG Guidance published in March 2016.

ATTACHMENT NO. 3
Table 2
Reference: Other Agencies

COST ESTIMATES FOR TREATMENT TECHNOLOGIES

(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	**Estimated 2012 Unit Cost Indexed to 2018*** ($/1,000 gallons treated)
1	Reduction - Coagulation-Filtration	Reference: February 28, 2013, Final Report Chromium Removal Research, City of Glendale, CA. 100-2000 gpm. Reduce Hexavalent Chromium to 1 ppb.	1.74 - 10.97
2	IX - Weak Base Anion Resin	Reference: February 28, 2013, Final Report Chromium Removal Research, City of Glendale, CA. 100-2000 gpm. Reduce Hexavalent Chromium to 1 ppb.	1.79 - 7.47
3	IX	Golden State Water Co., IX w/disposable resin, 1 MGD, Perchlorate removal, built in 2010.	0.55
4	IX	Golden State Water Co., IX w/disposable resin, 1000 gpm, perchlorate removal (Proposed; O&M estimated).	1.19
5	IX	Golden State Water Co., IX with brine regeneration, 500 gpm for Selenium removal, built in 2007.	7.81
6	GFO/Adsorption	Golden State Water Co., Granular Ferric Oxide Resin, Arsenic removal, 600 gpm, 2 facilities, built in 2006.	2.04 - 2.18
7	RO	Reference: Inland Empire Utilities Agency : Chino Basin Desalter. RO cost to reduce 800 ppm TDS, 150 ppm Nitrate (as NO3); approx. 7 mgd.	2.67
8	IX	Reference: Inland Empire Utilities Agency : Chino Basin Desalter. IX cost to reduce 150 ppm Nitrate (as NO3); approx. 2.6 mgd.	1.49

9	Packed Tower Aeration	Reference: Inland Empire Utilities Agency : Chino Basin Desalter. PTA-VOC air stripping, typical treated flow of approx. 1.6 mgd.	0.45
10	IX	Reference: West Valley WD Report, for Water Recycling Funding Program, for 2.88 mgd treatment facility. IX to remove Perchlorate, Perchlorate levels 6-10 ppb. 2008 costs.	0.62 - 0.88
11	Coagulation Filtration	Reference: West Valley WD, includes capital, O&M costs for 2.88 mgd treatment facility- Layne Christensen packaged coagulation Arsenic removal system. 2009-2012 costs.	0.41
12	FBR	Reference: West Valley WD/Envirogen design data for the O&M + actual capitol costs, 2.88 mgd fluidized bed reactor (FBR) treatment system, Perchlorate and Nitrate removal, followed by multimedia filtration & chlorination, 2012. NOTE: The capitol cost for the treatment facility for the first 2,000 gpm is $23 million annualized over 20 years with ability to expand to 4,000 gpm with minimal costs in the future. $17 million funded through state and federal grants with the remainder funded by WVWD and the City of Rialto.	1.84 - 1.94

*Costs were adjusted from date of original estimates to present, where appropriate, using the Engineering News Record (ENR) annual average building costs of 2018 and 2012. The adjustment factor was derived from the ratio of 2018 Index/2012 Index, or 1.188.

For the indexed 2015 costs, please refer to the ACWA PHG Guidance published in March 2016.

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

COST ESTIMATES FOR TREATMENT TECHNOLOGIES

(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	Estimated 2012 Unit Cost Indexed to 2018* ($/1,000 gallons treated)
1	Granular Activated Carbon	Reference: Malcolm Pirnie estimate for California Urban Water Agencies, large surface water treatment plants treating water from the State Water Project to meet Stage 2 D/DBP and bromate regulation, 1998	0.63 - 1.19
2	Granular Activated Carbon	Reference: Carollo Engineers, estimate for VOC treatment (PCE), 95% removal of PCE, Oct. 1994,1900 gpm design capacity	0.29
3	Granular Activated Carbon	Reference: Carollo Engineers, est. for a large No. Calif. surf. water treatment plant (90 mgd capacity) treating water from the State Water Project, to reduce THM precursors, ENR construction cost index = 6262 (San Francisco area) - 1992	1.38
4	Granular Activated Carbon	Reference: CH2M Hill study on San Gabriel Basin, for 135 mgd central treatment facility for VOC and SOC removal by GAC, 1990	0.54 - 0.78
5	Granular Activated Carbon	Reference: Southern California Water Co. - actual data for "rented" GAC to remove VOCs (1,1-DCE), 1.5 mgd capacity facility, 1998	2.47
6	Granular Activated Carbon	Reference: Southern California Water Co. - actual data for permanent GAC to remove VOCs (TCE), 2.16 mgd plant capacity, 1998	1.60
7	Reverse Osmosis	Reference: Malcolm Pirnie estimate for California Urban Water Agencies, large surface water treatment plants treating water from the State Water Project to meet Stage 2 D/DBP and bromate regulation, 1998	1.85 - 3.55
8	Reverse Osmosis	Reference: Boyle Engineering, RO cost to reduce 1000 ppm TDS in brackish groundwater in So. Calif., 1.0 mgd plant operated at 40% of design flow, high brine line cost, May 1991	4.38
9	Reverse Osmosis	Reference: Boyle Engineering, RO cost to reduce 1000 ppm TDS in brackish groundwater in So. Calif., 1.0 mgd plant operated at 100% of design flow, high brine line cost, May 1991	2.70
10	Reverse Osmosis	Reference: Boyle Engineering, RO cost to reduce 1000 ppm TDS in brackish groundwater in So. Calif., 10.0 mgd plant operated at 40% of design flow, high brine line cost, May 1991	2.92

COST ESTIMATES FOR TREATMENT TECHNOLOGIES

(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	Estimated 2012 Unit Cost Indexed to 2018* ($/1,000 gallons treated)
11	Reverse Osmosis	Reference: Boyle Engineering, RO cost to reduce 1000 ppm TDS in brackish groundwater in So. Calif., 10.0 mgd plant operated at 100% of design flow, high brine line cost, May 1991	2.26
12	Reverse Osmosis	Reference: Arsenic Removal Study, City of Scottsdale, AZ - CH2M Hill, for a 1.0 mgd plant operated at 40% of design capacity, Oct. 1991	7.33
13	Reverse Osmosis	Reference: Arsenic Removal Study, City of Scottsdale, AZ - CH2M Hill, for a 1.0 mgd plant operated at 100% of design capacity, Oct. 1991	4.33
14	Reverse Osmosis	Reference: Arsenic Removal Study, City of Scottsdale, AZ - CH2M Hill, for a 10.0 mgd plant operated at 40% of design capacity, Oct. 1991	3.24
15	Reverse Osmosis	Reference: Arsenic Removal Study, City of Scottsdale, AZ - CH2M Hill, for a 10.0 mgd plant operated at 100% of design capacity, Oct. 1991	2.01
16	Reverse Osmosis	Reference: CH2M Hill study on San Gabriel Basin, for 135 mgd central treatment facility with RO to remove nitrate, 1990	2.02 - 3.55
17	Packed Tower Aeration	Reference: Analysis of Costs for Radon Removal... (AWWARF publication), Kennedy/Jenks, for a 1.4 mgd facility operating at 40% of design capacity, Oct. 1991	1.16
18	Packed Tower Aeration	Reference: Analysis of Costs for Radon Removal... (AWWARF publication), Kennedy/Jenks, for a 14.0 mgd facility operating at 40% of design capacity, Oct. 1991	0.62
19	Packed Tower Aeration	Reference: Carollo Engineers, estimate for VOC treatment (PCE) by packed tower aeration, without off-gas treatment, O&M costs based on operation during 329 days/year at 10% downtime, 16 hr/day air stripping operation, 1900 gpm design capacity, Oct. 1994	0.31
20	Packed Tower Aeration	Reference: Carollo Engineers, for PCE treatment by Ecolo-Flo Enviro-Tower air stripping, without off-gas treatment, O&M costs based on operation during 329 days/year at 10% downtime, 16 hr/day air stripping operation, 1900 gpm design capacity, Oct. 1994	0.32
21	Packed Tower Aeration	Reference: CH2M Hill study on San Gabriel Basin, for 135 mgd central treatment facility - packed tower aeration for VOC and radon removal, 1990	0.50 - 0.82

