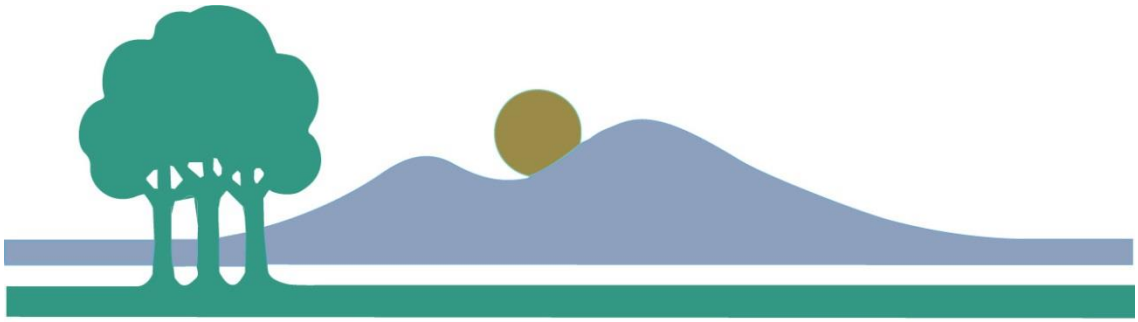

CITY OF MOUNTAIN VIEW

City of Mountain View
Water System No. 4310007

2016 Public Health Goals Report for Calendar Years 2013—2015

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1. INTRODUCTION

Section 116470 of the California Health and Safety Code (Attachment 1) specifies that on or before July 1, 1998, and every three years thereafter, public water systems serving more than 10,000 service connections shall prepare a report to inform the public of any California Public Health Goal (PHG) exceedance that occurred within the prior three years. During the most recent three-year period (2012-2015), the City had exceedances for lead in one household service connection, and hexavalent chromium exceedances in groundwater supply wells and two potable water sources. Per the Health and Safety Code, the City is required to prepare a report regarding these exceedances by July 1, 2016. This is the first PHG report issued by the City of Mountain View.

2. BACKGROUND

Public Health Goals and Maximum Contaminant Levels

The City is required to test its water to meet numerous Federal and State standards. These standards include Maximum Contaminant Levels (MCLs) and PHGs.

A PHG is a nonenforceable goal established by the California Office of Environmental Health Hazard Assessment (OEHHA) and is the level of a contaminant at which adverse health effects are not expected to occur from a lifetime of exposure. PHGs are not regulatory standards. State law requires the State Water Resources Control Board (SWRCB) to set drinking water standards for chemical contaminants as close to the corresponding PHG as is economically and technologically feasible. In some cases, it may not be feasible for SWRCB to set the drinking water standard for a contaminant at the same level as the PHG. The technology to treat the chemicals may not be available, or the cost of treatment may be very high. The SWRCB must consider these factors when developing a drinking water standard.

An MCL is a regulation to be met by public water systems which specifies the maximum allowable content of a contaminant in drinking water. MCLs take into account not only chemicals' health risks but also factors such as their detectability and treatability, as well as costs of treatment. Health and Safety Code Section 116365(a) requires a contaminant's MCL to be established at a level as close to its PHG as is technologically and economically feasible, placing primary emphasis on the protection of public health.

The process for establishing a PHG for a chemical contaminant in drinking water is very rigorous. OEHHA scientists first compile all relevant scientific information

available, which includes studies of the chemical's effects on laboratory animals and studies of humans who have been exposed to the chemical. The scientists use data from these studies to perform a health risk assessment in which they determine the levels of the contaminant in drinking water that could be associated with various adverse health effects. When calculating a PHG, OEHHA uses all the information it has compiled to identify the level of the chemical in drinking water that would not cause significant adverse health effects in people who drink that water every day for 70 years. OEHHA must also consider any evidence of immediate and severe health effects when setting the PHG.

For cancer-causing chemicals, OEHHA typically establishes the PHG at the "one-in-one million" risk level. At that level, not more than one person in a population of one million people drinking the water daily for 70 years would be expected to develop cancer as a result of exposure to that chemical.

The California Health and Safety Code states that if a contaminant was detected by a water supplier between 2012 and 2015 at a level exceeding an applicable PHG, the PHG report must by law include the following information:

- The identification of each contaminant detected in drinking water that exceeds the applicable PHG during the last three years.

- The MCL and PHG as determined by OEHHA for each contaminant identified.

- The category or type of risk to health that could be associated with each contaminant identified.

- The Best Available Technologies (BATs) commercially available, if any, that could be used to reduce the contaminant level.

