2013 Public Health Goals Report

City of Santa Barbara Water System

1.0 Introduction

The Calderon-Sher Safe Drinking Water Act of 1996 requires all public water systems in California serving more than 10,000 connections to prepare a report containing information on 1) the detection of any contaminant in drinking water at a level exceeding a Public Health Goal (PHG) 2) the estimated costs to remove detected contaminants to below the PHG using Best Available Technology (BAT), and 3) the health risk associated with each contaminant exceeding a PHG. The report must be updated and made available to the public every three years. City of Santa Barbara Water System's (City of Santa Barbara) prepares a PHG report every three years. The current report is due by July 1, 2013.

This 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 preformed on water samples collected from City of Santa Barbara's water sources during calendar years 2010 to 2012. The report is designed to be as informative as possible, without unnecessary duplication of information contained in City of Santa Barbara's Consumer Confidence Reports, which are mailed to customers by July 1st of each year.

There are no regulations that explain the requirements or methodology for preparing PHG reports. However, 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. City of Santa Barbara followed ACWA's guidelines in the preparation of this report. These guidelines include tables of cost estimates for BAT. The State of California 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 and for any contaminant California is proposing to regulate with a primary drinking water standard. A PHG is the level 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 California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) is the State office responsible for developing PHGs. OEHHA submits the PHG to the California Department of Public Health (CDPH) Division of Drinking Water and Environmental Management for use in revising or developing a Maximum Contaminant Level (MCL) in drinking water. The MCL is the highest level of a contaminant allowed in drinking water. California MCLs cannot be less stringent than federal MCLs and must be as close as is technically and economically feasible to the PHGs. The CDPH 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 Health and Safety Code requires public water systems serving more than 10,000 connections to identify each contaminant detected in its drinking water that exceeded its applicable PHG. Section 116470(f) requires the Maximum Contaminant Level Goal (MCLG), the federal U.S. Environmental Protection Agency (USEPA) equivalent of PHGs, to be used for comparison if there is no applicable PHG.

Four chemical contaminants (selenium, styrene, total chromium and 2,3,7,8-TCDD) and two radiological contaminants (gross alpha particle and gross beta particle) have MCLs but do not yet have designated PHGs. If any of these contaminants have been detected in drinking water, the MCLG is used in this PHG Report.

N-Nitrosodimethylamine (NDMA) has a PHG of 3 nanograms per liter but is 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 zero but are not individually regulated with primary drinking water standards. According to the ACWA guidance and instructions from CDPH, these four chemicals do not have existing MCL's and are not required to be included in this report.

3.0 Identification of Contaminants

City of Santa Barbara's system provides water service through approximately 26,900 service connections. The following contaminants were detected at one or more locations in City of Santa Barbara's water system at levels that exceeded the applicable PHGs or MCLGs.

- **Arsenic** occurs naturally in local surface and groundwater. During 2010 - 2012, arsenic levels in surface water supplied to the City of Santa Barbara system ranged from non-detect to 4.6 micrograms per liter (IJgiL), with an average of 1.3 IJQ/L; and the arsenic levels in groundwater supplied to the City of Santa Barbara system ranged from non-detect to 17.6 j.Jg/L, with an average of 0.5 j.Jg/L. The MCL is 10 IJg/L and the PHG is 0.004 j.Jg/L. The arsenic levels detected in City of Santa Barbara's source waters were below the MCL at all times, except for at

one well on one occasion in August 2010. As a result, the City has monitored its wells on a monthly basis when they are in service, rather than the required monitoring of once every three years to ensure this one data point was an anomaly, rather than a trend. Since August 2010, all the *City's* wells have measure below the MCL for arsenic. .