COST ESTIMATES FOR TREATMENT TECHNOLOGIES

(INCLUDES ANNUALIZED CAPITAL AND O&M COSTS)

No.	Treatment Technology	Source of Information	Estimated 2012 Unit Cost Indexed to 2018* ($/1,000 gallons treated)
22	Advanced Oxidation Processes	Reference: Carollo Engineers, estimate for VOC treatment (PCE) by UV Light, Ozone, Hydrogen Peroxide, O&M costs based on operation during 329 days/year at 10% downtime, 24 hr/day AOP operation, 1900 gpm capacity, Oct. 1994	0.61
23	Ozonation	Reference: Malcolm Pirnie estimate for CUWA, large surface water treatment plants using ozone to treat water from the State Water Project to meet Stage 2 D/DBP and bromate regulation, *Cryptosporidium* inactivation requirements,1998	0.14 - 0.29
24	Ion Exchange	Reference: CH2M Hill study on San Gabriel Basin, for 135 mgd central treatment facility - ion exchange to remove nitrate, 1990	0.67 - 0.88

*Costs were adjusted from date of original estimates to present, where appropriate, using the Engineering News Record (ENR) annual average building costs of 2018 and 2012. The adjustment factor was derived from the ratio of 2018 Index/2012 Index, or 1.188.
For the indexed 2015 costs, please refer to the ACWA PHG Guidance published in March 2016.

ATTACHMENT NO. 4

discontinued, if directed by the State Board. Such a water source shall not be returned to service without written approval from the State Board.

§64445.2. Sampling of Treated Water Sources.

(a) Each water supplier utilizing treatment to comply with any MCL for an organic chemical listed in table 64444-A shall collect monthly samples of the treated water at a site prior to the distribution system. If the treated water exceeds the MCL, the water supplier shall resample the treated water to confirm the result and report the result to the State Board within 48 hours of the confirmation.

(b) The State Board will consider requiring more frequent monitoring based on an evaluation of (1) the treatment process used, (2) the treatment effectiveness and efficiency, and (3) the concentration of the organic chemical in the water source.

Article 12. Best available technologies (BAT)

§64447. Best Available Technologies (BAT) – Microbiological Contaminants.

The technologies identified by the State Board as the best available technology, treatment techniques, or other means available for achieving compliance with the total coliform MCL are as follows:

(a) Protection of wells from coliform contamination by appropriate placement and construction;

(b) Maintenance of a disinfectant residual throughout the distribution system;

(c) Proper maintenance of the distribution system; and

(d) Filtration and/or disinfection of approved surface water, in compliance with Section 64650, or disinfection of groundwater.

§64447.2. Best Available Technologies (BAT) - Inorganic chemicals.

The technologies listed in table 64447.2-A are the best available technology, treatment techniques, or other means available for achieving compliance with the MCLs in table 64431-A for inorganic chemicals.

Table 64447.2-A
Best Available Technologies (BAT)
Inorganic Chemicals

Chemical	*Best Available Technologies (BATs)*
Aluminum	10
Antimony	2, 7
Arsenic	1, 2, 5, 6, 7, 9, 13
Asbestos	2, 3, 8
Barium	5, 6, 7, 9
Beryllium	1, 2, 5, 6, 7
Cadmium	2, 5, 6, 7
Chromium	2, 5, 6[a], 7
Cyanide	5, 7, 11
Fluoride	1
Mercury	2[b], 4, 6[b], 7[b]
Nickel	5, 6, 7
Nitrate	5, 7, 9
Nitrite	5, 7
Perchlorate	5,12
Selenium	1, 2[c], 6, 7, 9
Thallium	1, 5

[a]BAT for chromium III (trivalent chromium) only.
[b]BAT only if influent mercury concentrations <10 µg/L.
[c]BAT for selenium IV only.

Key to BATs in table 64447.2:
1 = Activated Alumina
2 = Coagulation/Filtration (not BAT for systems < 500 service connections)
3 = Direct and Diatomite Filtration
4 = Granular Activated Carbon
5 = Ion Exchange
6 = Lime Softening (not BAT for systems < 500 service connections)
7 = Reverse Osmosis
8 = Corrosion Control
9 = Electrodialysis
10 = Optimizing treatment and reducing aluminum added
11 = Chlorine oxidation
12 = Biological fluidized bed reactor
13 = Oxidation/Filtration

§64447.3. Best Available Technologies (BAT) - Radionuclides.

The technologies listed in tables 64447.3-A, B and C are the best available technology, treatment technologies, or other means available for achieving compliance with the MCLs for radionuclides in tables 64442 and 64443.

Table 64447.3-A
Best Available Technologies (BATs)
Radionuclides

Radionuclide	*Best Available Technology*
Combined radium-226 and radium-228	Ion exchange, reverse osmosis, lime softening
Uranium	Ion exchange, reverse osmosis, lime softening, coagulation/filtration
Gross alpha particle activity	Reverse osmosis
Beta particle and photon radioactivity	Ion exchange, reverse osmosis

Table 64447.3-B
Best Available Technologies (BATs) and Limitations for Small Water Systems
Radionuclides

Unit Technologies	*Limitations (see footnotes)*	*Operator Skill Level Required*	*Raw Water Quality Range and Considerations*
1. Ion exchange	(a)	Intermediate	All ground waters; competing anion concentrations may affect regeneration frequency
2. Point of use, ion exchange	(b)	Basic	All ground waters; competing anion concentrations may affect regeneration frequency
3. Reverse osmosis	(c)	Advanced	Surface waters usually require pre-filtration
4. Point of use, reverse osmosis	(b)	Basic	Surface waters usually require pre-filtration
5. Lime softening	(d)	Advanced	All waters

ATTACHMENT NO. 5

THE WATER QUALITY DATA CHART LISTS ALL DRINKING WATER CONTAMINANTS DETECTED DURING THE 2016 CALENDAR YEAR.
The presence of these contaminants in the water does not necessarily indicate the water poses a health risk. PWD tests for many contaminants in addition to those listed in the chart. Test results for these additional contaminants were all "None Detected (ND)" and are not required to be included in the chart. The state allows us to monitor for some contaminants less than once per year because the concentrations of these contaminants do not change frequently. As a result, some of the data, though representative of the water quality, is more than one year old. Unless otherwise noted, the data presented in this chart is from testing performed January 1 to December 31, 2016. Unregulated contaminant monitoring helps USEPA and the State Water Resources Control Board to determine where certain contaminants occur and whether the contaminants need to be regulated.

