CITY OF SOUTH GATE
2016 PUBLIC HEALTH GOAL REPORT

JUNE 2016

STETSON ENGINEERS INC.

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

Northern California • Southern California • Arizona • Colorado

2016 Public Health Goal Report

City of South Gate

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.

The 2016 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 2013, 2014, and 2015 or, if certain analyses were not performed during those years, the most recent data is used. The 2016 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 Water Quality Report), which was 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 2016 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.

Total chromium and two radiological contaminants (gross alpha particle and gross beta particle) have MCLs but do not yet have designated PHGs. For these contaminants, the Maximum Contaminant Level Goal (MCLG), the federal U.S. Environmental Protection Agency (USEPA) equivalent of PHGs, is used in the PHG Report.

N-nitrosodimethylamine (NDMA) has a PHG of 3 nanograms per liter and 1,2,3-trichloropropane (1,2,3-TCP) has a PHG of 0.7 nanogram per liter but both are not regulated in drinking water with a primary drinking water standard. Bromodichloromethane, bromoform, and dichloroacetic acid are three disinfection byproducts that have federal MCLGs of 0 but are not individually regulated with primary drinking water standards. According to the ACWA guidance and instructions from DDW, these five chemicals do not have to be included in the 2016 PHG Report because they do not have an existing MCL.

3.0 Identification of Contaminants

Section 116470(b)(1) of the 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) requires the MCLG to be used for comparison if there is no applicable PHG.

The City of South Gate (City) water system has approximately 14,179 service connections. 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 in local groundwater
- **Chromium, Hexavalent** – naturally-occurring in local groundwater; industrial contamination in groundwater
- **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.
- **Gross alpha particle activity** (gross alpha) – naturally-occurring in local groundwater
- **Lead** – corrosion of residential plumbing
- **Tetrachloroethylene (PCE)** – industrial contamination in local groundwater
- **Trichloroethylene (TCE)** – industrial contamination in local groundwater
- **Uranium** – naturally-occurring in local groundwater.

The accompanying table shows the applicable PHG or MCLG and MCL or Action Level (AL) for each contaminant identified above. The table includes the maximum, minimum, and average concentrations of each contaminant in drinking water supplied by the City in calendar years 2013 through 2015. Lead is regulated by an AL, not a MCL, and is tested from samples collected at selected customers' indoor faucets or taps. The AL is the concentration of lead, which if exceeded in more than 10 percent of the tap samples, triggers treatment or other requirements that a water system must follow. The chart shows the 90th percentile concentration of lead observed during the at-the-tap sampling.

4.0 Numerical Public Health Risks

Section 116470(b)(2) of the 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 the accompany table. 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 and the risk associated with the MCL is 2.5 excess cases of cancer in 1,000 people exposed over a 70-year lifetime.

Chromium, Hexavalent – OEHHA has determined that the theoretical health risk associated with the PHG is 1 excess case of cancer in a million people and the risk associated with the MCL is 5 excess cases of cancer in 10,000 people exposed over a 70-year lifetime.

Coliform Bacteria, Total – USEPA has determined that the health risk associated with the MCLG is 0.

Gross Alpha – USEPA has determined that the theoretical health risk associated with the MCLG is 0 and the risk associated with the MCL is 1 excess case of cancer in 1,000 people over a lifetime exposure.

Lead – OEHHA has determined that the theoretical health risk associated with the PHG is less than 1 excess case of cancer in a million people and the risk associated with the AL is 2 excess cases of cancer in a million people exposed over a 70-year lifetime.

PCE – OEHHA has determined that the theoretical health risk associated with the PHG is 1 excess case of cancer in a million people and the risk associated with the MCL is 8 excess cases of cancer in 100,000 people exposed over a 70-year lifetime.

TCE – OEHHA has determined that the theoretical health risk associated with the PHG is 1 excess case of cancer in a million people and the risk associated with the MCL is 3 excess cases of cancer in a million people exposed over a 70-year lifetime.

Uranium – OEHHA has determined that the theoretical health risk associated with the PHG is 1 excess case of cancer in a million people and 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 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 the accompanying table.

6.0 Description of Best Available Technology

Section 116470(b)(4) of the 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 on the accompanying table.

7.0 Costs of Using Best Available Technologies and Intended Actions

Section 116470(b)(5) of the 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) 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 City operates one Spray Aeration Treatment System installed in the South Gate Park Reservoir for the treatment of PCE and TCE detected in the local groundwater.

