

MESA WATER DISTRICT 2019 PUBLIC HEALTH GOALS REPORT

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861 Village Oaks Drive, Suite 100 • Covina, California 91724
Phone: (626) 967-6202 • FAX: (626) 331-7065 • Web site: www.stetsonengineers.com

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2019 Public Health Goals Report

Mesa Water District

1.0 Introduction

Under the Calderon-Sher Safe Drinking Water Act of 1996 public water systems in California serving greater than 10,000 service connections must prepare a report containing information on 1) detection of any contaminant in drinking water at a level exceeding a Public Health Goal (PHG), 2) estimate of costs to remove detected contaminants to below the PHG using Best Available Technology (BAT), and 3) health risks for each contaminant exceeding a PHG. This report must be made available to the public every three years. The initial PHG Report was due on July 1, 1998, and subsequent reports are due every three years thereafter.

This 2019 PHG Report has been prepared to address the requirements set forth in Section 116470 of the California Health and Safety Code. It is based on water quality analyses during calendar years 2016, 2017, and 2018. This 2019 PHG Report has been designed to be as informative as possible, without unnecessary duplication of information contained in the Consumer Confidence Report (also known as the Water Quality Report), which is mailed to customers by July 1st of each year.

There are no regulations explaining requirements for the preparation of PHG reports. A workgroup of the Association of California Water Agencies (ACWA) Water Quality Committee has prepared suggested guidelines for water utilities to use in preparing PHG reports. The ACWA guidelines were used in the preparation of this 2019 PHG Report. These guidelines include tables of cost estimates for BAT. The State of California (State) provides ACWA with numerical health risks and category of health risk information for contaminants with PHGs. This health risk information is appended to the ACWA guidelines.

2.0 California Drinking Water Regulatory Process

California Health and Safety Code Section 116365 requires the State to develop a PHG for every contaminant with a primary drinking water standard or for any contaminant the State is proposing to regulate with a primary drinking water standard. A PHG is the level of a contaminant in drinking water that poses no significant health risk if consumed for a lifetime. The process of establishing a PHG is a risk assessment based strictly on human health considerations. PHGs are recommended targets and are not required to be met by any public water system.

The State office designated to develop PHGs is the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA). The PHG is then forwarded to the State Water Resources Control Board, Division of Drinking Water (DDW)

for use in revising or developing a Maximum Contaminant Level (MCL) in drinking water. The MCL is the highest level of a contaminant that is allowed in drinking water. State MCLs cannot be less stringent than federal MCLs and must be as close as is technically and economically feasible to the PHGs. DDW is required to take treatment technologies and cost of compliance into account when setting an MCL. Each MCL is reviewed at least once every five years.

Section 116470(b)(1) of the California Health and Safety Code requires public water systems serving more than 10,000 connections to identify each contaminant detected in drinking water that exceeded the applicable PHG.

Section 116470(f) of the California Health and Safety Code requires that where OEHHA has not adopted a PHG for a constituent, water suppliers are to use the established Maximum Contamination Level Goals (MCLGs) adopted by the United States Environmental Protection Agency (USEPA). MCLGs are the federal equivalent to PHGs.

3.0 Identification of Contaminants

Section 116470(b)(1) of the California Health and Safety Code requires public water systems serving more than 10,000 service connections to identify each contaminant detected in drinking water that exceeded the applicable PHG. Section 116470(f) of the California Health and Safety Code requires the MCLG to be used for comparison if there is no applicable PHG.

Mesa Water District (Mesa Water®) water system has approximately 24,018 service connections serving 110,000 people. The following constituents were detected at one or more locations within the drinking water system at levels that exceeded the applicable PHGs or MCLGs:

- **Arsenic** – naturally-occurring contaminant. In addition, arsenic is a waste product from many industrial production processes. Arsenic was measured above the PHG level in Mesa Water groundwater.
- **Bromate** – formed when naturally-occurring bromide reacts with ozone during the disinfection process. Bromate was measured above the PHG in treated surface water purchased from Metropolitan Water District of Southern California (MWD).
- **Coliform Bacteria, Total** – naturally-occurring in the environment but can also be an indicator of the presence of other pathogenic organisms originating from sewage, livestock or other wildlife. Total coliform bacteria was measured above the MCLG level in Mesa Water distribution system.
- ***E. coli* Bacteria** – a type of fecal coliform bacteria. Fecal coliform bacteria live specifically in the gut and feces of warm-blooded animals. *E. coli* bacteria is considered the best indicator of fecal coliform bacteria pollution and that additional pathogens may be present. *E. coli* bacteria was measured above the MCLG level in one sample in 2017. Repeat samples were absent for *E. coli* bacteria.