Parameter Primary Standards	MCL or MRDL (units)	Meets Standard?	DLR	Sample Frequency* Surface Water/ Groundwater	Treated Surface Water		*Ground Water Sampled in 2016		EPA (MCLG) PHG or [MRDLG]	Typical Source of Contaminant
					Range	Sampled 3/17/2016 or Average Effluent	Range	Average		
Turbidity (Water Clarity)	TT = 1 NTU TT = 95% of monthly samples ≤0.3 NTU	Y	NA	Continuous/Once in 3yrs.	0.05 - 0.13 100%	0.08 100%	0.06 - 0.62 NA	0.12 NA	NA	Soil Runoff
Turbidity is a measure of the cloudiness of the water. We measure it because it is a good indicator of the effectiveness of our filtration system. Treated Surface Water Range and Average are of Daily Maximum										
Dist. System Microbiological										
Total Coliform Bacteria (Total Coliform Rule)	For systems that collect less than 40 samples per month: More than 1 positive sample. For systems that collect 40 or more samples per month: No more than 5.0% of monthly samples are positive	Y	NA	Weekly	NA	0%	NA	NA	(0)	Naturally present in the environment
E. coli (Federal Ground Water Rule)	0	Y	NA	Weekly	NA	0	NA	0	(0)	Human and animal fecal waste
Organic Chemicals										
Disinfection By-products										
					Stage 2 D/DBP					
					All Sample Range	Highest LRAA				
TTHMs	80 µg/L	Y	NA	Monthly/NA	1 - 113	54	NA	NA	NA	By-product of drinking water disinfection
HAA5	60 µg/L	Y	NA	Quarterly/NA	ND - 17	7.8				
Disinfectant Residual										
					System RAA from Dist. Syst.					
Chlorine Residual	4.0 (mg/L as Cl2)	Y	NA	Weekly/NA	0.04 - 1.86	0.98	NA	NA	[4]	Drinking water disinfectant added for treatment
Disinfectant By-product Precursors										
Control of DBP Precursor (Total Organic Carbon, TOC) - see explanation on the next page	TT = ratio of actual TOC removal to required TOC removal shall be ≥ 1	Y	1	Monthly/NA	2.04 - 3.14	2.63	NA	NA	NA	Various natural and manmade sources
Total Organic Carbon	Reported as mg/L		0.3		0.7 - 1.4	1.1				
Inorganic Chemicals										
Arsenic	10 µg/L	Y	2	Yearly/Once in 3yrs.	NA	ND	ND - 2.3	ND	0.004	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Fluoride	2 mg/L	Y	0.1	Quarterly/Quarterly	0.12 - 0.21	0.15	ND - 0.56	0.19	1	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Nitrate (as nitrogen)	10 mg/L	Y	0.4	Quarterly/Quarterly	NA	ND	ND - 6.8	1.3	10	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Hexavalent Chromium	10 µg/L	Y	1	Quarterly/Quarterly	NA	ND	ND - 9.5	4.0	0.02	Steel and pulp mill discharges, chrome plating, natural erosion
Radioactivity										
Gross Alpha Activity**	15 pCi/L	Y	3	**See comment below	NA	ND	ND - 5.7	ND	(0)	Erosion of natural deposits
Uranium***	20 pCi/L	Y	1	NA/Quaterly	NA	ND	NA	1.1	0.43	

Tap Monitoring Lead & Copper	Action Level			No. of samples in 2015	90th Percentile	No. sites exceeded AL			
Lead	15 µg/L	Y	5	50	ND	NONE	NA	0.2	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits
Copper	1.3 mg/L	Y	0.05	50	0.370	NONE	NA	0.3	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives

Parameter Secondary Standards	MCL or MRDL (units)	Meets Standard?	DLR	Sample Frequency* Surface Water/ Groundwater	Treated Surface Water		*Ground Water Sampled in 2016		EPA (MCLG) PHG or [MRDLG]	Typical Source of Contaminant
					Range	Sampled 3/17/2016 or Average Effluent	Range	Average		
Color	15 units	Y	NA	Weekly/Once in 3yrs.	NA	ND	NA	ND	NA	Naturally occurring organic materials
Odor-Threshold	3 units	Y	1	Weekly/Once in 3yrs.	NA	1.0	ND - 1.0	ND	NA	
Chloride	500 mg/L	Y	NA	Quarterly/Quarterly	93 - 140	124	5 - 110	24	NA	Runoff/leaching from natural deposits; seawater influence
Sulfate	500 mg/L	Y	0.5	Quarterly/Quarterly	46 - 87	64	16 - 170	41	NA	Runoff/leaching of natural deposits; industrial wastes
Total Dissolved Solids	1000 mg/L	Y	NA	Yearly/Once in 3yrs.	NA	500	140 - 550	246	NA	Runoff/leaching of natural deposits
Specific Conductance	1600 µmhos/cm	Y	NA	Yearly/Once in 3yrs.	NA	800	250 - 900	406	NA	Substances that form ions when in water; seawater influence
Additional Constituents Analyzed										
pH	NA (Units)	NA	NA	Continuous/Once in 3yrs.	6.8 - 7.5	7.0	7.9 - 8.4	8.1	NA	Leaching from natural deposits
Hardness	NA (mg/L)	NA	NA	Weekly/Once in 3yrs.	108 - 156	138	24 - 240	122	NA	Sum of polyvalent cations present in the water, generally magnesium and calcuim. The cations are usually naturally-occuring.
Alkalinity	NA (mg/L)	NA	NA	Weekly/Once in 3yrs.	56 - 86	75	79 - 200	117	NA	Dissolved as water passes through limestone deposits
Calcium	NA (mg/L)	NA	NA	Yearly/Once in 3yrs.	NA	36	8 - 75	38	NA	
Sodium	NA (mg/L)	NA	NA	Yearly/Once in 3yrs.	NA	110	17 - 80	36	NA	Generally naturally-occurring salt present in water
Potassium	NA (mg/L)	NA	NA	Yearly/Once in 3yrs.	NA	3.4	ND - 3.0	1.6	NA	Leaching from natural deposits
Magnesium	NA (mg/L)	NA	NA	Yearly/Once in 3yrs.	NA	14	0.7 - 16	6.8	NA	Dissolved as water passes through magnesium-bearing minerals
Special Testing										
UCMR 3 (Sampled in 2015)					Effluent & Dist. System		Ground Water			
Molybdenum	NA	NA	1.0	Special	2.9 - 4.4	3.4	ND - 2.0	1.6	NA	
Strontium	NA	NA	0.30	Special	320 - 440	391	140 - 510	373	NA	
Vanadium	NL = 50 ug/L	Y	0.20	Special	ND - 22	6.6	7.1 - 31	17	NA	Leaching from natural deposits, steel manufacturing, hazardous waste sites
Chromium (total)	50 µg/L	Y	0.20	Special	ND - 5.8	1.9	1.3 - 6.9	4.0	(100)	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits
Chromium -6	10 µg/L	Y	0.03	Special	0.09 - 5.9	1.9	1.3 - 7.7	4.2	0.02	Discharge from electroplating factories, leather tanneries, wood preservation, chemical synthesis, refractory production, and textile manufacturing facilities; erosion of natural deposits
Chlorate	NA	NA	20	Special	120 - 310	215	ND - 200	101	NA	
Bromochloromethane	NA	NA	0.06	Special	0.086 - 0.28	0.18	NA	ND	NA	

* Wells are sampled once/3yrs except for Fluoride, Chloride, Sulfate, & Nitrate which are sampled quarterly. ** Sampled between 2010 and 2016. Individual sites are sampled once/6yrs or once/9yrs. Range is from individual sample results.
*** Sample collected only when quarterly average of Gross Alpha exceeds 5pCi/L.

Lead And Copper:

The District is required to draw new sample sets of tap samples for Lead and Copper every 3 years and the last samples taken were in the year 2015 (50 samples). The 90th percentile results of none-detected for lead and 0.370 ppm for copper are well within the AL of 15 ppb lead and the AL of 1.3 ppm for copper. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Palmdale Water District is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. [Optional: If you do so, you may wish to collect the flushed water and reuse it for another beneficial purpose, such as watering plants.] If you are concerned about lead in your drinking water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (800-426-4791) or at http://www.epa.gov/lead.

Health effects of Lead: Infants and children who drink water containing lead in excess of the action level may experience delays in their physical and mental development. Children may show slight deficits in attention span and learning abilities. Adults who drink this water over many years may develop kidney problems or high blood pressure.