- An estimate of the cost to utilize that treatment if it is appropriate and feasible.

- A description of the action, if any, public water systems intend to take to reduce the concentration of the contaminant.

The California Health and Safety Code further specifies that a public hearing is to be held for the purpose of accepting and responding to public comment on the report. The hearing can be part of any regularly scheduled meeting.

Water Quality Data Reviewed for this Report

The City reviewed water quality data for 2013, 2014, and 2015 for the purpose of determining compliance with PHGs. This data was summarized in the City's 2013, 2014, and 2015 Annual Water Quality Reports (also known as Consumer Confidence Reports (CCRs)). In 2013, CCRs were distributed to all of City of Mountain View customers through direct mail. In 2014 and 2015, an informational postcard was distributed through direct mail describing how to review the report online and how to request a hard copy of the report.

Guidelines Followed for Preparation of this Report

The Association of California Water Agencies (ACWA) formed a workgroup which prepared guidelines for water utilities to use in preparing these required reports. In March 2016, ACWA released updated guidelines that were used in the preparation of this report.

3. CONTAMINANT LEVELS THAT EXCEEDED PHGs OR MCLs

Hexavalent chromium (also known as chromium 6) and lead exceeded PHGs and are therefore subject to reporting by the City. Additional details regarding each contaminant are provided below.

Hexavalent Chromium

Regulations: Public Health Goal—Hexavalent Chromium

Chromium is a naturally occurring inorganic element that is also used in many industrial processes. For decades, both the U.S. Environmental Protection Agency (EPA) and SWRCB have enforced limits for total chromium, which includes trivalent, hexavalent, and other forms of the element. In 2011, the OEHHA established a PHG for hexavalent chromium of 0.02 PPB, and in 2014 published the first enforceable hexavalent chromium standard in the nation: a State MCL of 10 PPB. The PHG is one five-hundredth (0.02 percent) of the MCL. There is no Federal MCL for hexavalent chromium.

The EPA required testing for hexavalent chromium in drinking water through the Unregulated Contaminant Rule Monitoring Rule 3 (UCMR 3), which required public water systems serving over 10,000 people to monitor hexavalent chromium for one year between 2013 and 2015. The EPA is also working to issue its final human health risk assessment for hexavalent chromium, which may lead to the adoption of Federal standards for hexavalent chromium.

Health Effects

Hexavalent chromium is a soluble form of chromium and enters water from sources such as electroplating factories, leather tanneries, and textile manufacturing facilities. Hexavalent chromium is also naturally occurring and can enter groundwater from geologic formations that contain chromium. Hexavalent chromium has been known to cause cancer when inhaled and has also been linked to cancer when ingested.

The OEHHA characterizes hexavalent chromium as a carcinogen, and calculated the PHG based on the carcinogenic risk. Noncarcinogenic risks have also been associated with inhalation and/or oral ingestion of hexavalent chromium, including reproductive toxicity (developmental, male reproductive, and female reproductive toxicity), liver toxicity (mild chronic inflammation, fatty changes), and toxicity of blood-forming tissues.

Contaminant Levels

The PHG for hexavalent chromium is 0.02 parts per billion (PPB). The test results for hexavalent chromium in the City's three water sources are shown below:

- Hexavalent chromium levels exceeded the PHG at four potable groundwater wells, with measurements of 0.84 to 1.6 PPB.

- Hexavalent chromium levels in water supplied by the San Francisco Public Utilities Commission (SFPUC) measured up to 0.12 PPB.

- Hexavalent chromium levels in water supplied by the Santa Clara Valley Water District (SCVWD) measured up to 0.12 PPB.

- Water in the City's distribution system, which is a mixture of water from the City's wells and water from the SFPUC or the SCVWD, measured up to 0.29 PPB.

Source	Years Sampled	Units	Results	MCL	PHG
Groundwater Wells	2014	PPB	0.84 - 1.6	10	**0.02**
SCVWD	2013-15	PPB	ND - 0.12	10	**0.02**
SFPUC	2013-15	PPB	ND - 0.12	10	**0.02**
Distribution System	2014	PPB	0.04 - 0.29	10	**0.02**

Best Available Technologies

Both the EPA and SWRCB identify BATs which are the best known methods of reducing contaminant levels below the MCL.

While a BAT may identify a process that can reduce the presence of a contaminant, there may not be commercially available technologies to reach that level. Treatment is further complicated because it is often not possible to verify by analytical means that the contaminant has been totally eliminated. In some cases, installing a treatment technology to attempt to reduce very low levels of one contaminant may, in turn, have adverse effects on other aspects of water quality.