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 the local groundwater. The City 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 (µg/l) using ion exchange was calculated. Because the DDW detection limit for purposes of reporting (DLR) for arsenic is 2 µg/l, treating arsenic to below the PHG level means treating arsenic to below the DLR of 2 µg/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 $3,600,000 per year, or $253 per service connection per year.

Chromium, Hexavalent – The BATs for removal of hexavalent chromium in water are: reduction to chromium III (trivalent chromium) prior to coagulation/filtration, ion exchange, and reverse osmosis. Hexavalent chromium was detected above the PHG in the local groundwater. The City is in compliance with the MCL for hexavalent

chromium. The estimated cost to reduce hexavalent chromium levels in local groundwater to below the PHG of 0.02 µg/l using ion exchange was calculated. Because the DLR for hexavalent chromium is 1 µg/l, treating hexavalent chromium to below the PHG level means treating hexavalent chromium to below the DLR of 1 µg/l. There are numerous factors that may influence the actual cost of reducing hexavalent chromium levels to the PHG. Achieving the water quality goal for hexavalent chromium could range from $2,070,000 to $8,660,000 per year, or between $146 and $609 per service connection per year.

Coliform Bacteria, Total – The BAT for removal of coliform bacteria in drinking water has been determined by USEPA to be disinfection. The City 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.

Coliform bacteria are indicator organisms that are ubiquitous in nature. They are a useful tool because of the ease in monitoring and analysis. The City collects weekly samples for total coliforms at various locations in the distribution system. If 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 sample. Although USEPA set the MCLG for total coliforms at 0 percent positive, there is no commercially available technology that will guarantee 0 percent positive every single month; therefore, the cost of achieving the PHG cannot be estimated.

The City 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 coliforms and the presence of a protective chlorine residual
- Flushing program in which water pipelines known to have little use are flushed to remove stagnant water and bring in fresh water with residual disinfectant
- Cross-connection control program that prevents the accidental entry of non-disinfected water into the drinking water system.

Gross Alpha and Uranium – The only BAT for the removal of gross alpha in water for large water systems is reverse osmosis, which can also remove uranium, if detected. Gross alpha was detected above the MCLG in the local groundwater. Uranium was detected above the PHG in the local groundwater. The cost of providing treatment using reverse osmosis to reduce gross alpha levels in local groundwater to the MCLG of 0 picoCurie per liter (pCi/l) (and consequently uranium in local groundwater below the PHG) was calculated. Because the DLR for gross alpha is 3 pCi/l, treating gross alpha to 0 pCi/l means treating it to below the DLR of 3 pCi/l. Achieving the water quality goal

for gross alpha could range from $2,000,000 to $17,100,000 per year, or between $141 and $1,200 per service connection per year.

Lead – USEPA has determined the BAT to reduce lead in drinking water to be corrosion control optimization. This method is capable of bringing a water system into compliance with the AL of lead at 15 µg/l. The City water system is already in compliance with the lead AL, meets all State and federal requirements, and is therefore deemed by DDW to have optimized corrosion control. Further corrosion control optimization would be incapable of achieving the PHG; therefore, the cost of reducing lead to the PHG level cannot be estimated.

The principal reason for this is that the largest source of lead in tap water is the pipe and fixtures in the customer's own household plumbing. Lead has not been detected in the City's source waters. Factors that increase the amount of lead in the water include:

- Household faucets or fittings made of brass;
- Lead plumbing materials;
- Homes constructed before 1980;
- Water supplied to the home is naturally soft or corrosive; or
- Water often sits in the household plumbing for several hours.

The City collected extensive lead and copper tap samples in 2015. The lead levels in all of the most recent samples were below the AL. The City will continue to monitor the water quality parameters that relate to corrosivity, such as pH, hardness, alkalinity and total dissolved solids, and will take action if necessary to maintain the water system in an optimized corrosion control condition.

PCE and TCE – The BATs for removing PCE in water are granular activated carbon (GAC) and packed tower aeration (PTA), which can also remove TCE. PCE and TCE were detected above their respective PHGs in the local groundwater and treated water from the City's Spray Aeration Treatment System. The City is in compliance with the MCL for PCE and TCE. The estimated cost to treat PCE in the local groundwater to below the PHG of 0.06 µg/ using PTA (and consequently TCE to below the PHG level) was calculated. Because the DLR for PCE is 0.5 µg/l, treating PCE to below the PHG level means treating PCE to below the DLR of 0.5 µg/l. There are numerous factors that may influence the actual cost of treating PCE levels to the PHG. Achieving the water quality goal for PCE using PTA could range from $506,000 to $1,340,000 per year, or between $35.60 and $94.10 per household per year.