- **Aluminum** is the most abundant metal in the earth's crust and third most abundant of all elements. Because of the prevalence of aluminum in foods, consumer products, pharmaceuticals and the environment, it is impossible for humans to avoid exposure to aluminum compounds. Aluminum in potable drinking water constitutes a small fraction of the total daily intake (<10 percent). Naturally occurring aluminum compounds have limited solubility in water at neutral pH, but solubility increases markedly with increasing or decreasing pH. Domestic tap water may contain aluminum either naturally or because aluminum has been added as a flocculant in the treatment process. Aluminum levels in the water supplied to the City of Santa Barbara system during 2010-2012 ranged from non-detect to 7.2 milligrams per liter (mg/L). The average aluminum level was 0.03 mg/L. The MCL is 1 mg/L and the PHG is 0.6 mg/L. The aluminum levels detected in City of Santa Barbara's source waters were below the MCL at all times.

- **Total Coliform Bacteria** (total coliforms) are naturally occurring in the environment and can indicate the presence of other pathogenic organisms originating from sewage, livestock or other wildlife. The City of Santa Barbara collects drinking water samples from various locations in its distribution system for total coliforms analysis, and no more than 5.0 percent of the samples collected in a given month may be positive for total coliforms. During 2010 to 2012, the highest monthly percentage of positive total coliforms samples was 1.33 percent. The MCLG for total coliforms is 0.0 percent. The total coliform levels detected in City of Santa Barbara's distribution system were below the MCL at all times.

- **Lead** in drinking water is generally the result of corrosion of residential plumbing. As required by the USEPA Lead and Copper Rule, the City of Santa Barbara tests representative residential taps for lead and copper every three years. If more than 10 percent (90th percentile) of these samples exceed the established Action Level (AL), a water system must provide treatment or inject additives to reduce corrosion in the distribution system. City of Santa Barbara tested for lead and copper in 2012, in accordance with CDPH requirements. Samples did not exceed the AL for neither lead nor copper in more than 10 percent of the samples. The goth percentile for lead was 2.2 lJQ/L, which is below the AL of 15 lJg/L but above the PHG of 0.2 lJQ/L. City of Santa Barbara is in compliance with the Lead and Copper Rule and City of Santa Barbara's water system is considered optimized for corrosion control.

- Gross Alpha Particle Activity (gross alpha) occurs naturally in local groundwater. Gross alpha ranged from non-detect to 5.54 picoCuries per liter (pCi/L) in the drinking water wells supplying the City of Santa Barbara service area in 2010 and 2012. The average gross alpha level in City of Santa Barbara's water supply wells was below the MCL of 15 pCi/L. There is no PHG for gross alpha particle emitters. The MCLG is 0.0 pCi/L. The gross alpha levels detected in City of Santa Barbara's wells were below the MCL at all times, but exceeded the MCLG in 2 wells.

- Uranium occurs naturally in local groundwater. Uranium levels ranged from non-detect to 7.4 pCi/L in the drinking water wells supplying the City of Santa Barbara service area in 2010 and 2012. The average uranium level in City of Santa Barbara water supply wells was 2.0 pCi/L. The MCL is 20 pCi/L and the PHG is 0.43 pCi/L. The uranium levels detected in City of Santa Barbara's source waters were below the MCL at all times, but exceeded the PHG in 2 wells.

The attached chart shows the applicable PHG or MCLG and the applicable MCL or Action Level (AL) for each contaminant listed above. Lead and copper are regulated by an AL, not an MCL, and their presence is measured in samples collected from selected customers' indoor faucets or taps. The AL, 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 goth percentile concentration of lead and copper observed during the most recent round of at-the-tap sampling. The chart includes the maximum, minimum, and average concentrations of arsenic, lead and copper, gross alpha and uranium in the water supplied by City of Santa Barbara during calendar years 2010 through 2012.

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 the Office of Environmental Health Hazard Assessment (OEHHA), associated with each MCL, AL, PHG and MCLG. OEHHA has only quantified numerical risks associated with cancer-causing chemicals. Available numerical health risks developed by OEHHA for the contaminants identified above are shown on the attached chart.

