PUBLIC HEALTH GOALS
REPORT ON WATER QUALITY

CITY OF SAN JOSE
MUNICIPAL WATER SYSTEM –
EVERGREEN, EDENVALE AND COYOTE
System No. 4310020

JUNE 2016

City of San Jose
Environmental Services Department

SAN JOSE MUNICIPAL WATER SYSTEM
PUBLIC HEALTH GOALS REPORT ON WATER QUALITY

TABLE OF CONTENTS

SECTION 1: BACKGROUND INFORMATION

WHAT ARE PUBLIC HEALTH GOALS (PHGS)?

PHGs are water quality goals established by the California Office of Environmental Health Hazard Assessment (OEHHA) and are based solely on public health risk considerations. In setting the PHGs, OEHHA does not take into account any of the practical risk-management factors which are considered by the United States Environmental Protection Agency (USEPA) and the State Water Resources Control Board (SWRCB) when setting drinking water standards such as Maximum Contaminant Levels (MCLs), including factors such as analytical detection capability, treatment technology available, benefits and costs. PHGs are typically set at values lower than the corresponding MCLs. PHGs are non-enforceable and are not required to be met by public water systems under the California Health and Safety Code. Maximum Contaminant Level Goals (MCLGs), established by USEPA, are the federal equivalent to PHGs.

REPORTING REQUIREMENTS:

Provisions of the California Health and Safety Code §116470(b) (see Attachment 1) specify that public water systems serving more than 10,000 service connections must prepare a special report if their water quality measurements have exceeded any PHGs. Reporting must be done every three years. The law also requires that where OEHHA has not adopted a PHG for a contaminant, the water suppliers are to use the MCLGs adopted by USEPA.

The purpose of this report is to inform consumers of contaminants in San Jose Municipal Water System's (SJMWS) drinking water that exceeded the PHGs or MCLGs during 2013, 2014, and 2015. Included in PHG reports are the numerical public health risk associated with the Maximum Contaminant Level (MCL) and the PHG or MCLG, the category or type of risk to health that could be associated with each contaminant, the best treatment technology available that could be used to reduce the contaminant level, and an estimate of the cost to install that treatment if it is appropriate and feasible. For general information about the quality of the water delivered by SJMWS, please refer to the latest Annual Water Quality Report that was prepared in June 2016. The report can be found online at www.sjenvironment.org/waterquality

WATER QUALITY DATA CONSIDERED:

The water quality data collected by SJMWS and by SJMWS's water suppliers between 2013 and 2015 were considered for the purpose of determining compliance with drinking water standards and PHG reporting requirements (see Attachment 2). This data was all summarized in SJMWS's Annual Water Quality Reports, which are currently available to customers online at www.sjenvironment.org/waterquality. For each regulated contaminant, SWRCB establishes Detection Limits for Purposes of Reporting (DLR). DLRs are the minimum levels at which any analytical result must be reported to SWRCB. Analytical results below the DLRs cannot be quantified with any certainty. In some cases, PHGs are set below the DLRs.

GUIDELINES FOLLOWED:

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

BEST AVAILABLE TREATMENT TECHNOLOGY AND COST ESTIMATES:

Both USEPA and SWRCB adopted Best Available Technologies (BATs), which are the best known methods of reducing contaminant levels to the MCL. However, since many PHGs and MCLGs are set much lower than the MCL, it is not always possible or feasible to determine what treatment is needed to further reduce a contaminant to or below the PHG or MCLG. Where the MCLG or PHG is set at zero, there may not be commercially available technology to reach that level. Estimating the costs to reduce a contaminant 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 contaminant may have adverse effects on other aspects of water quality.

