ELSINORE VALLEY MUNICIPAL WATER DISTRICT

2013 - 2015 PUBLIC HEALTH GOALS REPORT

July 2016

Elsinore Valley Municipal Water District

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Background

The California Health and Safety Code specifies that Public Water Systems with more than 10,000 service connections must prepare a report every three years identifying any constituents in the water system that exceed the Public Health Goals **(PHGs)** within the three preceding calendar years. PHGs are established by California Environmental Protection Agency's **(Cal-EPA)** Office of Environmental Health Hazard Assessment **(OEHHA)** and are used for health risk assessments. The law states that if no PHG is established by OEHHA, then water suppliers must use the Maximum Contaminant Level Goal **(MCLG)** adopted by the United States Environmental Protection Agency **(USEPA)** in their risk assessment. Lead and Copper do not have MCL's but rather have Action Levels **(AL)**. If the AL for lead or copper is exceeded, then public water systems are required to take action to reduce corrosion and notify the general public. Constituents that have a California drinking water standard, and a PHG or MCLG are to be addressed in a report.

The purpose of this report is to inform the Elsinore Valley Municipal Water District **(District)** customers of constituents that were detected in the District's water system between 2013 and 2015 at a level exceeding a PHG or MCLG. This report will provide the following information as required by law: numerical public health risk associated with the MCL and PHG or MCLGs, the category or type of risk to health that could be associated with each constituent, the Best Available Technology **(BAT)** available that could be used to reduce the constituent level and an estimate of the cost to install that treatment. Constituents that are routinely detected in the District's water system but have no PHG or MCLG, and have been adopted by OEHHA or USEPA will not be addressed in this report. Such constituents will be addressed in a future report once OEHHA or USEPA selects and adopts a PHG or MCLG.

What are PHGs?

PHGs are set by OEHHA and are non-enforceable goals that are based on public health risk consideration. PHGs are numerical contamination levels that are deemed little to no risk to the public while disregarding risk management factors. Risk-management factors include analytical detection capabilities, treatment technology available, benefits and costs. Instead, public water systems follow drinking water standards called maximum contaminant levels **(MCLs)**. MCLs are set by the USEPA and California State Water Resources Control Board **(SWRCB)** - Division of Drinking Water **(DDW)** that takes into account risk-management factors while protecting the public's health. DDW regulates public water systems in California, including the District's water system. Drinking water that meets these drinking water standards have little to no risk and are deemed safe for consumption. MCLGs are the federal equivalent to PHGs, are set by the USEPA, and unlike PHGs can be set to zero.

Water Quality Data Considered

Water quality data from the District's water system between 2013 and 2015 was used for this report to determine compliance with DDW requirements. This report includes post treatment constituents detected above the PHG. If no data after blending or treatment was available then pre-treatment data was used.

Report Guidelines

The Association of California Water Agencies **(ACWA)** provided guidelines for water utilities to be used in preparing PHG reports. The ACWA guidelines were used to prepare this report. No guidelines were available from the state regulatory agencies.

Best Available Technology (BAT)

USEPA and DDW adopted Best Available Technologies **(BATs)** which are best known methods of reducing contaminant levels. It is required by law in this report to produce cost estimates for BATs to lower constituents down to PHG or MCLG level. However, it is not always feasible to determine what treatment is needed to further reduce a constituent down to the PHG or MCLG.

The State regulations set a specific Detection Limit for Purposes of Reporting **(DLR)** each reportable analyte. The DLR is not laboratory specific and is independent of the analytical method used (in cases where several methods are approved). Certified laboratories performing drinking water analyses choose a standard analytical method with capability to detect concentrations at or below the respective State DLR for each reportable analyte. The analytical results are reportable as quantified values if detected above the DLR, or otherwise reported as Not-Detected **(ND).**

Many MCLGs and PHGs are set to a numerical value far below the respective DLRs. This makes it difficult to verify if constituents were reduced to the PHG by any analytical means. In other cases, installing treatment to further reduce the constituent to PHG or MCLG levels could adversely affect other aspects of water quality.