Health effects of Copper: Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time may experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years may suffer liver or kidney damage. People with Wilson's disease should consult their personal doctor.

DEFINITIONS:

The following definitions of key terms are provided to help you understand the data used in this report.

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

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

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by OEHHA (Office of Environmental Health Hazard Assessment) a division of the California Environmental Protection Agency (CEPA).

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

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

Running Annual Average (RAA): The running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected.

Detection Limit for purposes of Reporting (DLR): The designated minimum level at or above which any analytical finding of a contaminant in drinking water shall be reported to the Department of Public Health.

Unregulated Contaminant Monitoring (UCMR): Unregulated contaminant monitoring helps USEPA and the California Department of Public Health to determine where certain contaminants occur and whether the contaminants need to be regulated.

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

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

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

Secondary Drinking Water Standard (SDWS): MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SWDSs do not affect the health at the MCL level.

Counting Error: The 95% confidence level for the radioactivity analysis.

ABBREVIATIONS USED IN 2015 WATER QUALITY DATA CHART:

ND: Not detectable or None detected at testing limit (DLR)

NA: Not Applicable

Nreg: No regulation

< Less Than

> Greater Than

pCi/L: picocuries per liter (a measure of radiation)

DBP: Disinfection By-products

Comparison examples are provided for the following measurements to help you better understand the amount of chemical contaminants detected in the water. This does not mean that the amounts are not significant regarding risk of health effects for specific contaminants.

ppm: parts per million or milligrams per liter (mg/L) = qualitatively, approx.
1 drop in 10 gals.

ppb: parts per billion or micrograms per liter (ug/L) = qualitatively, approx.
1 drop in 10,000 gals.

ppt: parts per trillion or nanograms per liter (ng/L) = qualitatively, approx.
1 drop in 100,000 gals.

EDUCATIONAL INFORMATION AND POSSIBLE DRINKING WATER CONTAMINANTS:

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline (1-800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791). PWD tested for cryptosporidium and giardia monthly from January through December in 2016 and results were "none detected."

TOTAL TRIHALOMETHANES (TTHMS): Total Trihalomethanes (TTHMs) are the total of four trihalomethanes of concern in drinking water: chloroform, bromoform, bromodichloromethane, and chlorodibromomethane. In the Primary Standards Disinfection Byproducts section of the Water Quality Chart under Highest LRAA from Distribution System, the highest Locational Running Annual Average (LRAA) for 2016 is 54 µg/L, which is less than and complies with the Federal TTHM MCL of 80 µg/L. The range of monthly sample results from all 8 sampling points in 2016 is 1 – 113 µg/L, indicating that certain sampling points or specific locations within the customer service area have exceeded 80 µg/L. These samples were taken from dedicated sample points within the distribution system and are representative of maximum residence time in the system.

Health effects of Total Trihalomethanes (TTHMs): Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience liver, kidney, or central nervous system problems and may have an increased risk of getting cancer.

TOTAL ORGANIC CARBON (TOC): Total Organic Carbon (TOC) has no health effects. However, TOC provides a medium for the formation of disinfection byproducts. TOC result is based on quarterly RAA of percent removal ratio. Paired samples (one from source and the other from treated water) are collected monthly. The percent removal between source water and treated water is divided by the required monthly TOC percent removal based on certain criteria that all public water systems must follow. The quarterly RAA of these monthly results should be 1.0 or higher. Our quarterly RAA in 2016 ranged from 2.04 to 3.14 and averaged 2.63. Individual TOC sample results for treated water ranged from 0.7 to 1.4 mg/L and averaged 1.1 mg/L.

HEXAVALENT CHROMIUM: In the Primary Standards Inorganic Chemicals section of the chart for Hexavalent Chromium, the treated surface water sample is None Detected (ND). For groundwater samples (22 wells in service), the range of all quarterly sample results is None Detected (ND) to 9.5 µg/L and the average is 4.0 µg/L. The highest Running Annual Average (RAA) for treated surface water and groundwater is None Detected (ND) and 8.5 µg/L, respectively. The State Hexavalent Chromium MCL is 10 µg/L and the DLR is 1 µg/L.

Health effects of Hexavalent Chromium: Some people who drink water containing hexavalent chromium in excess of the MCL over many years may have an increased risk of getting cancer.

FLUORIDE: Fluoride in the treated surface water ranged from 0.12 to 0.21 mg/L and averaged 0.15 mg/L. The groundwater samples ranged from ND to 0.56 mg/L and averaged 0.19 mg/L. The fluoride MCL is 2 mg/L and the DLR is 0.1 mg/L.

Health effects of Fluoride: Some people who drink water containing fluoride in excess of the federal MCL of 4 mg/L over many years may get bone disease, including pain and tenderness of the bones. Children who drink water containing fluoride in excess of the state MCL of 2 mg/L may get mottled teeth.

NITRATE: In the Primary Standards Inorganic Chemicals section of the chart for Nitrate (as Nitrogen), treated surface water sample is None Detected (ND). In the groundwater column, the range of Nitrate (as Nitrogen) is ND to 6.8 mg/L, and the average is 1.3 mg/L. The State Water Resources Control Board requires annual sampling if all results are less than 50% of the MCL. If the result from any one source is greater than 50% of the MCL, then sampling must be done quarterly at that source. The District samples all its wells on a quarterly basis (4 times a year) even when they test below 50% of the MCL. The numbers expressed on the chart are derived from quarterly sampling of all District wells, except those that are out of service.

Health effects of Nitrate: Nitrate in drinking water at levels above 10 mg/L is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 10 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask advice from your health care provider. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity.

GROSS ALPHA PARTICLE ACTIVITY: In 2016, 4 out of the 22 wells in service were sampled for Gross Alpha. Well 19 = 5.0 pCi/L, Well 22 = None Detected (ND), Well 26 = None Detected (ND) and Well 29 = 3.2 pCi/L. The remaining water sources will be monitored in the future during this compliance cycle.

Health effects of Gross Alpha Particle Activity: Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

URANIUM: Samples for Uranium are collected only when the Gross Alpha particle activity exceeds 5 pCi/L. Since Well 19 was the only well that detected Gross Alpha particle activity equal to or greater than 5 pCi/L, it was the only well that we collected and analyzed uranium in 2016. The uranium result for Well 19 was 1.1 pCi/L. The uranium MCL is 20 pCi/L and the DLR is 1 pCi/L.

Health effects of Uranium: Some people who drink water containing uranium in excess of the MCL over many years may have kidney problems or an increased risk of getting cancer.

THE WATER QUALITY DATA CHART LISTS ALL DRINKING WATER CONTAMINANTS DETECTED DURING THE 2017 CALENDAR YEAR.
The presence of these contaminants in the water does not necessarily indicate the water poses a health risk. PWD tests for many contaminants in addition to those listed in the chart. Test results for these additional contaminants were all "None Detected (ND)" and are not required to be included in the chart. The state allows us to monitor for some contaminants less than once per year because the concentrations of these contaminants do not change frequently. As a result, some of the data, though representative of the water quality, is more than 1 year old. Unless otherwise noted, the data presented in this chart is from testing performed January 1 to December 31, 2017. Unregulated contaminant monitoring helps USEPA and the State Water Resources Control Board determine where certain contaminants occur and whether the contaminants need to be regulated.