Although there are several approved BATs for hexavalent chromium, there is limited information available about their treatment performance and costs applicable to large drinking water systems comparable to Mountain View.

Costs of Implementation

The effectiveness of BATs varies depending on several factors such as the initial hexavalent chromium concentration and the pH of the water. The majority of BATs are effective with low-pH water, which limits treatment options available to the City.

The SFPUC developed a high-level estimate of the cost of anion exchange treatment to meet the PHG. The 20-year total cost (capital, operations, and maintenance) to treat all water is $835 million, which would raise the City's cost of water by an estimated 148 percent. The SCVWD is not a water retailer and is not required to develop an estimate for treatment costs.

The cost estimates for treatment at City facilities were developed using the estimated SFPUC costs and cost factors from ACWA to provide a perspective on the scale of potential costs of meeting PHGs. The estimated cost to construct, operate, and maintain the facilities for a 20-year period at the City's SFPUC supply sites is approximately $53.0 million, and the cost for the City's SCVWD supply is approximately $8.0 million. Treatment facilities for the SFPUC and SCVWD sites would likely be too large to fit on the current location of the City's connections. The costs for treatment sites are not included in the above estimates. The estimated cost to construct, operate, and maintain the facilities for a 20-year period at the City's well sites is approximately $24.0 million. However, because the City operates five well sites (four currently in service and one out-of-service well), it is likely the costs would be higher as treatment facilities would be required at multiple sites. Implementation of treatment to remove hexavalent chromium

would increase the cost of water by approximately $14 per month for a typical single-family residential customer.

Additional costs may include, but are not limited to, the following:

- Construction, operation, and evaluation of a pilot plant to determine the feasibility and design parameters of the selected treatment technology.

- Pretreatment to reduce pH to a level appropriate for the treatment technology.

- Pretreatment to ensure no additional chemicals and/or contaminants are added or released into treated effluent.

- Post treatment to raise pH back to the level appropriate for corrosion control.

- Excess capacity for redundancy.

- Land acquisition, permitting, environmental mitigations, and O&M costs associated with items above. It should be noted that anion exchange has only been tested using water with a much higher influent concentration (10 to 70 PPB) than that in Mountain View (1 PPB). Lower influent concentrations might affect O&M costs, depending on the performance of the anion exchange resin.

Next Steps

The City of Mountain View will continue to monitor and protect water sources as required by State and Federal regulations. The California MCL for hexavalent chromium in drinking water is 10 PPB and the level of hexavalent chromium in all of the City's individual water sources is significantly below the State's MCL. The water supplied through the distribution system is a mixture of treated water and groundwater; hexavalent chromium levels in the distribution system were measured at maximum of 0.29 PPB (less than 3 percent of the MCL).

Because the City's water meets all quality requirements, and due to the high cost and uncertain success of treatment to meet the PHG, the City does not intend to implement additional treatment to reduce hexavalent chromium levels.

Lead

Regulations: Public Health Goal—Lead

In 1991, the EPA published regulations to control lead and copper in drinking water, requiring water systems to conduct tap water testing in single-family residences that installed copper pipe with lead solder after 1982 (it is believed that the corrosion may have stabilized in pipes of older structures built in 1982 or before, while newer pipes may continue to leach lead and copper for some time). The EPA and SWRCB have an action level of 15 PPB of lead in drinking water, which requires the water system operator to undertake additional actions to control corrosion and inform the public regarding steps they should take to protect their health if more than 10 percent of homes tested have lead levels higher than 15 PPB. The California OEHHA reduced the PHG for lead in drinking water from 2 PPB to 0.2 PPB in 2009 based on new studies regarding the potential carcinogenicity and neurotoxicity of lead, and neurobehavioral deficits to lower blood lead concentrations than previously reported.

The City tests lead levels at 30 to 40 residences every three years as required by the SWRCB. Lead is leached from pipes and fixtures containing lead within consumer's homes. The corrosion of household plumbing systems, such as those containing lead-based solder used to join copper pipe, brass, and chrome-plated brass faucets, lead pipe connections from homes to the water main, brass/bronze water meters, and brass/bronze valves, can all contribute to lead leaching. Samples are taken from homes that are considered to be the highest risk locations. Lead levels at these locations may be higher than others because of the plumbing material used when these homes were built.