BATs that could be used to reduce constituent levels are summarized in this report. BAT cost estimates are based on the maximum potential water capacity for each well that contains the constituents above the PHG and DLR, multiplied by the annualized capital cost and Operations and Maintenance **(O&M)** per 1,000 gallons of water. Many of the constituents that are above the PHG in the District's water system can be removed with multiple BATs. Only BATs that were able to address multiple water contaminants within the District's water system and are considered effective for large public water systems are provided in this report.

Water System Description and Water Quality

Approximately sixty-six percent of the District's water supply comes from imported water purchased from Metropolitan Water District **(MWD)** of Southern California, while the rest is provided from local groundwater and/or surface water sources. The District receives MWD supplies via two connections to MWD; the Temecula Valley Pipeline **(TVP)** that supplies treated water from MWD's Mills Water Treatment Plant and the Auld Valley Pipeline **(AVP)** that supplies treated water from MWD's Skinner WTP. The District's local water supplies come from twelve groundwater wells and one surface water source, the Canyon Lake. The Canyon Lake surface water supply receives treatment at the Canyon Lake Water Treatment Plant **(CLWTP)** which provides coagulation, clarification, filtration and disinfection treatment before delivery to the distribution system. Arsenic

water quality issues have been found in some of the groundwater wells. Wells that are operational and impacted by arsenic receive either blending and/or coagulation filtration treatment to ensure water delivered to the distribution system does not exceed the MCL.

Canyon Lake Water Treatment Plant (CLWTP)

The District has one surface water supply, Canyon Lake reservoir, which could be treated by the CLWTP before water is delivered to the consumers. The CLWTP provides full treatment of the lake water to comply with the State and Federal standards as per the surface water treatment regulations (SWTR). The objective of the treatment plant is to ensure that the lake water is adequately filtered and disinfected for compliance with the drinking water standards before treated water is delivered to the distribution system. The CLWTP undergoes continuous online monitoring as well as daily, weekly, and monthly grab sampling to ensure compliance with the SWTR.

Back-Basin Groundwater Treatment Plant (BBGWTP)

Groundwater in the Backbasin area is known to have elevated levels of arsenic which has affected some of the District's wells. BBGWTP was constructed by the District in 2008 to remove arsenic from two of the District Wells; Cereal Well 3 and Cereal Well 4, before these well waters are delivered to the costumers. BBGWTP provides coagulation, filtration technology for removal of arsenic, followed by disinfection treatment. The objective of the treatment plant is to ensure that the District maintains arsenic concentrations below the MCL in the treated water delivered to the distribution system. The BBGWTP undergoes weekly-monthly grab sampling to ensure compliance with the MCL.

Corydon Blending Station (CBS)

Four of the District's Backbasin area wells (Cereal Well 1, Summerly, Diamond, and Corydon) are known to have varying levels of arsenic levels, some exceeding the MCL at times. The Corydon Blending Station allows for blending of groundwater produced by these well via a static mixer. In CBS, the water from these different wells can be blended based on respective arsenic levels and flow rates to control the arsenic concentration below the MCL, in the blended water delivered to the customers. During 2014, the District added the flexibility to route the treated water from BBGWTP through the CBS, providing an additional low arsenic blending source. The CBS undergoes weekly-monthly grab sampling to ensure compliance with the MCL.

Machado Blending Station (MBS)

Three of the District's northern area wells (Joy, Lincoln, and Machado wells) can have varying levels of arsenic concentrations, some have exceeded the MCL at times. Lincoln Well has also had a persistent coliform bacterial contamination problem in the past and is provided with disinfection treatment to achieve 99.99% or greater virus inactivation in the water delivered to the customers. The Machado Blending Station allows for blending of ground waters produced by Joy, Lincoln, and Machado wells, via a static mixer. In MBS, the water

from these different wells can be blended based on respective arsenic concentrations and flow rates to control arsenic level below the MCL in the blended water delivered to the distribution system. The Lincoln well, and MBS undergoes weekly-monthly grab sampling to ensure virus inactivation and compliance with the MCL.