Parameter Primary Standards	MCL or MRDL (units)	Meets Standard?	DLR	Sample Frequency* Surface Water/ Groundwater	Treated Surface Water		*Groundwater Sampled in 2016		EPA (MCLG) PHG or [MRDLG]	Typical Source of Contaminant
					Range	Sampled 1/26/2017 or Average Effluent	Range	Average		
Turbidity (Water Clarity)	TT = 1 NTU TT = 95% of monthly samples ≤0.3 NTU	Y	NA	Continuous/Once in 3 yrs.	0.04 - 0.15 100%	0.08 100%	0.06 - 0.62 NA	0.12 NA	NA	Soil Runoff
Turbidity is a measure of the cloudiness of the water. We measure it because it is a good indicator of the effectiveness of our filtration system. Treated Surface Water Range and Average are of Daily Maximum.										
Dist. System Microbiological										
Total Coliform Bacteria (Total Coliform Rule)	For systems that collect less than 40 samples per month: More than 1 positive sample. For systems that collect 40 or more samples per month: No more than 5.0% of monthly samples are positive	Y	NA	Weekly	NA	0%	NA	NA	(0)	Naturally present in the environment
E. coli (Federal Groundwater Rule)	0	Y	NA	Weekly	NA	0	NA	0	(0)	Human and animal fecal waste
Organic Chemicals										
Disinfection By-products										
					Stage 2 D/DBP					
					All Sample Range	Highest LRAA				
TTHMs	80 µg/L	Y	NA	Monthly/NA	0.7 - 88	62	NA	NA	NA	By-product of drinking water disinfection
HAA5	60 µg/L	Y	NA	Quarterly/NA	ND - 12	8.5				
Disinfectant Residual										
					System RAA from Dist. Syst.					
Chlorine Residual	4.0 (mg/L as Cl2)	Y	NA	Weekly/NA	0.20 - 1.87	0.94	NA	NA	[4]	Drinking water disinfectant added for treatment
Disinfectant By-product Precursors										
Control of DBP Precursor (Total Organic Carbon, TOC) - see explanation on the next page	TT = ratio of actual TOC removal to required TOC removal shall be ≥ 1	Y	1	Monthly/NA	2.52 - 3.09	2.79	NA	NA	NA	Various natural and manmade sources
Total Organic Carbon	Reported as mg/L		0.3		0.8 - 1.3	1.0				
Inorganic Chemicals										
Arsenic	10 µg/L	Y	2	Yearly/Once in 3 yrs.	NA	ND	ND - 2.3	ND	0.004	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Fluoride	2 mg/L	Y	0.1	Quarterly/Quarterly	ND - 0.14	ND	ND - 0.58	0.18	1	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Nitrate (as nitrogen)	10 mg/L	Y	0.4	Quarterly/Quarterly	NA	ND	ND - 6.7	1.4	10	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Hexavalent Chromium	10 µg/L	Y	1	Quarterly/Quarterly	NA	ND	ND - 8.5	3.8	0.02	Steel and pulp mill discharges, chrome plating, natural erosion
Radioactivity										
Gross Alpha Activity**	15 pCi/L	Y	3	**See comment below	NA	ND	ND - 5.7	ND	(0)	Erosion of natural deposits
Uranium***	20 pCi/L	Y	1	NA/Quarterly	NA	ND	NA	1.1	0.43	

Tap Monitoring Lead & Copper	Action Level	Meets Standard?	DLR	No. of samples in 2015	90th Percentile	No. sites exceeded AL	No. of Schools requesting lead sampling	EPA (MCLG) PHG or [MRDLG]	Typical Source of Contaminant
Lead	15 µg/L	Y	5	50	ND	NONE	NONE	0.2	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits
Copper	1.3 mg/L	Y	0.05	50	0.370	NONE	NA	0.3	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives

Parameter Secondary Standards	MCL or MRDL (units)	Meets Standard?	DLR	Sample Frequency* Surface Water/ Groundwater	Treated Surface Water		*Groundwater Sampled in 2016		EPA (MCLG) PHG or [MRDLG]	Typical Source of Contaminant
					Range	Sampled 1/26/2017 or Average Effluent	Range	Average		
Color	15 units	Y	NA	Weekly/Once in 3 yrs.	NA	ND	NA	ND	NA	Naturally occurring organic materials
Odor-Threshold	3 units	Y	1	Weekly/Once in 3 yrs.	NA	1.0	ND - 1.0	ND	NA	
Chloride	500 mg/L	Y	NA	Quarterly/Quarterly	59 - 140	97	6 - 103	24	NA	Runoff/leaching from natural deposits; seawater influence
Sulfate	500 mg/L	Y	0.5	Quarterly/Quarterly	15 - 58	41	16 - 145	36	NA	Runoff/leaching of natural deposits; industrial wastes
Total Dissolved Solids	1000 mg/L	Y	NA	Yearly/Once in 3 yrs.	NA	430	140 - 550	246	NA	Runoff/leaching of natural deposits
Specific Conductance	1600 µmhos/cm	Y	NA	Yearly/Once in 3 yrs.	NA	680	250 - 900	406	NA	Substances that form ions when in water; seawater influence
Additional Constituents Analyzed										
pH	NA (Units)	NA	NA	Continuous/Once in 3 yrs.	6.7 - 7.6	7.0	7.9 - 8.4	8.1	NA	Leaching from natural deposits
Hardness	NA (mg/L)	NA	NA	Weekly/Once in 3 yrs.	66 - 150	103	24 - 240	122	NA	Sum of polyvalent cations present in the water, generally magnesium and calcium. The cations are usually naturally-occuring.
Alkalinity	NA (mg/L)	NA	NA	Weekly/Once in 3 yrs.	33 - 75	53	79 - 200	117	NA	Dissolved as water passes through limestone deposits
Calcium	NA (mg/L)	NA	NA	Yearly/Once in 3 yrs.	NA	29	8 - 75	38	NA	
Sodium	NA (mg/L)	NA	NA	Yearly/Once in 3 yrs.	NA	79	17 - 80	36	NA	Generally naturally-occurring salt present in water
Potassium	NA (mg/L)	NA	NA	Yearly/Once in 3 yrs.	NA	3.5	ND - 3.0	1.6	NA	Leaching from natural deposits
Magnesium	NA (mg/L)	NA	NA	Yearly/Once in 3 yrs.	NA	14	0.7 - 16	6.8	NA	Dissolved as water passes through magnesium-bearing minerals
Special Testing										
UCMR 3 (Sampled in 2015)					Effluent & Dist. System		Groundwater			Environmental Source
Molybdenum	NA (µg/L)	NA	1.0	Special	2.9 - 4.4	3.4	ND - 2.0	1.6	NA	Naturally-occurring element found in ores and present in plants, animals and bacteria; commonly used form molybdenum trioxide used as a chemical reagent
Strontium	NA (µg/L)	NA	0.30	Special	320 - 440	391	140 - 510	373	NA	Naturally-occurring element; historically, commercial use of strontium has been in the faceplate glass of cathode-ray tube televisions to block x-ray emissions
Vanadium	NL = 50 ug/L	Y	0.20	Special	ND - 22	6.6	7.1 - 31	17	NA	Leaching from natural deposits, steel manufacturing, hazardous waste sites
Chromium (total)	50 µg/L	Y	0.20	Special	ND - 5.8	1.9	1.3 - 6.9	4.0	(100)	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits
Chromium -6	10 µg/L	Y	0.03	Special	0.09 - 5.9	1.9	1.3 - 7.7	4.2	0.02	Discharge from electroplating factories, leather tanneries, wood preservation, chemical synthesis, refractory production, and textile manufacturing facilities; erosion of natural deposits
Chlorate	NA (µg/L)	NA	20	Special	120 - 310	215	ND - 200	101	NA	Agricultural defoliant or desiccant; disinfection byproduct; and used in production of chlorine dioxide
Bromochloromethane	NA (µg/L)	NA	0.06	Special	0.086 - 0.28	0.18	NA	ND	NA	Used as a fire-extinguishing fluid, an explosive suppressant, and as a solvent in the manufacturing of pesticides

* Wells are sampled once/3 yrs. except for Fluoride, Chloride, Sulfate, & Nitrate, which are sampled quarterly. ** Sampled between 2010 and 2017. Individual sites are sampled once/6 yrs. or once/9 yrs. Range is from individual sample results.
*** Sample collected only when quarterly average of Gross Alpha exceeds 5pCi/L.