SECTION 2: CONTAMINANTS DETECTED THAT EXCEED PHGS OR MCLGS

The following is a discussion of the constituents that were detected in one or more of our drinking water sources at levels above the PHG, or if no PHG, above the MCLG. The three contaminants that were detected at levels above the applicable PHGs or MCLGs between 2013 and 2015 are:

Contaminant	Unit	CA MCL	DLR	PHG	MCLG	SJMWS Levels
Total Coliform	P/A	5.0%	n/a	n/a	0	0 - 2.24%
Hexavalent Chromium	ppb	10	1	0.02	n/a	0.062 - 8.8
Gross Alpha Particle Activity	pCi/L	15	3	n/a	0	0 - 6.3

A. COLIFORM BACTERIA

The MCL for coliform is more than 5.0% of samples testing positive for the presence of coliforms per month, and the MCLG is zero samples with presence of coliform per month. Coliform bacteria are an indicator organism that are common in nature and are not generally considered harmful. They are used as an indicator because of the ease of monitoring and analysis.

The reason for the coliform drinking water standard is to minimize the possibility that the water contains pathogens, which are organisms that cause waterborne disease. If a positive sample is found, it indicates a potential problem that needs to be investigated and follow up sampling is required. It is not unusual for a system to have an occasional positive sample. It is difficult, if not impossible, to ensure that a system will never get a positive sample. Additionally, due to the sensitive nature of the laboratory analysis method used throughout the time period, some positive results may be caused by sample contamination.

Because coliform is only an indicator of the potential presence of pathogens, it is not possible to state a specific numerical health risk or public health risk category.

SJMWS Results

Between 2013 and 2015, SJMWS collected between 100 and 125 samples each month for coliform analysis. Coliform bacteria exceeded the MCLG of zero in 8 of the 36 months. Of these eight, none exceeded the MCL of 5.0% in any one month. Results for the three years covered by this report (2013-2015) are summarized by year below:

- **2013**: Three months with total coliform positive samples; the highest monthly percentage of positives was 2.24%

- **2014**: Three months with total coliform positive samples; the highest monthly percentage of positives was 0.97%

- **2015**: Two months with total coliform positive samples; the highest monthly percentage of positives was 0.97%

Health Risk Category and Level

Because coliform is only an indicator organism for pathogens in drinking water, its numerical health risk cannot be determined. While MCLGs are normally set at a level where no known or anticipated adverse effects on health would occur, the USEPA has indicated that it is not possible to do so with coliform, since the actual pathogens are not being measured.

Best Available Technology

As part of routine operations, SJMWS takes steps described by SWRCB as "best available technology" for coliform bacteria in Section 64447, Title 22, CCR, including protection of wells from contamination and proper maintenance of the distribution system. Some steps are implemented from the wholesale agencies who supply water to SJMWS, such as the filtration and/or disinfection of surface water supplies. Some steps are implemented in a modified way following coordination with and approval by SWRCB, such as biannual temporary disinfection of groundwater supplies in lieu of constant disinfection.

Other equally important measures that have been implemented to protect drinking water include an effective cross-connection control program, an effective monitoring and surveillance program, flushing of mains and hydrants, and maintaining positive pressures in the distribution system.

There is one method that could potentially further reduce the presence of total coliform, which is to increase the amount of disinfectant residual in the distribution system and/or the regularity of disinfection of groundwater supplies. The tradeoffs include increased chemical usage and storage, a change in the taste and odor of the drinking water, and increased potential for the presence of cancer-causing disinfection byproducts. Additionally, there are limits for the maximum amount of disinfectant residual allowed in the distribution system as set by SWRCB and USEPA.

Recommendations

SWRCB and USEPA set primary drinking water standards to protect public health, which are met by SJMWS. There is no known treatment technology that can be added which could ensure complete absence of coliform bacteria in all water samples; therefore, the costs associated with incorporating any additional technology may be better utilized to provide greater public health protection benefits if spent in other aspects, such as operations, maintenance, and water quality monitoring programs. SJMWS will continue to coordinate with SWRCB to identify any additional measures that will improve operations and water quality in the distribution system. No further action is proposed at this time.