Constituents Detected That Exceed A PHG or A MCLG

The following information is in regards to constituents that were detected in one or more of the District's water sources at levels exceeding the PHG or MCLG when no PHG is adopted by OEHHA. As long as drinking water is below the MCL set by DDW, the drinking water is considered "safe" for consumption. Table 1 refers to constituents that were above the PHG that will be addressed in this report with their respective MCL, DLR and BATs.

Constituent	EVMWD Groundwater	EVMWD Canyon Lake WTP	MWD Mills WTP (TVP)	MWD Skinner WTP (AVP)
Arsenic (PHG)	✓	✓	✓	
Fluoride (PHG)	✓			
Uranium (PHG)	✓		✓	✓
Bromate (PHG)			✓	✓
NDMA-Nitrosodiumethylamine (PHG)			✓	✓
Gross Alpha (MCLG)	✓	✓	✓	✓
Gross Beta (MCLG)	✓	✓		✓
		Distribution System		
Copper (PHG)	✓	✓		
Lead (PHG)		✓		
Total Coliform (MCLG)		✓		

Table 1: Constituents found in the EVMWD's drinking water system that were above the PHG or MCLG

Constituent	State DLR	MCL (AL)	PHG (MCLG)	2013-2015 Detections Range, (Average)	BATs
Arsenic (ug/L)	2	10	0.004	ND – 8.8, (1.9)	IX, AA, ED, RO CF, LS, OF
Fluoride (mg/L)	0.1	2	1	0.1 – 1.1, (0.4)	AA, RO, Blending
Gross Alpha (pCi/L)	3	15	(Zero)	ND – 8.97, (2.2)	RO
Gross Beta (pCi/L)	4	50	(Zero)	ND – 5.67, (2.8)	RO, IX
Uranium (pCi/L)	1	20	0.43	ND – 9.02, (3.1)	RO, IX, LS, CF
Bromate (ug/L)	1–5**	RAA=10	0.1	ND – 23, (4.5)	RO
Nitrosodiumethylamine (NDMA), (ng/L)	--	NR	3	ND – 11, (3.04)	UV
Copper (mg/L)	0.05	(90^{th}% AL=1.3)	0.3	(GW): ND - 0.42 (DS Range): ND–0.96 (DS 90^{th} %): ND–0.32	Corrosion Control
Lead (ug/L)	5	(90^{th}% AL=15)	0.2	(DS Range): ND–290 (DS 90^{th} %): ND	Corrosion Control
Total Coliform, (%)	--	5%	(Zero)	0% - 3%	Disinfection

MCL: Maximum Contaminant Limit, DLR: Detection Limit for Reporting, PHG: Public Health Goal, MCLG: Federal Maximum Contaminant Level, NR: Not Regulated, ND:Non-Detect, AL: Action Level, RAA=Rolling Annual Average, BAT: Best Available Technologies to reduce constituents from the MCL. GW: Groundwater, DS: Distribution System, DS 90^{th} %: highest 90^{th} percentile value, CF: Coagulation Filtration, IX: Ion Exchange, GAC: Granular Activated Carbon, GFO: Granular Ferric Oxide Resin, RO: Reverse Osmosis, B: Biological, AA: Activated Alumina, ED: Electrodialysis, LS: Lime Softening, UV: Ultraviolet, OF: Oxidation Filtration; mg/L = milligram per liter (parts per million or ppm), ug/L = microgram per liter (parts per billion or ppb), ng/L = nanogram per liter (parts per trillion or ppt), pCi/L = picocuries per liter

Notes: NDMA BATs (EPA-505-F-14-005)

**The DLR for Bromate is 1 ug/L for analysis performed using EPA Method 317.0 Revision 2.0, 321.8, or 326.0.

Non-detected Contaminants

Between 2013 and 2015, EVMWD did not detect any of the 32 contaminants having their PHGs below the corresponding DLRs. Contaminants may be present at any level below the DLRs, but they were not quantifiable and reportable. Hence, these contaminants are considered as did not having measurable concentrations greater than the PHG during the report period.