- **Gross Alpha Particle Activity** (gross alpha) – naturally occurring contaminant. Gross alpha was measured above the MCLG in treated surface water purchased from MWD.
- **Gross Beta Particle Activity** (gross beta) – naturally occurring contaminant. Gross beta was measured above the MCLG in treated surface water purchased from MWD.
- **Uranium** – naturally-occurring contaminant. Uranium was measured above the PHG in local groundwater and in treated surface water purchased from MWD.

Chart A shows the applicable PHG or MCLG and MCL or Action Level (AL) for each contaminant identified above. Chart A includes the maximum, minimum, and average concentrations of each contaminant in drinking water supplied by Mesa Water in calendar years 2016 through 2018.

4.0 Numerical Public Health Risks

Section 116470(b)(2) of the California Health and Safety Code requires disclosure of the numerical public health risk, determined by OEHHA, associated with the MCLs, ALs, PHGs and MCLGs. Available numerical health risks developed by OEHHA for the contaminants identified above are shown on Chart A. Only numerical risks associated with cancer-causing chemicals have been quantified by OEHHA.

Arsenic – OEHHA has determined that the theoretical health risk associated with the PHG is 1 excess case of cancer in a million people. USEPA has determined the risk associated with the MCL is 2.5 excess cases of cancer in 1,000 people exposed over a 70-year lifetime.

Bromate – OEHHA has determined the theoretical health risk associated with the PHG is 1 excess case of cancer in a million people. USEPA has determined the risk associated with the MCL is 1 excess case of cancer in 10,000 people exposed over a 70-year lifetime.

Coliform Bacteria, Total – OEHHA has not established a PHG. USEPA has established an MCLG of 0.

E. coli Bacteria – OEHHA has not established a PHG. USEPA has established an MCLG of 0.

Gross Alpha – OEHHA has not established a PHG. USEPA has established an MCLG of 0. USEPA has determined the risk associated with the MCL is 1 excess case of cancer in 1,000 people over a lifetime exposure.

Gross Beta – OEHHA has not established a PHG. USEPA has established an MCLG of 0. USEPA has determined the risk associated with the MCL is 2 excess cases of cancer in 1,000 people over a lifetime exposure.

Uranium – OEHHA has determined that the theoretical health risk associated with the PHG is 1 excess case of cancer in a million people. USEPA has determined the risk associated with the MCL is 5 excess cases of cancer in 100,000 people exposed over a 70-year lifetime.

5.0 Identification of Risk Categories

Section 116470(b)(3) of the California Health and Safety Code requires identification of the category of risk to public health associated with exposure to the contaminant in drinking water, including a brief, plainly worded description of those terms. The risk categories and definitions for the contaminants identified above are shown on Chart A.

6.0 Description of Best Available Technology

Section 116470(b)(4) of the California Health and Safety Code requires a description of the BAT, if any is available on a commercial basis, to remove or reduce the concentrations of the contaminants identified above. The BATs are shown in Section 7.0 and on Chart A.

7.0 Costs of Using Best Available Technologies and Intended Actions

Section 116470(b)(5) of the California Health and Safety Code requires an estimate of the aggregate cost and cost per customer of utilizing the BATs identified to reduce the concentration of a contaminant to a level at or below the PHG or MCLG. In addition, Section 116470(b)(6) of the California Health and Safety Code requires a brief description of any actions the water purveyor intends to take to reduce the concentration of the contaminant and the basis for that decision.

The following sections summarize the estimated cost of compliance and cost per Mesa Water service connection to reduce the concentration of contaminants to a level at or below the PHG or MCLG. All cost estimates are adjusted to 2018 cost of construction.

Arsenic – The BATs for removal of arsenic in water for large water systems are: activated alumina, coagulation/filtration, electrodialysis, ion exchange, lime softening, oxidation/filtration, and reverse osmosis. Arsenic was detected above the PHG in two Mesa Water wells. Mesa Water is in compliance with the MCL for arsenic. The estimated cost to reduce arsenic levels in local groundwater to below the PHG of 0.004 microgram per liter ($\mu\text{g/l}$) using ion exchange was calculated. Because the DDW detection limit for purposes of reporting (DLR) for arsenic is 2 $\mu\text{g/l}$, treating arsenic to below the PHG level means treating arsenic to below the DLR of 2 $\mu\text{g/l}$. There are numerous factors that may influence the actual cost of reducing arsenic levels to the PHG. Achieving the water quality goal for arsenic could be approximately \$2,400,000 per year, or \$98 per service connection per year.

Bromate – The BATs for removal of bromate in water for large water systems are: coagulation/filtration optimization, granular activated carbon, and reverse osmosis.