B. HEXAVALENT CHROMIUM [Cr(VI)]

Chromium is a naturally occurring inorganic element that is used in many industrial processes. For decades, both the USEPA and California have enforced limits for total chromium, which includes trivalent, hexavalent, and other forms of the element. In 2001, California rescinded its PHG for total chromium (25 parts per billions [ppb]). In 2011, California established a PHG for Cr(VI) of 0.02 ppb. In 2014, California published the first enforceable Cr(VI) standard in the nation: the state MCL of 10 ppb, with a DLR of 1 ppb. The PHG is one-five hundredth of the MCL.

The USEPA recently included Cr(VI) in UCMR 3, which required public water systems serving over 10,000 people to monitor Cr(VI) for one year between 2013 and 2015. The USEPA is also working to issue its final human health risk assessment for Cr(VI), which might lead to the adoption of federal standards for Cr(VI). However, as of this writing, the USEPA has no standards for Cr(VI).

SJMWS Results

SJMWS detected Cr(VI) in 2013 and 2014. In 2013, Cr(VI) was detected when sampling groundwater sources in accordance with UCMR 3. The highest concentration detected was 5.4 ppb, which is below the MCL of 10 ppb but above the PHG of 0.02 ppb.

In 2013, Cr(VI) was also detected in the Evergreen treated water supply, from samples taken from the Santa Clara Valley Water District turnout and SJMWS distribution system. The contaminant concentrations from these sources ranged between 0.06 ppb to 0.09 ppb, well below the MCL.

In 2014, Cr(VI) was detected as part of routine monitoring of groundwater sources. Detected levels of Cr(VI) ranged from 3.9 ppb to 8.8 ppb.

Health Risk Category and Level

The OEHHA characterizes Cr(VI) as carcinogenic. However, most studies of chromium toxicity relate to inhaling airborne Cr(VI) in the workplace rather than ingesting it in drinking water. Exposure to chromium 6 from breathing dust or fumes is considered much more dangerous than exposure from drinking water. It is estimated that exposure to airborne Cr(VI) is 1000 times more potent than exposure from drinking water.

It can occur naturally but can also enter drinking water sources by historic leaks from industrial plants' hazardous waste sites. The OEHHA calculated the PHG based on the carcinogenic risk. Non-carcinogenic risks have also been associated with inhalation and/or oral ingestion of Cr(VI), including reproductive toxicity (developmental, male reproductive, and female reproductive toxicity), liver toxicity (mild chronic inflammation, fatty changes), and toxicity of blood-forming tissues.

The OEHHA calculated health-protective levels based on carcinogenic and non-carcinogenic effects. The health-protective level for carcinogenic effects is one-hundredth of the level based on non-carcinogenic effects; thus, the carcinogenic risk was used to calculate the PHG. The cancer risk associated with lifetime consumption of water at the PHG is one in one million excess cancer cases. Cancer risk at the MCL is five per ten thousand excess cancer cases.

Best Available Technology

The federal and state approved technologies for removing chromium from drinking water include coagulation/filtration, anion exchange, reverse osmosis, and lime softening.

As a result of research completed over the past decade by multiple water agencies and the state of California, three Cr(VI) technologies have emerged as leading candidates with respect to feasibility and cost; these include weak base anion exchange (WBA), strong base anion exchange (SBA), and reduction with ferrous iron/coagulation/filtration (RCF).

SJMWS does not own or operate a water treatment facility and therefore cannot provide an exact cost estimate to treat Cr(VI).

Recommendations

SJMWS will continue to monitor and protect water sources, as required by state and federal regulations. In the event that Cr(VI) levels exceed the MCL, SJMWS will coordinate with the SWRCB to identify solutions for removing or reducing Cr(VI) levels in the water. No further action is proposed at this time.