1,1,2,2-T etrachloroethane
1,1,2-Trichloroethane (1,1,2-TCA)
1,2,3-T richloropropane
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dichloroethane (1,2-DCA)
1,3-Dichloropropene
2,3,7,8-TCDD (dioxin)
Atrazine
Benzene
Benzo(a)pyrene
Cadmium
Carbofuran
Carbon tetrachloride
Chlordane
Chromium, Hexavalent (Chromium-6)
Ethylene dibromide (EDB)
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Lindane
Methoxychlor
Molinate
Perchlorate
Polychlorinated biphenyls (PCBs)
Radium-226
Radium-228
Strontium-90
Tetrachloroethylene (PCE)
Thallium
Toxaphene
Tritium
Vinyl Chloride

In addition, EVMWD also monitored other regulated contaminants that have PHGs and/or MCLGs above the corresponding DLRs. For the reporting period, these contaminants were not detected above their DLRs and, therefore, no PHG exceedance occurred.

Lead and Copper

There are no MCLs for lead and copper; however lead and copper have an action level. Every three years homes are tested within the distribution system for lead and copper levels. The health risks associated with lead include adverse effects to the nervous system, high blood pressure and an increased risk of cancer. The cancer risk associated with drinking two liters of water a day above the action level is two surpluses of cancer cases per millions of people. Copper is an essential nutrient in humans, and has not been shown to be carcinogenic in animals or humans. However, young children, and infants in particular, appear to be especially susceptible to the effects of excess copper. Case reports have attributed to adverse effects (diarrhea and weight loss) in infants. Consumption of high levels of copper have been linked to cirrhosis of Liver in children; and nausea, abdominal pain, or vomiting in adults.

Customers' homes that are identified as high risk, such as new plumbing installed with lead solder, have their tap water tested for lead and copper. As per State regulations, if the 90th percentile value exceeds the action level for lead or copper then the District must undergo additional actions to control corrosion. The PHG for lead and copper are 0.2 ug/L and 0.3 mg/L, respectively.

Chemical Name	Health Risk	State DLR	AL	PHG	MCLG	Numerical Health Risk at MCL	Numerical Health Risk at PHG
Copper (mg/L)	Gastro-intestinal (nausea, vomiting, diarrhea)	0.05	1.3	0.3	1.3	N/A	N/A
Lead (ug/L)	Developmental Neurotoxicity/ Cardiovascular Toxicity/ Carcinogenicity	5	15	0.2	Zero	$2x10^{-6}$ (2 per Million)	$<1x10^{-6}$ (<1 per Million PHG is not based on this effect)

Detections above PHG or MCLG:

Copper (mg/L)		**Year**		
		2013	**2014**	**2015**
Groundwater	Range	ND	ND - 0.26	ND - 0.42
	Average	ND	0.086	0.1
Distribution System – LCR*	Range	ND - 0.96	-	0.16 - 0.46
	90th %	0.24	-	0.32

Lead (ug/L)		Year		
		2013	2014	2015
Distribution System – LCR*	Range	ND - 290	-	ND – 8
	90th %	ND	-	ND

2013 Testing was in the Elsinore System and 2015Testing was in the Temescal System

Copper concentrations in Groundwater from Corydon Blended Station was above the PHG is some samples during 2015. The average concentration of all samples was less than the PHG.

During 2013 and 2015 the District conducted lead and copper testing in the distribution system under the Lead and Copper Rule (LCR) monitoring requirements. Samples were taken from customer's tap that were considered high risk for lead and copper contamination. The 90th percentile lead value of all samples tested was ND. The 90th percentile copper value was above the PHG in 2015.

The best available technology for lead and copper reduction is corrosion control. Care is taken to monitor pH, hardness, alkalinity and total dissolved solids. All of these are contributors to system corrosion which may result in excess lead and copper levels. The District's water system and water sources are in full compliance with the Federal and State LCR levels and considered optimized for corrosion control. It is unclear if any additional corrosion control steps could be considered without causing other potential water quality problems. Hence, no BAT and cost assessment will be needed for lead and copper.