Arsenic – OEHHA has determined that the health risk associated with the PHG is one excess case of cancer per million people and the risk associated with the MCL is 2 excess cases of cancer per 1,000 people, over a 70-year lifetime exposure.

Aluminum – OEHHA has determined that the theoretical health risk associated with the PHG of 0.6 mg/L was determined based on the pharmacologic effect of increased serum Aluminum. The current State MCL for aluminum in drinking water is 1.0 mg/L Aluminum exposure via drinking water has been associated with Alzheimer's disease (AD) and other dementia, although a causal link has not been established and other

factors are likely to be involved in AD. Aluminum is a neurotoxin for humans exposed parenterally, via the oral route in those suffering renal disease, or potentially in neonates receiving formulas with excess aluminum.

Coliform Bacteria – The MCL for coliform is 5% positive samples of all samples per month and the 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 per 1,000 people, over a lifetime exposure to the most potent alpha emitter.

Lead – OEHHA has determined that the theoretical health risk associated with the PHG is three excess cases of cancer per ten million people and the risk associated with the AL is 2 excess cases of cancer per million people over a lifetime exposure. The lead PHG is based on neurobehavioral effects in children and hypertension in adults. OEHHA has not established a numerical health risk for these chronic toxicity effects because PHGs for non-carcinogenic chemicals in drinking water are set at a concentration at which no known or anticipated adverse health risks will occur, with an adequate margin of safety.

Uranium – OEHHA has determined that the health risk associated with the PHG is one excess case of cancer per million people and the risk associated with the MCL is 5 excess cases of cancer per 100,000 people, over a lifetime exposure.

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 the attached chart.

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 on the attached chart.

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) requires a brief description of any actions the water purveyor plans to take to reduce the concentration of the contaminant and the basis for that decision.

Arsenic- The BATs for the removal of arsenic from water for large water systems are: activated alumina, coagulation/filtration, lime softening, ion exchange, and reverse osmosis. Arsenic was detected below the MCL but above the PHG level in groundwater wells owned by City of Santa Barbara. Because the Detection Limit for the purpose of Reporting (DLR) for arsenic is 2 !Jg/1, treating arsenic to below the PHG level means treating arsenic to below the DLR of 2 !Jg/1. There are numerous factors that influence the cost of reducing arsenic levels to the PHG. The estimated cost to reduce arsenic below the PHG of 0.004 !Jg/1 using ion exchange technology is estimated to range from $5,800,000 to $7,100,000 per year, or between $214 and $263 per household per year.

Coliform Bacteria - The MCL for coliform is 5% positive samples of all samples per month. The MCLG is zero. There is no PHG for coliform bacteria. There is no numeric health risk number for the MCLG since the USEPA assumes there is no absolutely safe level of exposure to coliform bacteria. The reason for the coliform drinking water standard is to minimize the possibility of the water containing pathogens which are organisms that cause waterborne disease. Because coliform is only a surrogate indicator of the potential presence of pathogens, it is not possible to state a specific numerical health risk. While USEPA normally sets MCLGs "at a level where no known or anticipated adverse effects on persons would occur", they indicate that they cannot do so with coliforms. Coliform bacteria are an indicator organism that are ubiquitous in nature and are not generally considered harmful. They are used because of the ease in monitoring and analysis. If a positive sample is found, it indicates a potential problem that needs to be investigated and follow up sampling done. It is not at all unusual for a system to have an occasional positive sample. It is difficult, if not impossible, to assure that a system will never get a positive sample.

It is not unusual for a system to have an occasional positive sample which could be the result of a sampling error since the test is very sensitive to air contamination during sampling, preparation, and testing. Therefore, repeat samples are particularly important. All repeat samples that were taken by the City of Santa Barbara after a positive sample result was observed proved negative for the presence of bacteria. Therefore, there is no reasonable action that could be taken with any certainty that could ensure the City of Santa Barbara's water system would have 0% coliform results for every single sample taken.