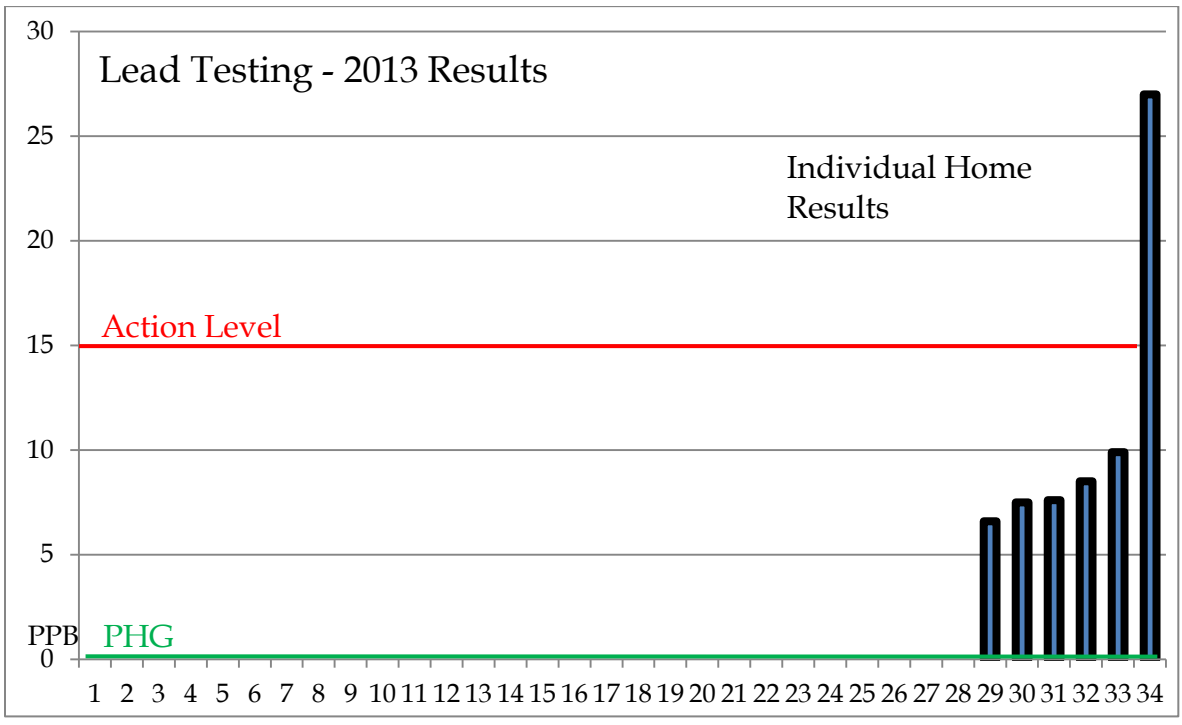
The Safe Drinking Water Act (originally passed in 1974) established the definition for "lead-free" pipes, pipe fittings, plumbing fittings, fixtures, solder, and flux. The Act prohibits the "use of any pipe, any pipe or plumbing fitting or fixture, any solder, or any flux, after June 1986, in the installation or repair of: (i) any public water system; or (ii) any plumbing in a residential or nonresidential facility providing water for human consumption, that is not lead-free." The Act also includes several exemptions from the lead-free requirements, specifically for plumbing devices that are used exclusively for nonpotable services, as well as a list of specific products: toilets, bidets, urinals, fill valves, flushometer valves, fire hydrants, tub fillers, shower valves, service saddles, or water distribution main gate valves that are 2" in diameter or larger.

Health Effects

Lead is a metallic element which has been used primarily in piping, paints, cable coverings, bullets, radiation shielding material, and as a gasoline additive. Lead is a widespread contaminant and occurs in drinking water primarily as a consequence of leaching from plumbing containing lead, and has multiple toxic effects on the human body. In particular, decreased intelligence in children and increased blood pressure in adults are among the more serious noncarcinogenic effects. Lead is also a carcinogen in animals and a probable carcinogen in humans, and has the potential to cause kidney disease and cancer; however, the carcinogenic risks are considered smaller than the risks for chronic toxicity.

Contaminant Levels

Tests completed in Mountain View in 2013 showed that lead levels exceeded the PHG of 0.2 PPB at six residences of 34 tested, ranging from 7 PPB to 27 PPB. Lead was detected at one home at a level exceeding the PHG. Results from the lead and copper sampling represent the worst case conditions for lead levels in the distribution system. These samples are collected under a first-draw condition; which means that water must sit in the customer's piping for 6 hours before it is collected. During the 2013 testing only 3 percent of the samples exceeded 15 PPB of lead. Because the action level for lead is 10 percent of samples exceeding 15 PPB, no further action by the City is required. The results of lead testing are shown below.