Arsenic

Arsenic is a semi-metal that enters drinking water via natural deposits or through industrial or agricultural uses. People who drink water containing arsenic above the MCL over many years may experience skin damage or circulatory problems. Arsenic is also categorized as a carcinogen: increases the risk of cancer when drinking water with arsenic above the MCL. The health risk associated with arsenic is 2.5 $x10^{-3}$, or 2.5 surpluses of cancer cases per thousand people drinking two liters of water a day for seventy years.

Chemical Name	Health Risk	State DLR	MCL	PHG	MCLG	Numerical Health Risk at MCL	Numerical Health Risk at PHG
Arsenic (ug/L)	Carcinogenicity (causes cancer)	2	10	0.004	Zero	$2.5x10^{-3}$ (2.5 per Thousand)	$1x10^{-6}$ (1 per Million)

Detections above PHG or MCLG:

Arsenic (ug/L)		Year		
		2013	2014	2015
Groundwater	Range	ND - 5.8	ND - 6.5	ND - 8.8
	Average	2.7	3.14	4.3
Canyon Lake WTP	Range	3.1	2	ND
	Average	3.1	2	ND
MWD Mills WTP	Range	ND	ND	2.2
	Average	ND	ND	2.2

Arsenic levels in the District's treated / blended groundwater, Canyon Lake surface water supplies, and imported water supplies delivered by MWD Mills WTP exceed the PHG. The Arsenic levels complied with the health based MCL of 10 ug/L set by DDW.

Fluoride

Fluoride is a naturally occurring element, deposited into drinking water via erosion of natural deposits. Fluoride is sometimes added into drinking water supplies as a public health measure to prevent tooth decay. Drinking fluoride above the federal MCL of 4 mg/L over many years one may develop bone disease, including pain and tenderness of the bones. Children who drink water containing fluoride above the MCL of 2 mg/L may develop mottled teeth.

Chemical Name	Health Risk	State DLR	MCL	PHG	MCLG	Numerical Health Risk at MCL	Numerical Health Risk at PHG
Fluoride (mg/L)	Musculoskeletal toxicity (causes tooth mottling)	0.1	2	1	4	N/A	N/A

Detections above PHG or MCLG:

Fluoride (mg/L)		Year		
		2013	2014	2015
Groundwater	Range	0.2 - 1.1	0.1 - 1	0.1 - 0.7
	Average	0.4	0.43	0.4

One groundwater sample from 2013 (Cereal Well 1) exceeded the PHG. The BAT for fluoride is reverse osmosis, activated alumina and blending. The District provides blends Cereal Well 1 with other groundwater sources (Corydon/Diamond/Summerly) before delivery to the customers. The fluoride levels in 2014 and 2015 were at or below the PHG.

Total Coliform

Total Coliform bacteria are naturally present in the environment and are used as indicators of potentially harmful pathogens. Once a sample is total coliform positive, the water distribution system must test for fecal coliform, which causes short-term effects such as diarrhea, cramps and/or headaches. The MCL for Total Coliform's is 5% positive samples in any one month. The District's water distribution samples may not collectively exceed more than 5% positive for total coliform.

Chemical Name	Health Risk	State DLR	MCL	PHG	MCLG	Numerical Health Risk at MCL	Numerical Health Risk at PHG
Total Coliform (%)	Not a health threat in itself; It is used to indicate possible presence of other potentially harmful bacteria	--	5% in any one month	N/A	0% in any one month	N/A	N/A

Detections above PHG or MCLG:

Total Coliform (%)	Year		
	2013	2014	2015
Elsinore Distribution (Range)	0 - 3%	0 - 2.8%	0 - 1.3%

During 2013, 2014 and 2015 between 152 and 190 samples were collected each month for coliform analysis. Occasionally, a sample was found to be positive for coliform bacteria but repeat/re-check samples were negative and follow-up actions were taken. A maximum of 3% of these samples were positive in any given month. Chloramine is added at our sources to assure that the water served is microbiologically safe. The chorine residual levels are carefully controlled to provide the best health protection without causing the water to have undesirable taste and odor or increasing the disinfection byproduct level. This careful balance of treatment processes is essential to continue supplying our customers with safe drinking water.