The City of Santa Barbara adds chlorine at its treatment plant and well production facilities to assure that the water served is microbiologically safe. The chlorine 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 by-product level which is also a regulated parameter. This careful balance of treatment processes is

essential to continue supplying customers with drinking water that meets all regulatory requirements. Other equally important measures that the City of Santa Barbara has in place include: an effective cross-connection control program, maintenance of a disinfectant residual throughout the system, an effective monitoring and surveillance program, and maintaining positive pressures throughout the water system.

The City of Santa Barbara has taken all of the steps described by CDPH as BAT for coliform bacteria. The result is that the City of Santa Barbara has remained well below the CDPH standard for coliform bacteria. Therefore, since the City of Santa Barbara's drinking water remains well below the CDPH standard for coliform bacteria, is using the BAT already, and the sensitive nature of the test, no further action is needed or available to further reduce or eliminate a positive result for coliform bacteria in every sample taken in the water system. Therefore, no change to the current treatment protocol for this contaminant is needed at this time.

Lead - USEPA has determined that the BAT to reduce lead in drinking water is corrosion control optimization. This method is capable of bringing a water system into compliance with the AL. City of Santa Barbara is already in compliance with the lead AL, and meets all state and federal requirements, and is considered by CDPH 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 City of Santa Barbara's source waters. Factors that increase the amount of lead in the water include:

- copper plumbing materials that use lead-based solder;
- homes less than five years old or constructed before 1980;
- water supplied to the home is naturally soft or corrosive; and
- water that sits in the household plumbing for several hours.

City of Santa Barbara collected extensive lead and copper tap samples in 2012. The lead and copper levels in over 90 percent of the samples were below the AL. The City of Santa Barbara 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 its water system in an optimized corrosion control condition.

Gross Alpha and Uranium - The only BAT for the removal of gross alpha radioactivity in water for large water systems is reverse osmosis, which can also remove uranium. Gross alpha and uranium were detected above the MCLG and PHG, respectively, in many of the City of Santa Barbara's wells. Because the DLR for gross alpha is 3 pCi/1, treating gross alpha to 0 means treating to below the DLR of 3 pCi/1. The cost of providing treatment using reverse osmosis to reduce gross alpha levels in groundwater to the MCLG of 0 (and consequently uranium below the PHG) is estimated to range

from $35,400,000 to $55,500,000 per year, or between $1,311 and $2,055 per household per year.

All Contaminants – Reverse osmosis can remove all of the contaminants detected above the PHGs or MCLGs in City of Santa Barbara's wells to non-detect levels except total coliform and lead and copper which can be introduced and detected anywhere in the distribution system or at-the-tap. As shown on the attached table, achieving the water quality goals for all contaminants is estimated to range from $35,400,000 to $55,500,000 per year, or between $1,311 and $2,055 per household per year.

RECOMMENDATIONS FOR FURTHER ACTION

The City of Santa Barbara's drinking water quality meets all CDPH and USEPA drinking water standards set to protect public health. The levels of constituents identified in this report are already significantly below the health-based MCLs established to provide safe drinking water. Further reductions in these levels would require additional costly treatment processes and the ability of these processes to provide significant additional reductions in constituent levels is uncertain. In addition, the health protection benefits of these possible reductions are not at all clear and may not be quantifiable. Therefore, no action is proposed at this time.

For additional information, please contact Louis Chiourn, Laboratory Supervisor, at lchiourn@santabarbaraca.gov or call (805) 568-1004. You may also write to City of Santa Barbara's Water Resources Division at P.O. Box 1990, Santa Barbara, CA 93102-1990.

This report is posted on City of Santa Barbara's website at www.santabarbaraca.gov.