Bromate was detected above the PHG in water supplied by MWD. Mesa Water is in compliance with the MCL for bromate. The estimated cost to reduce bromate levels in MWD water to below the PHG of 0.1 µg/l using reverse osmosis was calculated. Because the DDW DLR for bromate is 1 µg/l, treating bromate to below the PHG level means treating bromate to below the DLR of 1 µg/l. There are numerous factors that may influence the actual cost of reducing bromate levels to the PHG. Achieving the water quality goal for bromate could range from approximately \$870,000 to \$7,380,000 per year, or between \$36 and \$307 per service connection per year.

Coliform Bacteria, Total and *E. coli* – From 2016 to 2018, approximately 100 to 125 samples were collected each month for total coliform bacteria analysis. During one of these months, the total coliform bacteria levels were found positive in 0.8 percent of the samples. The MCL for total coliform bacteria is 5 percent positive samples of all samples per month and the MCLG is 0. During one of these months, one sample was found to be *E. coli* bacteria positive. The MCL for *E. coli* bacteria is based on either an *E. coli* bacteria positive repeat sample following a total coliform bacteria positive routine sample or a total coliform bacteria repeat sample following an *E. coli* bacteria positive routine sample. The MCLG for *E. coli* bacteria is 0. Mesa Water is in compliance with the MCL for total coliform bacteria and *E. coli* bacteria.

The BAT for removal of total coliform bacteria in drinking water has been determined by USEPA to be disinfection. Mesa Water already disinfects all water served to the public. Chlorine is used to disinfect the water because it is an effective disinfectant and residual concentrations can be maintained to guard against biological contamination in the water distribution system.

Total coliform bacteria are indicator organisms that are ubiquitous in nature. They are a useful tool because of the ease in monitoring and analysis. Mesa Water collects weekly samples for total coliform bacteria at various locations in the distribution system. If total coliform bacteria are detected in the drinking water sample, it indicates a potential problem that needs to be investigated and followed up with additional sampling. It is not unusual for a system to have an occasional positive total coliform bacteria sample. Although USEPA set the MCLG for total coliform bacteria at 0 percent positive, there is no commercially available technology that will guarantee 0 percent positive total coliform bacteria every single month; therefore, the cost of achieving the PHG cannot be estimated.

Exceeding zero *E. coli* bacteria at any one time, in and of itself, would not normally constitute the need for any treatment or action. There is no action that could be taken with absolute certainty that could ensure that the system would always have zero-percent *E. coli* bacteria every single time. The one single action that would likely decrease the possibility of positive *E. coli* bacteria detection would be to significantly increase the disinfectant residual. This would likely result in increased disinfection byproducts (DBPs). DBPs can have potentially adverse chronic health risks. The limits to the amount of disinfectant residual allowed in the distribution system are the Maximum Residual Disinfectant Levels as established by the Disinfectants and Disinfection Byproducts Rule.

Therefore, the cost of achieving the PHG cannot be estimated. Mesa Water collects weekly samples for total coliform bacteria, which includes *E. coli* bacteria, at various locations in the distribution system. If a positive total coliform bacteria drinking water sample is found, it indicates a potential problem that needs to be investigated and followed up with additional sampling.

Mesa Water will continue several programs that are in place to prevent contamination of the water supply with microorganisms. These include:

- Disinfection using chlorine and maintenance of a chlorine residual at every point in the distribution system
- Monitoring throughout the distribution system to verify the absence of total coliform bacteria and the presence of a protective chlorine residual
- Cross-connection control program that prevents the accidental entry of non-disinfected water into the drinking water system.

Gross Alpha, Gross Beta and Uranium – The only BAT for the removal of gross alpha radioactivity in drinking water for large water systems is reverse osmosis, which can also remove gross beta, and uranium. The next available BAT is ion exchange, however, it can only remove gross beta. Consequently, reverse osmosis will be used in the calculation. Both gross alpha and gross beta were detected above their respective MCLGs in water supplied by MWD. Uranium was detected above the PHG in one Mesa Water well, and also detected above the PHG in water supplied by MWD. The cost of providing treatment using reverse osmosis to reduce gross alpha levels in MWD water and gross beta levels in MWD water to the MCLG of 0 (and consequently uranium in groundwater and MWD water below the PHG) was calculated. Achieving the radioactivity water quality goals could range from \$1,080,000 to \$9,170,000 per year, or between \$45 and \$382 per service connection per year.

All Contaminants – In addition, a cost estimate to treat all water produced by Mesa Water using reverse osmosis to remove all the contaminants detected above the PHGs or MCLGs was calculated. All the contaminants listed in Chart A may be removed to non-detectable levels by reverse osmosis, except total coliform bacteria and *E. coli* bacteria. As shown on Chart A, achieving the water quality goals for all contaminants, except total coliform bacteria and *E. coli* bacteria, using reverse osmosis could range from \$4,650,000 to \$39,660,000 per year, or between \$194 and \$1,651 per service connection per year.