The District works closely with their regional supplier MWD to ensure proper disinfection within the District's water system. The District takes all measures described by DDW as BAT for coliform bacteria in Section 64447, Title 22 of the California Code of Regulations. These measures include an effective cross- connection control program to protect the wells and the distribution systems from coliform contamination, maintaining a disinfectant residual throughout the systems, an effective monitoring and surveillance program, and maintaining positive pressures in the distribution system. Further disinfection may cause adverse effects within the District's water quality. Therefore, no estimate cost has been included to further reduce total coliform to the PHG.

Radioactivity - Gross Alpha

Gross Alpha is a measure of several different radioactive substances that naturally occur in well water due to radioactive elements decaying or breaking down. These include radium 226, radium 228, and uranium. There is a health risk of obtaining cancer if one drinks water containing gross alpha above the MCL of 15 pCi/L. The cancer risk associated with gross alpha particles is one surplus of cancer cases per one thousand people who drink two liters of water a day for 70 years. The MCL associated with gross alpha excludes alpha particles emitted from uranium and radon. Since there is not a PHG for gross alpha; the MCLG of zero is adopted for Gross Alpha.

Chemical Name	Health Risk	State DLR	MCL	PHG	MCLG	Numerical Health Risk at MCL	Numerical Health Risk at MCLG
Gross Alpha Particle Activity (pCi/L)	Carcinogenicity (causes cancer)	3	15	N/A	Zero	$1x10^{-3}$ (for 210Po, the most potent alpha emitter) (1 per Thousand)	Zero

Detections above PHG or MCLG:

Gross Alpha (pCi/L)		**Year**		
		2013	**2014**	**2015**
Canyon Lake WTP	Range	1.2	8.97	3
	Average	1.2	8.97	3
Groundwater	Range	ND - 8.35	1.38 - 8.35	1.4 - 8.4
	Average	4.3	4.1	4.7
MWD Mills WTP	Range	ND	ND – 4	ND – 4
	Average	ND	ND	ND
MWD Skinner WTP	Range	ND – 3	ND - 5	ND - 5
	Average	ND	ND	ND

All District sources of supply contain Gross Alpha above the zero MCLG. The selected BAT for Gross Alpha is RO

Radioactivity -Gross Beta

Gross Beta is a screening standard for a group of radionuclides. Gross Beta is an indicator of man-made radioactivity and is naturally occurring in surface water and groundwater. It has a health risk category for carcinogenicity. The level of carcinogenic risk is dependent on the beta/photon emitting isotopes and the sample tissue. Monitoring of gross beta is conducted every 3 to 9 years at the Canyon Lake Water Treatment Plant.

Chemical Name	Health Risk	State DLR	MCL	PHG	MCLG	Numerical Health Risk at MCL	Numerical Health Risk at MCLG
Gross Beta Particle Activity (pCi/L)	Carcinogenicity (causes cancer)	4	50 (4mrem/year)	N/A	Zero	$2x10^{-3}$ (for 210Po, the most potent beta emitter) (2 per Thousand)	Zero

Detections above PHG or MCLG:

Gross Beta (pCi/L)		**Year**		
		2013	**2014**	**2015**
Canyon Lake WTP	Range	3.23	5.67	3.1
	Average	3.23	5.67	3.1
Groundwater	Range	-	ND - 3.1	1.7 - 3.1
	Average	-	ND	ND
MWD Skinner WTP	Range	ND – 5	5	5
	Average	ND	5	5

Most of the District sources of supply contain Gross Beta above the zero PHG. The BATs for reducing Gross Beta would be reverse osmosis and ion exchange. The selected BAT for Gross Beta is RO due to its effectiveness in reducing other radiological chemicals.

Radioactivity -Uranium

Uranium is a radioactive compound that naturally occurs in varying amounts in the earth's crust. Uranium has a health risk of developing cancer if one drinks water containing uranium above the MCL. The cancer risk associated with uranium is five surpluses of cancer cases per hundred thousand people who drink two liters of water per day for seventy years.