Lead and Copper:

Palmdale Water District is required to draw new sample sets of tap samples for lead and copper every 3 years. The last samples taken were in 2015 (50 samples). The 90th percentile results of none-detected for lead and 0.370 ppm for copper are well within the AL of 15 ppb lead and the AL of 1.3 ppm for copper. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. PWD is responsible for providing high-quality drinking water, but is unable to control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. [If you do so, you may wish to collect the flushed water and reuse it for another beneficial purpose, such as watering plants.]

If you are concerned about lead in your drinking water, you can have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at 1-800-426-4791 or at www.epa.gov/lead.

Health Effects of Lead: Infants and children who drink water containing lead in excess of the action level may experience delays in their physical and mental development. Children may show slight deficits in attention span and learning abilities. Adults who drink this water over many years may develop kidney problems or high blood pressure.

Health Effects of Copper: Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time may experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years may suffer liver or kidney damage. People with Wilson's disease should consult their personal doctor.

DEFINITIONS:

The following definitions of key terms are provided to help you understand the data used in this report.

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

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

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by OEHHA (Office of Environmental Health Hazard Assessment) a division of the California Environmental Protection Agency (CEPA).

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

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

Running Annual Average (RAA): The running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected.

Detection Limit for purposes of Reporting (DLR): The designated minimum level at or above which any analytical finding of a contaminant in drinking water shall be reported to the Department of Public Health.

Unregulated Contaminant Monitoring (UCMR): Unregulated contaminant monitoring helps USEPA and the California Department of Public Health to determine where certain contaminants occur and whether the contaminants need to be regulated.

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

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

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

Secondary Drinking Water Standard (SDWS): MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDWSs do not affect the health at the MCL level.

Counting Error: The 95% confidence level for the radioactivity analysis.

ABBREVIATIONS USED IN 2017 WATER QUALITY DATA CHART:

ND: Not detectable or None detected at testing limit (DLR)

NA: Not Applicable

Nreg: No regulation

< Less Than

> Greater Than

pCi/L: picocuries per liter (a measure of radiation)

DBP: Disinfection By-products

Comparison examples are provided for the following measurements to help you better understand the amount of chemical contaminants detected in the water. This does not mean that the amounts are not significant regarding risk of health effects for specific contaminants.

ppm: parts per million or milligrams per liter (mg/L) = qualitatively, approximately 1 drop in 10 gals.

ppb: parts per billion or micrograms per liter (µg/L) = qualitatively, approximately 1 drop in 10,000 gals.

ppt: parts per trillion or nanograms per liter (ng/L) = qualitatively, approximately 1 drop in 100,000 gals.

µmhos/cm: micromhos per centimeter (a measure for conductivity)

EDUCATIONAL INFORMATION AND POSSIBLE DRINKING WATER CONTAMINANTS:

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline 1-800-426-4791. Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline 1-800-426-4791. PWD tested for *Cryptosporidium* and *Giardia* monthly from January through April in 2017 and results were None Detected (ND).

TOTAL TRIHALOMETHANES (TTHMS): Total Trihalomethanes (TTHMs) are the total of four trihalomethanes of concern in drinking water: chloroform, bromoform, bromodichloromethane, and chlorodibromomethane. In the Primary Standards Disinfection Byproducts section of the Water Quality Chart under highest LRAA from Distribution System, the highest Locational Running Annual Average (LRAA) for 2017 is 62 µg/L, which is less than and complies with the Federal TTHM MCL of 80 µg/L. The range of monthly sample results from all 8 sampling points in 2017 is 0.7 – 88 µg/L, indicating that certain sampling points or specific locations within the customer service area have exceeded 80 µg/L. These samples were taken from dedicated sample points within the distribution system and are representative of maximum residence time in the system.

Health effects of Total Trihalomethanes (TTHMs): Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience liver, kidney, or central nervous system problems and may have an increased risk of getting cancer.

TOTAL ORGANIC CARBON (TOC): Total Organic Carbon (TOC) has no health effects. However, TOC provides a medium for the formation of disinfection byproducts. TOC result is based on quarterly RAA of percent removal ratio. Paired samples (one from source and the other from treated water) are collected monthly. The percent removal between source water and treated water is divided by the required monthly TOC percent removal based on certain criteria that all public water systems must follow. The quarterly RAA of these monthly results should be 1.0 or higher. Our quarterly RAA in 2017 ranged from 2.52 to 3.09 and averaged 2.79. Individual TOC sample results for treated water ranged from 0.8 to 1.3 mg/L and averaged 1.0 mg/L.

FLUORIDE: Fluoride in the treated surface water ranged from ND to 0.14 mg/L and on average None Detected (ND). The groundwater samples ranged from ND to 0.58 mg/L and averaged 0.18 mg/L. The fluoride MCL is 2 mg/L and the DLR is 0.1 mg/L.

Health effects of Fluoride: Some people who drink water containing fluoride in excess of the federal MCL of 4 mg/L over many years may get bone disease, including pain and tenderness of the bones. Children who drink water containing fluoride in excess of the state MCL of 2 mg/L may get mottled teeth.

NITRATE: In the Primary Standards Inorganic Chemicals section of the chart for Nitrate (as Nitrogen), treated surface water sample is None Detected (ND). In the groundwater column, the range of Nitrate (as Nitrogen) is ND to 6.7 mg/L, and the average is 1.4 mg/L. The State Water Resources Control Board requires annual sampling if all results are less than 50% of the MCL. If the result from any one source is greater than 50% of the MCL, then sampling must be done quarterly at that source. PWD samples all its wells on a quarterly basis (4 times a year) even when they test below 50% of the MCL. The numbers expressed on the chart are derived from quarterly sampling of all PWD wells, except those that are out of service.

Health effects of Nitrate: Nitrate in drinking water at levels above 10 mg/L is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness with symptoms including shortness of breath and blueness of the skin. Nitrate levels above 10 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant or you are pregnant, you should ask advice from your health care provider. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity.

GROSS ALPHA PARTICLE ACTIVITY: In 2016, 4 out of the 22 wells in service were sampled for Gross Alpha. Well 19 = 5.0 pCi/L, Well 22 = None Detected (ND), Well 26 = None Detected (ND) and Well 29 = 3.2 pCi/L. The remaining water sources will be monitored in the future during this compliance cycle.

Health effects of Gross Alpha Particle Activity: Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

HEXAVALENT CHROMIUM: In the Primary Standards Inorganic Chemicals section of the chart for Hexavalent Chromium, the treated surface water sample is None Detected (ND). For groundwater samples (22 wells in service), the range of all quarterly sample results is None Detected (ND) to 8.5 µg/L and the average is 3.8 µg/L. The highest Running Annual Average (RAA) for treated surface water and groundwater is None Detected (ND) and 8.1 µg/L, respectively. There is currently no MCL for hexavalent chromium. The previous MCL of 10 µg/L was withdrawn on September 11, 2017.

Health effects of Hexavalent Chromium: Some people who drink water containing hexavalent chromium in excess of the MCL over many years may have an increased risk of getting cancer.

THE WATER QUALITY DATA CHART LISTS ALL DRINKING WATER CONTAMINANTS DETECTED DURING THE 2018 CALENDAR YEAR.
The presence of these contaminants in the water does not necessarily indicate the water poses a health risk. PWD tests for many contaminants in addition to those listed in the chart. Test results for these additional contaminants were all "None Detected" (ND) and are not required to be included in the chart. The state allows us to monitor for some contaminants less than once per year because the concentrations of these contaminants do not change frequently. As a result, some of the data, though representative of the water quality, is more than 1 year old. Unless otherwise noted, the data presented in this chart is from testing performed January 1 to December 31, 2018. Unregulated contaminant monitoring helps USEPA and the State Water Resources Control Board determine where certain contaminants occur and whether the contaminants need to be regulated.