C. GROSS ALPHA PARTICLE ACTIVITY

Gross Alpha Particle Activity refers to a group of alpha-emitting radionuclides rather than one specific contaminant. Radionuclides are unstable atoms that emit energy in the form of particles or rays, becoming more stable in the process. Radionuclides can be naturally-occurring or manmade. The MCL of 15 picocuries per liter (pCi/L) represents a screening level that, if exceeded, flags the need for further analysis to characterize which alpha-emitters are present. While the OEHHA concluded it would not be practical to adopt a PHG for alpha particle activity, the USEPA has adopted an MCLG of zero pCi/L. The DLR of 3 pCi/L is higher than the MCLG of zero.

SJMWS Results

A number of groundwater samples taken in 2014 and 2015 show that Gross Alpha Particle Activity was detected above the MCLG, but below the MCL. The detected levels of Gross Alpha Particle Activity were as high as 6.3 pCi/L, which is less than half the MCL of 15 pCi/L.

Health Risk Category and Level

Alpha-emitters are carcinogenic, and thus the USEPA has set the MCLG at zero. The increased risk of cancer from alpha-emitters present at the MCL depends on the composition of the alpha-emitters. Theoretically, if the alpha-emitters consisted entirely of the most potent alpha-emitter, Polonium-210, the increased lifetime cancer risk could be as high as one in one thousand.

The health effect of alpha particles depends upon how exposure takes place. External exposure is far less of a concern than internal exposure, because alpha particles lack the energy to penetrate the outer dead layer of skin. If alpha-emitters have been inhaled, ingested, or absorbed into the blood stream, living tissue may be exposed. Exposure of living tissue to alpha radiation is associated with an increased risk of cancer,

in particular lung cancer (inhalation). The greatest exposure to alpha radiation comes from the inhalation of radon and its decay products, several of which also emit potent alpha radiation.

Best Available Technology

Gross Alpha Particle Activity can be reduced by reverse osmosis (RO). Using RO to treat radionuclides in drinking water can result in an average alpha-emitter removal rate of 95 percent. This level of alpha-emitter removal at the groundwater sources could reduce Gross Alpha Particle Activity to as low as 0.32 pCi/L, which is still above the MCLG of zero but below the DLR of 3 pCi/L.

Both the City of San Jose and the Santa Clara Valley Water District have a watershed management/protection program to identify and reduce potential contamination sources to the groundwater. These efforts, together with a proactive water quality monitoring program, are significantly far more efficient mechanisms for reducing contaminants, including alpha-emitters, than constructing an expensive treatment facility with no assurance of meeting the performance goal. SJMWS does not own or operate a water treatment facility and therefore cannot provide an exact cost estimate to treat Gross Alpha Particle Activity.

Recommendations

SJMWS will continue to monitor and protect water sources, as required by state and federal regulations. In the event that Gross Alpha Particle Activity levels exceed the MCL, SJMWS will coordinate with the SWRCB to identify solutions for removing or reducing Gross Alpha Particle Activity in the water. No further action is proposed at this time.

ATTACHMENT 1

EXERPT FROM CALIFORNIA HEALTH & SAFETY CODE SECTION 116470

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

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

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

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

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

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

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

…

(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.