All Contaminants – In addition, a cost estimate to treat all water produced by the City using PTA and reverse osmosis to remove all the contaminants detected above the PHGs or MCLGs was calculated. All the contaminants listed in the attached table may be removed to non-detectable levels by PTA and reverse osmosis, except total coliform bacteria and lead. As shown on the attached table, achieving the water quality goals for all contaminants, except total coliform bacteria and lead, using PTA and reverse

osmosis could range from $2,510,000 to $18,400,000 per year, or between $177 and $1,290 per service connection per year.

For additional information, please contact Mr. Chris Castillo at (323) 563-5790, or write to the City of South Gate, 4244 Santa Ana Street, South Gate, California 90280.

2016 PUBLIC HEALTH GOAL REPORT
CITY OF SOUTH GATE

PARAMETER	UNITS OF MEASUREMENT	PHG OR (MCLG)*	MCL OR (AL)	DLR	CONCENTRATION		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						
MICROBIOLOGICAL												
Total Coliform Bacteria (a)	% samples positive	(0)	5	NA	1.9	NA	NA	NA	NA	D	(b)	(b)
INORGANIC CHEMICALS												
Arsenic	µg/l	0.004	10	2	<2	ND - 3.6	C	1×10^{-6}	2.5×10^{-3}	AA,C/F,E,IE,LS,O/F,RO	$3,600,000 (c)	$253 (c)
Chromium, Hexavalent	µg/l	0.02	10	1	1.1	ND - 9.2	C	1×10^{-6}	5×10^{-4}	R-C/F, IE, RO	$2,070,000 - $8,660,000 (d)	$146 - $609 (d)
Lead (e)	µg/l	0.2	(15)	5	1.7	NA	C, CV, N	$< 1 \times 10^{-6}$	2×10^{-6}	CC	(b)	(b)
ORGANIC CHEMICALS												
Tetrachloroethylene (PCE)	µg/l	0.06	5	0.5	2.8	ND - 9	C	1×10^{-6}	8×10^{-5}	GAC, PTA	$506,000 - $1,340,000 (f)	$35.60 - $94.10 (f)
Trichloroethylene (TCE)	µg/l	1.7	5	0.5	1.2	ND - 5.9	C	1×10^{-6}	3×10^{-6}	GAC, PTA	--	--
RADIOLOGICAL												
Gross Alpha Particle Activity	pCi/l	(0)	15	3	<3	ND - 8.2	C	0	1×10^{-3}	RO	$2,000,000 - $17,100,000 (g)	$141 - $1,200 (g)
Uranium	pCi/l	0.43	20	1	1.8	ND - 3.6	C	1×10^{-6}	5×10^{-5}	IE, C/F, LS, RO	--	--
ALL CONTAMINANTS	--	--	--	--	--	--	--	--	--	PTA and RO	$2,510,000 - $18,400,000 (h)	$177 - $1,290 (h)

* 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 Appplicable 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
< = Value is less than the DLR

TREATMENT/CONTROL TECHNOLOGIES
AA = Activated Aluminum
CC = Corrosion Control
C/F = Coagulation/Filtration
D = Disinfection
E = Electrodialysis
GAC = Granular Activated Carbon
IE = Ion Exchange
LS = Lime Softening
O/F = Oxidation/Filtration
PTA = Packed Tower Aeration
R-C/F = Requires Reduction to Chromium III (Trivalent Chromium) Prior to C/F
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) Cost could not be estimated
(c) Estimated cost to remove arsenic using IE.
(d) Estimated cost to remove hexavalent chromium using IE.
(e) An action level has been established for lead. The action level is exceeded if the 90th percentile concentration in samples collected throughout the distribution system is higher than the action level. The table shows the 90th percentile concentration.
(f) Estimated cost to remove PCE and TCE using PTA.
(g) Estimated cost to remove gross alpha particle activity using RO, which also removes uranium.
(h) Assuming treating the entire production by PTA and RO, which can remove all contaminants listed in the above table to below the detectable levels, except for total coliform and lead, which can be detected anywhere in the distribution system