8.0 Recommendations for Further Action

Section 116470(b)(6) of the California Health and Safety Code also requires a brief description of any actions the water purveyor intends to take to reduce the concentration of the contaminant and the basis for that decision. Mesa Water's drinking water quality meets or exceeds all state and federal drinking water standards set to protect public health. To further reduce levels of the constituents identified in this report that are already below the health-based MCLs established to provide "safe drinking water," additional costly treatment process would be required. The effectiveness of the treatment

processes to provide significant reduction 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.

For additional information, please contact Ms. Kaying Lee, Water Quality and Compliance Supervisor at (949) 207-5491, or write to Mesa Water District, 1965 Placentia Ave, Costa Mesa, California 92627.

CHART A

2019 PUBLIC HEALTH GOALS REPORT MESA WATER DISTRICT

PARAMETER	UNITS OF MEASUREMENT	PHG OR (MCLG)*	MCL OR (AL)	DLR	CONCENTRATION GROUNDWATER		CONCENTRATION SURFACE WATER		CATEGORY OF RISK	CANCER RISK AT PHG OR MCLG	CANCER RISK AT MCL	BEST AVAILABLE TECHNOLOGIES	AGGREGATE COST PER YEAR	COST PER HOUSEHOLD PER YEAR
					VALUE	RANGE	VALUE	RANGE						
MICROBIOLOGICAL														
Total Coliform Bacteria (a)	% samples positive	(0)	5	NA	0.8	NA	NA	NA	NA	NA	NA	D	(c)	(c)
<i>E. coli</i> Bacteria	number of positive samples	(0)	(b)	NA	1	NA	NA	NA	NA	NA	NA	D	(c)	(c)
INORGANIC CHEMICALS														
Arsenic	µg/l	0.004	10	2	ND	ND - 2.1	NA	NA	C	1 x 10 ⁻⁶	2.5 x 10 ⁻³	AA,C/F,E,IE,LS,O/F,RO	\$2,400,000 (d)	\$98 (d)
Bromate	µg/l	0.1	10	1	NA	NA	3.5	ND - 10	C	1 x 10 ⁻⁶	1 x 10 ⁻⁴	C/F, GAC, RO	\$870,000 - \$7,380,000 (e)	\$36 - \$307 (e)
RADIOLOGICAL														
Gross Alpha Particle Activity	pCi/l	(0)	15	3	NA	NA	ND	ND - 4.0	C	0	1 x 10 ⁻³	RO	\$1,080,000 - \$9,170,000 (f)	\$45 - \$382 (f)
Gross Beta Particle Activity	pCi/l	(0)	50	4	NA	NA	5.0	4.0 - 6.0	C	0	2 x 10 ⁻³	IE, RO	--	--
Uranium	pCi/l	0.43	20	1	ND	ND - 2.29	3.0	2.0 - 3.0	C	1 x 10 ⁻⁶	5 x 10 ⁻⁵	RO	--	--
ALL CONTAMINANTS	--	--	--	--	--	--	--	--	--	--	--	RO	\$4,650,000 - \$39,660,000 (g)	\$194 - \$1,651 (g)

* MCLGs are shown in parentheses. MCLGs are provided only when no applicable PHG exists.

RISK CATEGORIES

C (Carcinogen) = A substance that is capable of producing cancer.
 CV (Cardiovascular Toxicity) = A substance that may cause high blood pressure
 N (Developmental Neurotoxicity) = A substance that may cause neurobehavioral effects in children

NOTES

AL = Action Level
 PHG = Public Health Goal
 MCL = Maximum Contaminant Level
 MCLG = Maximum Contaminant Level Goal
 NA = Not Applicable or Available
 ND = Not Detected
 ug/l = micrograms per liter or parts per billion
 pCi/l = picoCuries per liter
 DLR = Detection Limit for Purposes of Reporting

TREATMENT/CONTROL TECHNOLOGIES

AA = Activated Aluminum
 C/F = Coagulation/Filtration
 D = Disinfection
 E = Electrodialysis
 GAC = Granular Activated Carbon
 IE = Ion Exchange
 LS = Lime Softening
 O/F = Oxidation/Filtration
 RO = Reverse Osmosis

- (a) The table shows highest monthly percentage of positive samples as the detected value. Samples were collected in the distribution system.
- (b) *E. coli* bacteria positive repeat sample following a total coliform bacteria positive routine sample or a total coliform bacteria positive repeat sample following an *E. coli* bacteria positive routine sample
- (c) Costs could not be estimated.
- (d) Estimated cost to remove arsenic using IE.
- (e) Estimated cost to remove bromate using RO.
- (f) Estimated cost to remove gross alpha particle activity using RO, which also removes gross beta particle activity and uranium.
- (g) Assuming treating the entire production by RO, which can remove all contaminants listed in the above table to below the detectable levels, except for total coliform bacteria and *E. coli* bacteria, which can be detected anywhere in the distribution system.