Parameter Primary Standards	MCL or MRDL (units)	Meets Standard?	DLR	Sample Frequency* Surface Water/ Groundwater	Treated Surface Water		*Groundwater Sampled in 2016		EPA (MCLG) PHG or [MRDLG]	Typical Source of Contaminant
					Range	Sampled 2/14/2018 or Average Effluent	Range	Average		
Turbidity (Water Clarity)	TT = 1 NTU TT = 95% of monthly samples ≤0.3 NTU	Y	NA	Continuous/Once in 3 yrs.	0.05 - 0.29 100%	0.10 100%	0.06 - 0.62 NA	0.12 NA	NA	Soil Runoff
Turbidity is a measure of the cloudiness of the water. We measure it because it is a good indicator of the effectiveness of our filtration system. Treated Surface Water Range and Average are of Daily Maximum.										
Dist. System Microbiological										
Total Coliform Bacteria (state Total Coliform Rule)	For systems that collect less than 40 samples per month: more than 1 positive sample. For systems that collect 40 or more samples per month: no more than 5.0% of monthly samples are positive	Y	NA	Weekly	0% - 0.6%	0.06%	NA	NA	(0)	Naturally present in the environment
E. coli (state Total Coliform Rule)	A routine sample and a repeat sample are total coliform positive, and one of these is also *E. coli* positive	Y	NA	Weekly	NA	0%	NA	NA	(0)	Human and animal fecal waste
Fecal Indicator *E. coli* (Federal Groundwater Rule)	0	Y	NA	Triggered by positive TCR sample	NA	0	NA	0	(0)	Human and animal fecal waste
Organic Chemicals										
Disinfection By-products										
					Stage 2 D/DBP					
					All Sample Range	Highest LRAA				
TTHMs (Total Trihalomethanes)	80 µg/L	Y	NA	Monthly/NA	8.0 - 70	54	NA	NA	NA	Byproduct of drinking water disinfection
HAA5 (Sum of 5 Haloacetic Acids)	60 µg/L	Y	NA	Monthly/NA	ND - 9.0	7.7				
Disinfectant Residual										
					System RAA from Dist. Syst.					
Chlorine Residual	4.0 (mg/L as Cl2)	Y	NA	Weekly/NA	0.16 - 1.70	0.88	NA	NA	[4]	Drinking water disinfectant added for treatment
Disinfectant By-product Precursors										
Control of DBP Precursor (Total Organic Carbon, TOC) - see explanation on the next page	TT = ratio of actual TOC removal to required TOC removal shall be ≥ 1	Y	1	Monthly/NA	1.90 - 3.22	2.57	NA	NA	NA	Various natural and manmade sources
Total Organic Carbon	Reported as mg/L		0.3		0.7 - 1.5	1.0				
Inorganic Chemicals										
Arsenic	10 µg/L	Y	2	Yearly/Once in 3 yrs.	NA	ND	ND - 2.3	ND	0.004	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Fluoride	2 mg/L	Y	0.1	Quarterly/Quarterly	0.11 - 0.18	0.14	ND - 0.45	0.16	1	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Nitrate (as nitrogen)	10 mg/L	Y	0.4	Quarterly/Quarterly	NA	ND	ND - 6.4	1.4	10	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Radioactivity										
Gross Alpha Activity**	15 pCi/L	Y	3	**See comment	NA	ND	ND - 5.7	ND	(0)	Erosion of natural deposits
Uranium***	20 pCi/L	Y	1	***See comment	NA	ND	NA	1.1	0.43	

Tap Monitoring Lead & Copper	Action Level	Meets Standard?	DLR	Lead and Copper Rule			Lead Testing in Schools			EPA (MCLG) PHG or [MRDLG]	Typical Source of Contaminant
				No. of samples in 2018	90th Percentile	No. sites exceeded AL	Average	Range	No. of Schools requesting lead sampling in 2018		
Lead	15 µg/L	Y	5	50	ND	NONE	ND	88 sites sampled; 0 sites over AL	29	0.2	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits
Copper	1.3 mg/L	Y	0.05	50	0.420	NONE	NA	NA	NA	0.3	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives

Parameter Secondary Standards	Secondary MCL (units)	Meets Standard?	DLR	Sample Frequency* Surface Water/ Groundwater	Treated Surface Water		*Groundwater Sampled in 2016		EPA (MCLG) PHG or [MRDLG]	Typical Source of Contaminant
					Range	Sampled 2/14/2018 or Average Effluent	Range	Average		
Color	15 units	Y	NA	Weekly/Once in 3 yrs.	NA	ND	NA	ND	NA	Naturally occurring organic materials
Odor-Threshold	3 units	Y	1	Weekly/Once in 3 yrs.	NA	1.0	ND - 1.0	ND	NA	
Chloride	500 mg/L	Y	NA	Quarterly/Quarterly	70 - 101	81	6 - 93	25	NA	Runoff/leaching from natural deposits; seawater influence
Iron	300 µg/L	Y	NA	Monthly/Quarterly	NA	ND	ND - 110	ND	NA	Leaching from natural deposits; industrial wastes
Sulfate	500 mg/L	Y	0.5	Quarterly/Quarterly	24 - 37	30	14 - 130	40	NA	Runoff/leaching of natural deposits; industrial wastes
Total Dissolved Solids	1000 mg/L	Y	NA	Yearly/Once in 3 yrs.	NA	230	140 - 550	246	NA	Runoff/leaching of natural deposits
Specific Conductance	1600 µmhos/cm	Y	NA	Yearly/Once in 3 yrs.	NA	430	250 - 900	406	NA	Substances that form ions when in water; seawater influence
Additional Constituents Analyzed										
pH	NA (Units)	NA	NA	Continuous/Once in 3 yrs.	7.0 - 8.1	7.2	7.9 - 8.4	8.1	NA	Leaching from natural deposits
Hardness	NA (mg/L)	NA	NA	Weekly/Once in 3 yrs.	98 - 150	116	24 - 240	122	NA	Sum of polyvalent cations present in the water, generally magnesium and calcium. The cations are usually naturally occuring.
Alkalinity	NA (mg/L)	NA	NA	Weekly/Once in 3 yrs.	54 - 90	71	79 - 200	117	NA	Dissolved as water passes through limestone deposits
Calcium	NA (mg/L)	NA	NA	Yearly/Once in 3 yrs.	NA	23	8 - 75	38	NA	
Sodium	NA (mg/L)	NA	NA	Yearly/Once in 3 yrs.	NA	42	17 - 80	36	NA	Generally naturally occurring salt present in water
Potassium	NA (mg/L)	NA	NA	Yearly/Once in 3 yrs.	NA	2.4	ND - 3.0	1.6	NA	Leaching from natural deposits
Magnesium	NA (mg/L)	NA	NA	Yearly/Once in 3 yrs.	NA	9.4	0.7 - 16	6.8	NA	Dissolved as water passes through magnesium-bearing minerals
Hexavalent Chromium	NA (µg/L)	Y	1	Quarterly/Quarterly	NA	ND	ND - 8.4	3.8	0.02	Steel and pulp mill discharges, chrome plating, natural erosion
Special Testing										
UCMR 4 (Sampled in 2018)					Effluent & Dist. System		Groundwater			Environmental Source
HAA5	NA (µg/L)	NA	NA	Special	2.0 - 8.3	5.4	NA	NA	NA	Byproduct of drinking water disinfection
HAA6Br	NA (µg/L)	NA	NA	Special	2.6 - 16	10	NA	NA	NA	Byproduct of drinking water disinfection
HAA9	NA (µg/L)	NA	NA	Special	3.5 - 18	12	NA	NA	NA	Byproduct of drinking water disinfection
Manganese	50 µg/L	NA	0.40	Special	NA	0.9	ND - 1	ND	NA	Leaching from natural deposits

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

* Wells are sampled once/3 yrs. except for Fluoride, Chloride, Sulfate, & Nitrate, which are sampled quarterly.