2013 PUBLIC HEALTH GOALS REPORT
CITY OF SANTA BARBARA

CONSTITUENT	UNITS OF MEASUREMENT	MCLorAL	PHGOR (MCLGf*	ConcentraUon		HEALTH RISK CATEGORv<"	Cancer Risk at PHG or MCLc;ll	Cancer Risk at MCL	BEST AVAILABLE TECHNOLOGY	AGGREGATE COST PER YEAR	COST PER HOUSEHOLD PER YEAR
				Value a▮	Ranae						
MICROBIOLOGICAL Total CoiWorm Bacteria [1,,1]	% Mon!Ny Samples **Te5t Positive**	5	101	1.33	–	Bl	NA	NA	D	Jbl	Ibl
LEAD AND COPPER RULE Lead[1 1]	ua/L	AL 15	0.2	2.2	–	C N CT	3X10-a	2X10..	cc	b	b
INORGANIC CHEMICALS SURFACE WATER Arsenic lcl	ua/L	10	0.004	1.3	ND-4.6	C	1 x 10-a	2.5x 10^{4}	AA CIF IE LS RO	$5,800,000 • S7100 000	$214.$263
INORGANIC CHEMICALS GROUNDWATER Arsenic lcl	ua/l	10	0.004	0.5	ND-17.6	C	1 x 10-8	2.5x 10^{4}	AA CIF IE LS RO	$5,800,000 - $7100.000	$214-$263
Aluminum lcl	mail	1	0.6	0.03	ND-0.72	NI	NA	NA	IECIF RO	$5,800,000 - $7100.000	$214-$263
RADIOLOGICAL GROUNDWATER Gross Aloha Particle Activitv ldl	pJ;i/L	15	(0}	1.1	ND-5.54	C	0	1 x 10^{4}	RO	';5-:';C:,-	$1311-$2055
Uranium ldl	p ifL	20	0.43	2.0	ND-7.4	C	1 x 10..	5x 10^{5}	RO	';S C:,-	$1 361-$2 055

l•l The table shows the highesl monthly percentage of positive samples as the detected value. Samples were collected in the distribution system.

lbl The table shows the 90th percentile value of samples collected from household taps.

[1] MCLGs, which are shown in parentheses, are provided only when no applicable PHG exists.

ldl Health risk categories are hazard traits defined by OEHHA for California's Taxies Information Clearinghouse (online at: http://oehha.ca.gov/multimedia/green/pdf/GC_Regtext011912.pdf). For parameters with MCLGs, the health risk categories are based on the U.S. EPA MCLG document or California MCL document.

[1,1] Cancer Risk= Upper estimate of excess cancer risk from lifetime exposure. Actual cancer risk may be lower or zero. 1•10.. means one excess cancer case per million people exposed.

Legend
MCL = Maximum Contaminant Level
AL = Action Level
PHG = Public Health Goal
MCLG = Maximum Contaminant Level Goal
NA = Not Appplicable or Not Available
NO = Not Detected
mg/L = milligrams per liter or part per million
/L = micrograms per liter or parts per billion
pCi/L = picoCuries per liter

HEALTH RISK CATEGORIES
Bl (Bacterial Indicator) = A group of bacteria that indicates the possible presence of disease-i:ausing organisms.
C (Carcinogen)= A substance that is capable of producing cancer.
N (Neurotoxicity)= A substance that harms the nervous system. CT (Cardiovascular Toxicity)= A substance that is capable of causing high blood pressure.
I (Immunotoxicity) =A substance that harms the immune system.

TREATMENT/CONTROL TECHNOLOGIES
AA = Activaled Aluminum
CIF = Coagulation/Ritration
CC = Corrosion Control Optimization
D = Disinfection
IE = ion Exchange LS = Ume Softening RO = Reverse Osmosis

Notes
[a] The value samples are the highest monthly percentage of postive samples collected in the distribution system
[b] Cost could not be estimated.
[c] Estimated cost of treatment using ion exchange.
[d] Estimated cost to remove gross alpha particle ativity using reserve osmosis, which also removes combined radium and urnaiium.