Chemical Name	Health Risk	State DLR	MCL	PHG	MCLG	Numerical Health Risk at MCL	Numerical Health Risk at PHG
Uranium (pCi/L)	Carcinogenicity (causes cancer)	1	20	0.43	Zero	$5x10^{-5}$ (5 per 100 Thousand)	$1x10^{-6}$ (1 per Million)

Detections above PHG or MCLG:

Uranium (pCi/L)		Year		
		2013	2014	2015
Groundwater	Range	5.17 - 9.02	ND - 9	ND - 9
	Average	5.4	7.7	4.9
MWD Mills WTP	Range	ND - 1	ND - 4	ND - 4
	Average	1	2	2
MWD Skinner WTP	Range	ND - 2	1 - 2	1 - 2
	Average	1	2	2

Most of the District sources of supply contain uranium above the PHG. The BATs for reducing uranium would be reverse osmosis, lime softening, coagulation/filtration, or ion exchange. The selected BAT for uranium is RO due to its effectiveness in reducing other radiological chemicals.

Bromate

Bromate is a disinfectant by-product of drinking water ozonation with naturally occurring bromide. It has a health risk category for carcinogenicity. Bromate toxicity includes hemolysis, methemoglobinemia, and kidney damage. Compliance with the Bromate MCL is based on a 12 month annual average value. The cancer risk associated with Bromate is one surplus of cancer cases per ten thousand people who drink two liters of water per day for seventy years.

Chemical Name	Health Risk	State DLR	MCL	PHG	MCLG	Numerical Health Risk at MCL	Numerical Health Risk at PHG
Bromate (ug/L)	Carcinogenicity (causes cancer)	1–5**	10	0.1	Zero	$1x10^{-4}$ (1 per 10 Thousand)	$1x10^{-6}$ (1per Million)

**The DLR for Bromate is 1 ug/L for analysis performed using EPA Method 317.0 Revision 2.0, 321.8, or 326.0.

Detections above PHG or MCLG:

Bromate (ug/L)		Year		
		2013	2014	2015
MWD Skinner WTP	Range	1 - 11	ND - 8	1.1 – 9.9
	Average	5.9	3.6	4.3
MWD Mills WTP	Range	1 - 12	ND - 23	2.2 - 12
	Average	3.9	4.8	4.5

Bromate in the District's water system comes from the treated MWD imported water supplies. One of the most effective Best Available Treatment (BAT) technologies for bromate reduction is reverse osmosis (RO). RO treatment reduces the natural occurring bromide in source water by reducing the natural organic matter (NOM)

in water. When this is reduced, the demand for ozone decreases, therefore reducing bromate formation. Because the PHG for bromate is less than the DLR, it would be difficult to assess the effectiveness of RO treatment in reaching the PHG level.

Nitrosodiumethylamine (NDMA)

NDMA is a chemical formed in natural and industrial processes. Drinking water disinfected with chloramine and chlorination of wastewater for groundwater recharge has indicated levels of NDMA. It is also formed in the stomach when foods containing alkylamines are consumed. It has a health risk category for hematotoxicity. NDMA poses a carcinogenic risk and can cause liver damage. There is not a Maximum Contaminant Level (MCL) for NDMA. The best available technology for NDMA reduction is ultraviolet light (UV) oxidation.

Chemical Name	Health Risk	State DLR	MCL	PHG	MCLG	Numerical Health Risk at MCL	Numerical Health Risk at PHG
N-Nitrosodium-ethylamine (NDMA) (ng/L)	Carcinogenic (Causes cancer)	--	--	3	Zero	N/A	$1x10^{-6}$ (1 per Million)

Detections above PHG or MCLG:

NDMA (ng/L)		Year		
		2013	2014	2015
MWD Skinner WTP	Range	ND - 11	2 - 2.9	ND
	Average	6.5	2.5	ND
MWD Mills WTP	Range	ND - 11	4.4 – 5.4	2.2 – 2.5
	Average	2	4.9	2.35

N-Nitrosodium-ethylamine (NDMA) was found in the District's imported water supplies received from MWD's Skinner and Mills water treatment plants above the PHG level in 2013 and 2014. NDMA levels reported in 2015 were below the PHG level for both imported water sources. Hence, no BAT analysis and cost estimation is included in this report for NDMA.