ATTACHMENT 2

CALIFORNIA MCLS & PHGS AND FEDERAL MCLGS

PARAMETERS/CONTAMINANTS	Units	State MCL	DLR	PHG or (MCLG)	PHG EXCEEDED?
INORGANICS					
ALUMINUM	mg/L	1	0.05	0.6	NO
ANTIMONY	mg/L	0.006	0.006	0.02	NO
ARSENIC	mg/L	0.010	0.002	0.000004	NO
ASBESTOS	million fibers/L	7	0.2	7	NO
BARIUM	mg/L	1	0.1	2	NO
BERYLLIUM	mg/L	0.004	0.001	0.001	NO
CADMIUM	mg/L	0.005	0.001	0.00004	NO
CHROMIUM	mg/L	0.05	0.01	withdrawn	NO
CHROMIUM 6	mg/L	.01	0.001	0.00002	YES
COPPER (at-the-tap; 90th percentile)	mg/L	1.3	0.05	0.3	NO
CYANIDE	mg/L	0.15	0.1	0.15	NO
FLUORIDE	mg/L	2	0.1	1	NO
LEAD (at-the-tap; 90th percentile)	mg/L	0.015	0.005	0.0002	NO
MERCURY	mg/L	0.002	0.001	0.0012	NO
NICKEL	mg/L	0.1	0.01	0.012	NO
NITRATE [as N03]	mg/L	45	2	45	NO
NITRATE + NITRITE [as N]	mg/L	10	--	10	NO
NITRITE [as N]	mg/L	1	0.4	1	NO
PERCHLORATE	mg/L	0.006	0.004	0.006	NO
SELENIUM	mg/L	0.05	0.005	(0.05)	NO
THALLIUM	mg/L	0.002	0.001	0.0001	NO
ORGANIC CHEMICALS					
ALACHLOR	mg/L	0.002	0.001	0.004	NO
ATRAZINE	mg/L	0.001	0.0005	0.00015	NO
BENTAZON	mg/L	0.018	0.002	0.2	NO
BENZO (a) PYRENE	mg/L	0.0002	0.0001	0.000004	NO
BROMATE	mg/L	0.01	0.005	0.0001	NO
CARBOFURAN	mg/L	0.018	0.005	0.0017	NO
CHLORDANE	mg/L	0.0001	0.0001	0.00003	NO
CHLORITE	mg/L	1	0.02	0.05	NO
2,4-DICHLOROPHENOXYACETIC ACID	mg/L	0.07	0.01	0.02	NO
DALAPON	mg/L	0.2	0.01	0.79	NO
DIBROMOCHLOROPROPANE [DBCP]	mg/L	0.0002	0.00001	0.0000017	NO
DI (2-ETHYLHEXYL) ADIPATE	mg/L	0.4	0.005	0.2	NO
DI (2-ETHYLHEXYL) PHTHALATE	mg/L	0.004	0.003	0.012	NO
DINOSEB	mg/L	0.007	0.002	0.014	NO
DIOXIN [2,3,7,8 - TCDD]	mg/L	3x10-8	5x10-9	(0)	NO
DIQUAT	mg/L	0.02	0.004	0.015	NO
ENDOTHALL	mg/L	0.1	0.045	0.58	NO
ENDRIN	mg/L	0.002	0.0001	0.0018	NO
ETHYLENE DIBROMIDE [EDB]	mg/L	0.00005	0.00002	0.00001	NO
GLYPHOSATE	mg/L	0.7	0.025	0.9	NO
HEPTACHLOR	mg/L	0.00001	0.00001	0.000008	NO
HEPTACHLOR EPOXIDE	mg/L	0.00001	0.00001	0.000006	NO
HEXACHLOROBENZENE	mg/L	0.001	0.0005	0.00003	NO
HEXACHLOROCYCLOPENTADIENE	mg/L	0.05	0.001	0.05	NO
LINDANE	mg/L	0.0002	0.0002	0.000032	NO
METHOXYCHLOR	mg/L	0.03	0.01	0.03	NO