Most of the samples collected during the lead and copper sampling tested below the PHG for lead. The probable reason for the difference in lead concentration at the individual residences can be attributed to the plumbing components

Best Available Technologies

The SWRCB considers optimizing corrosion control as the best available treatment for reducing lead in drinking water, recommending a minimum pH of 8.2 be maintained throughout the distribution system.

From 2013-2015 the pH of the water supplied by the SFPUC averaged 8.9. Water supplied by the SFPUC exceeds minimum pH levels, so no additional treatment would be recommended.

The pH of the water supplied by the SCVWD averaged 7.7. The District treats their water with zinc orthophosphate to optimize corrosion control, and is considered to be compliant with BATs. Per the SCVWD, the District's program is effective for the following reasons:

- Elevated lead is seldom found in natural sources of drinking water. Lead and other metals are naturally present at low levels in groundwater due to the erosion of natural deposits.

- For the treated surface water provided by the District, regular testing of the finished water leaving our three drinking water treatment plants indicates nondetectable levels of lead.

- The District has a corrosion control program that has been working effectively for decades. The District adds a corrosion inhibitor and adjusts pH at their drinking water treatment plants to prevent pipes and plumbing systems from corroding and leaching lead (or copper) into the drinking water.

- The District's corrosion control program is approved by the California SWRCB's Division of Drinking Water.

- The District's treatment plants continuously monitor the corrosion inhibitor dosing and the pH balance of water as well as other important parameters 24/7.

- The District's state-of-the art, ISO-certified laboratory is nationally recognized as a leader in water quality analysis and holds one of the highest levels of

certification available from the SWRCB—Division of Drinking Water. The laboratory tests and quantifies the quality of Santa Clara County's drinking water treated by the Water District, testing approximately 170,000 samples per year for over 353 regulated and unregulated contaminants, including lead.

The pH of water produced from City wells ranged from 7.5 to 7.8. Although water from the wells could be treated to increase pH to optimal levels, well production typically accounts for an average of 2 percent to 4 percent of the City's annual water supply, and increasing the pH of well water would likely have a minimal effect on systemwide pH levels. The City would analyze the impact of increasing the pH of well water prior to initiating treatment to ensure the effectiveness of this strategy.

Consumer Actions to Reduce Lead Exposure

Following are steps consumers can take to reduce exposure to lead:

- Have household water tested for lead.

- Find out whether household pipes contain lead or lead solder.

- Run household water for 15 to 30 seconds or until it becomes cold before using it for drinking or cooking; this flushes any standing lead from the pipes.

- Avoid cooking with or drinking water from the hot water tap; lead dissolves more easily into hot water.

- Avoid boiling water to remove lead; excessive boiling of water makes lead more concentrated—the lead remains when the water evaporates.

Costs of Implementation

To implement BATs for water produced from City wells, the City would likely need to install chemical injection facilities at each well site to ensure pH remained at optimal levels. The estimated costs to construct, operate, and maintain the facilities for a 20-year period at the City's well sites is approximately $7.0 million. Implementation of treatment to reduce lead would increase the cost of water by approximately $1 per month for a typical single family residential customer.

Next Steps

Because the results of the City's lead testing are below action levels, and due to the high cost and uncertain success of treatment to meet the PHG, the City does not intend to implement additional treatment to reduce lead levels.

4. CONCLUSION

The drinking water for the City of Mountain View meets all standards established by SWRCB and U.S. EPA. No additional treatment is recommended at this time to lower the levels of lead and hexavalent chromium. There are no clear benefits to be derived from expensive efforts to further reduce the levels of this contaminant for it is well below the level of concern and elimination may be impossible. Therefore, no further action is proposed for lead and hexavalent chromium.

Additional information on the OEHHA PHGs can be found at:

Hexavalent Chromium PHG:
oehha.ca.gov/media/downloads/water/public-health-goal/cr6phg072911.pdf

Lead PHG:
oehha.ca.gov/media/downloads/water/chemicals/phg/leadfinalphg042409_0.pdf

2013 City of Mountain View Consumer Confidence Report:
mountainview.gov/civicax/filebank/blobdload.aspx?BlobID=13381

2014 City of Mountain View Consumer Confidence Report:
http://www.mountainview.gov/civicax/filebank/blobdload.aspx?BlobID=16625

2015 City of Mountain View Consumer Confidence Report:
http://www.mountainview.gov/civicax/filebank/blobdload.aspx?BlobID=19721

Attachment: 1. Health and Safety Code: Section 116470