Cost Estimates

The Guidelines for Preparation of Required Reports on Public Health Goals by ACWA states that data used by the drinking water agency in determining compliance with DDW requirements is used for the PHG Report. The data used for the District's PHG Report applies to any constituent that was detected above the PHG and DLR in the District's water system after treatment. If no data is available post-treatment, then pre-treatment data is used. Cost estimates for the BATs are based upon ACWA's guidelines for cost of BATs. The figures are set in

units of $/1,000 gallons of treated water for each BAT for that constituents. ACWA's BAT estimates are annualized cost with O&M including unless otherwise stated. These estimated cost were used, then multiplied based on the maximum potential water capacity for each well that contains the constituents above the PHG and DLR. The costs were determined on worst case basis assuming that there was no treatment currently available. Cost for BATs will be expressed in terms of annualized capital cost and O&M as well as cost per capita.

Table 2: Best Available Technology (BAT) for Constituents Selected for Treatment Cost Estimation

Constituent	**RO** Reverse Osmosis	**IX** Ion Exchange	**AA** Activated Alumina	**CF** Coagulation Filtration	**ED** Electro-Dialysis	**LS** Lime Softening
Arsenic	✓	✓	✓	✓	✓	✓
Fluoride	✓		✓			
Gross Alpha	✓					
Gross Beta	✓	✓				
Uranium	✓	✓		✓		✓
Bromate	✓					

Reverse osmosis (RO) is the most suitable best available technology for arsenic, fluoride, uranium, gross alpha, gross beta, and bromate; to attempt in lowering these constituents to levels at or below the PHGs or MCLG. According to the Association of California Water Agencies (ACWA) Cost Estimates for Treatment Technology BAT, it would cost approximately $1.83 - $3.22 per 1000 Gallons/Year for treating water using reverse osmosis (RO) treatment. If the District chooses to use RO as BAT, it would cost between $26.7 to $47 million per year in annualized capital and O&M to try to meet PHG levels. Using the 2015 service population of 150,836 and 43,748 service connections; the cost of the additional treatment would equate to approximately $177 - $312 per Capita/Year or $611-$1,075 per Connection/Year in addition to the existing water rates. The maximum capacity of the RO treatment plant for this cost estimate is determined to be 40 MGD, which is the maximum daily demand of the District.

Recommendations for Further Action

The District's drinking water meets all California SWRCB's DDW and USEPA drinking water standards set to protect public health. All constituents identified in this report are below the MCL after treatment via the District's BBGWTP, CLWTP or other rigorous blending plans. To reduce the constituents further would be additional treatment processes which would be costly to the District. There are also no analytical methods to measure if the constituents were effectively reduced to or below the PHG/MCLG. Furthermore, reduction of the constituents to such levels may adversely affect other aspects of water quality. The health benefits in this hypothetical reduction of constituents are unquantifiable, therefore no further action is proposed.

References:

No. 1 Excerpts from California Health & Safety Code, Section 116470 (b)
No. 2 Table of Regulated Constituents with MCLs, PHGs or MCLGs
No. 3 Elsinore Valley Municipal Water District's 2013, 2014 and 2015 Consumer Confidence Report
No. 4 Health Risk Information for Public Health Goal Exceedances Reports.

Reference No. 1

Excerpts from California Health & Safety Code, Section 116470 (b)
California Health & Safety Codes

Section 116470. Consumer Confidence Report & Public Health Goal Report

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Reference No. 2

Table of Regulated Constituents with MCLs, PHGs or MCLGs

Reference No. 3

Elsinore Valley Municipal Water District's 2013, 2014 and 2015 Consumer Confidence Report

Reference No. 4

Health Risk Information for Public Health Goal Exceedences Reports.