PARAMETERS/CONTAMINANTS	Units	State MCL	DLR	PHG or (MCLG)	PHG EXCEEDED?
MOLINATE	mg/L	0.02	0.002	0.001	NO
OXAMYL	mg/L	0.05	0.02	0.026	NO
PENTACHLOROPHENOL	mg/L	0.001	0.0002	0.0003	NO
PICLORAM	mg/L	0.5	0.001	0.5	NO
POLYCHLORINATED BIPHENYLS [PCBs]	mg/L	0.0005	0.0005	0.00009	NO
SILVEX [2,4,5-TP]	mg/L	0.05	0.001	0.025	NO
SIMAZINE	mg/L	0.004	0.004	0.004	NO
THIOBENCARB	mg/L	0.07	0.001	0.07	NO
TOXAPHENE	mg/L	0.003	0.001	0.00003	NO
BENZENE	mg/L	0.001	0.0005	0.00015	NO
CARBON TETRACHLORIDE	mg/L	0.0005	0.0005	0.0001	NO
1,2-DICHLOROBENZENE [ORTHO]	mg/L	0.6	0.0005	0.6	NO
1,4-DICHLOROBENZENE [PARA]	mg/L	0.005	0.0005	0.006	NO
1,1-DICHLOROETHANE [1,1-DCA]	mg/L	0.005	0.0005	0.003	NO
1,2-DICHLOROETHANE [1,2-DCA]	mg/L	0.0005	0.0005	0.0004	NO
1,1-DICHLOROETHENE [1,1-DCE]	mg/L	0.006	0.0005	0.01	NO
CIS-1,2-DICHLOROETHYLENE	mg/L	0.006	0.0005	0.1	NO
TRANS-1,2-DICHLOROETHYLENE	mg/L	0.01	0.0005	0.06	NO
DICHLOROMETHANE (METHYLENE CHLORIDE)	mg/L	0.005	0.0005	0.004	NO
1,2-DICHLOROPROPANE	mg/L	0.005	0.0005	0.0005	NO
1,3-DICHLOROPROPENE	mg/L	0.0005	0.0005	0.0002	NO
ETHYLBENZENE	mg/L	0.3	0.0005	0.3	NO
METHYL TERT BUTYL ETHER (MTBE)	mg/l	0.013	0.003	0.013	NO
MONOCHLOROBENZENE	mg/L	0.07	0.0005	0.2	NO
STYRENE	mg/L	0.1	0.0005	(0.1)	NO
1,1,2,2-TETRACHLOROETHANE	mg/L	0.001	0.0005	0.0001	NO
TETRACHLOROETHYLENE [PCE]	mg/L	0.005	0.0005	0.00006	NO
TOLUENE	mg/L	0.15	0.0005	0.15	NO
1,2,4-TRICHLOROBENZENE	mg/L	0.005	0.0005	0.005	NO
1,1,1-TRICHLOROETHANE [1,1,1-TCA]	mg/L	0.2	0.0005	1	NO
1,1,2-TRICHLOROETHANE [1,1,2-TCA]	mg/L	0.005	0.0005	0.0003	NO
TRICHLOROETHYLENE [TCE]	mg/L	0.005	0.0005	0.0017	NO
TRICHLOROFLUOROMETHANE (FREON 11)	mg/L	0.15	0.005	0.7	NO
TRICHLOROTRIFUOROETHANE (FREON 113)	mg/L	1.2	0.01	4	NO
VINYL CHLORIDE	mg/L	0.0005	0.0005	0.00005	NO
XYLENES [SUM OF ISOMERS]	mg/L	1.75	0.0005	1.8	NO
MICROBIOLOGICAL					
COLIFORM % POSITIVE SAMPLES	%	5	n/a	(zero)	YES
CRYPTOSPORIDIUM*		TT		(zero)	NO
GIARDIA LAMBLIA		TT		(zero)	NO
LEGIONELLA		TT		(zero)	NO
VIRUSES		TT		(zero)	NO
RADIOLOGICAL					
ALPHA ACTIVITY, GROSS	pCi/L	15	3	(zero)	YES
BETA ACTIVITY, GROSS	pCi/L	4 mrem/yr	4	(zero)	NO
RADIUM 226	pCi/L	--	1	0.05	NO
RADIUM 228	pCi/L	--	1	0.019	NO
RADIUM 226 + RADIUM 228	pCi/L	5	--	--	NO
STRONTIUM 90	pCi/L	8	2	0.35	NO
TRITIUM	pCi/L	20000	1000	400	NO
URANIUM	pCi/L	20	1	0.43	NO

Abbreviations: MCL = Maximum Contaminant Level; MCLG = Maximum Contaminant Level Goal; PHG = Public Health Goal; DLR = Detection Limit for purposes of Reporting, set by SWRCB; TT = Treatment Technique