** Sampled between 2010 and 2018. Individual sites are sampled once/6 yrs. or once/9 yrs. Range is from individual sample results.

*** Sample collected only when Gross Alpha exceeds 5pCi/L.

Lead and Copper

Palmdale Water District is required to draw new sample sets of tap samples for lead and copper every 3 years. The last samples were taken in 2018 (50 samples). The 90th percentile results of none-detected for lead and 0.420 ppm for copper are well within the AL of 15 ppb lead and the AL of 1.3 ppm for copper. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. PWD is responsible for providing high-quality drinking water, but is unable to control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. [If you do so, you may wish to collect the flushed water and reuse it for another beneficial purpose, such as watering plants.]

If you are concerned about lead in your drinking water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at 1-800-426-4791 or at http://www.epa.gov/lead.

Health Effects of Lead: Infants and children who drink water containing lead in excess of the action level may experience delays in their physical and mental development. Children may show slight deficits in attention span and learning abilities. Adults who drink this water over many years may develop kidney problems or high blood pressure.

Health Effects of Copper: Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time may experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years may suffer liver or kidney damage. People with Wilson's disease should consult their personal doctor.

DEFINITIONS:

The following definitions of key terms are provided to help you understand the data used in this report.

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

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

Locational Running Annual Average (LRAA): The running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of samples taken at a particular monitoring location.

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by OEHHA (Office of Environmental Health Hazard Assessment), a division of the California Environmental Protection Agency (CEPA).

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

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

Running Annual Average (RAA): The running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected.

Detection Limit for purposes of Reporting (DLR): The smallest concentration of a contaminant that can be measured and reported. DLRs are set by the DDW (same as MRL, Minimum Reporting Level, set by USEPA).

Unregulated Contaminant Monitoring (UCMR): Unregulated contaminant monitoring helps USEPA and the State Water Resources Control Board to determine where certain contaminants occur and whether the contaminants need to be regulated.

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

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

Notification Level (NL): State guidelines developed by DDW that address the concentration of a contaminant which, if exceeded, triggers public notification.

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

Secondary Drinking Water Standard (SDWS): MCLs for contaminants that affect taste, odor, or appearance of the drinking water. Contaminants with SDWSs do not affect the health at the MCL level.

ABBREVIATIONS USED IN 2018 WATER QUALITY DATA CHART:

ND: Not detectable or None detected at testing limit (DLR)

NA: Not Applicable

< Less Than

> Greater Than

pCi/L: picocuries per liter (a measure of radiation)

DBP: Disinfection Byproducts

Comparison examples are provided for the following measurements to help you better understand the amount of chemical contaminants detected in the water. This does not mean that the amounts are not significant regarding risk of health effects for specific contaminants.

ppm: parts per million or milligrams per liter (mg/L) = qualitatively, approximately
1 second in 11.5 days

ppb: parts per billion or micrograms per liter (µg/L) = qualitatively, approximately
1 second in nearly 32 years

ppt: parts per trillion or nanograms per liter (ng/L) = qualitatively, approximately
1 second in nearly 32,000 years

µmhos/cm: micromhos per centimeter (a measure for conductivity)

EDUCATIONAL INFORMATION AND POSSIBLE DRINKING WATER CONTAMINANTS:

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline 1-800-426-4791. Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline 1-800-426-4791.

TOTAL TRIHALOMETHANES (TTHMs): Total Trihalomethanes (TTHMs) are the total of four trihalomethanes of concern in drinking water: chloroform, bromoform, bromodichloromethane, and chlorodibromomethane. In the Primary Standards Disinfection Byproducts section of the Water Quality Chart under highest LRAA from Distribution System, the highest Locational Running Annual Average (LRAA) for 2018 is 54 µg/L, which is less than and complies with the Federal TTHM MCL of 80 µg/L. The range of monthly sample results from all 8 sampling points in 2018 is 8.0 – 70 µg/L. These samples were taken from dedicated sample points within the distribution system and are representative of maximum residence time in the system.

Health effects of Total Trihalomethanes (TTHMs): Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience liver, kidney, or central nervous system problems and may have an increased risk of getting cancer.

TOTAL ORGANIC CARBON (TOC): Total Organic Carbon (TOC) has no health effects. However, TOC provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (TTHMs) and haloacetic acids (HAAs). TOC result is based on quarterly RAA of percent removal ratio. The percent removal between source water and treated water is divided by the required monthly TOC percent removal based on certain criteria that all public water systems must follow. The quarterly RAA of these monthly results should be 1.0 or higher. Our quarterly RAA in 2018 ranged from 1.90 to 3.22 and averaged 2.57. Individual TOC sample results for treated water ranged from 0.7 to 1.5 mg/L and averaged 1.0 mg/L.

FLUORIDE: Fluoride in the treated surface water ranged from 0.11 to 0.18 mg/L and averaged 0.14 mg/L. The groundwater samples ranged from ND to 0.45 mg/L and averaged 0.16 mg/L. The fluoride MCL is 2 mg/L and the DLR is 0.1 mg/L.

Health effects of Fluoride: Some people who drink water containing fluoride in excess of the federal MCL of 4 mg/L over many years may get bone disease, including pain and tenderness of the bones. Children who drink water containing fluoride in excess of the state MCL of 2 mg/L may get mottled teeth.

NITRATE: In the Primary Standards Inorganic Chemicals section of the chart for Nitrate (as Nitrogen), treated surface water sample is None Detected (ND). In the groundwater column, the range of Nitrate (as Nitrogen) is ND to 6.4 mg/L, and the average is 1.4 mg/L. The State Water Resource Control Board requires annual sampling if all results are less than 50% of the MCL. If the result from any one source is greater than 50% of the MCL, then sampling must be done quarterly at that source. PWD samples all its wells on a quarterly basis (4 times a year) even when they test below 50% of the MCL. The numbers expressed on the chart are derived from quarterly sampling of all PWD wells, except those that are out of service.

Health effects of Nitrate: Nitrate in drinking water at levels above 10 mg/L is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness with symptoms including shortness of breath and blueness of the skin. Nitrate levels above 10 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant or you are pregnant, you should ask advice from your health care provider. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity.

GROSS ALPHA PARTICLE ACTIVITY: Between 2010 - 2018, 23 wells have been sampled for Gross Alpha. Results ranged from ND - 5.7 pCi/L and averaged ND. In 2018, Well 33 was the only well sampled for Gross Alpha. Well 33 = None Detected (ND). The remaining water sources will be monitored in the future during this compliance cycle.

Health effects of Gross Alpha Particle Activity: Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

ATTACHMENT NO. 6

GLOSSARY OF TERMS AND ABBREVIATIONS

ACWA:	Association of California Water Agencies
BAT:	Best Available Technology to achieve compliance with an MCL
DDW:	Division of Drinking Water
DLR:	Detection Limit for Reporting Purposes; set by SWRCB
MCL:	Maximum Contaminant Level; set by SWRCB and USEPA
MCLG:	Maximum Contaminant Level Goal; set by USEPA
MGD:	Million Gallons per Day
OEHHA:	Office of Environmental Health Hazard Assessment (State of California)
PHG:	Public Health Goal; set by OEHHA
SWRCB:	State Water Resources Control Board
USEPA:	United States Environmental Protection Agency
mg/L:	milligrams per liter or parts per million
pCi/L:	picocuries per liter
µg/L:	micrograms per liter or parts per billion