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2017 Water Quality Report

NASA Ames Research Center, Moffett Field, California

July 2018

Ames Environmental Management Division Fact Sheet

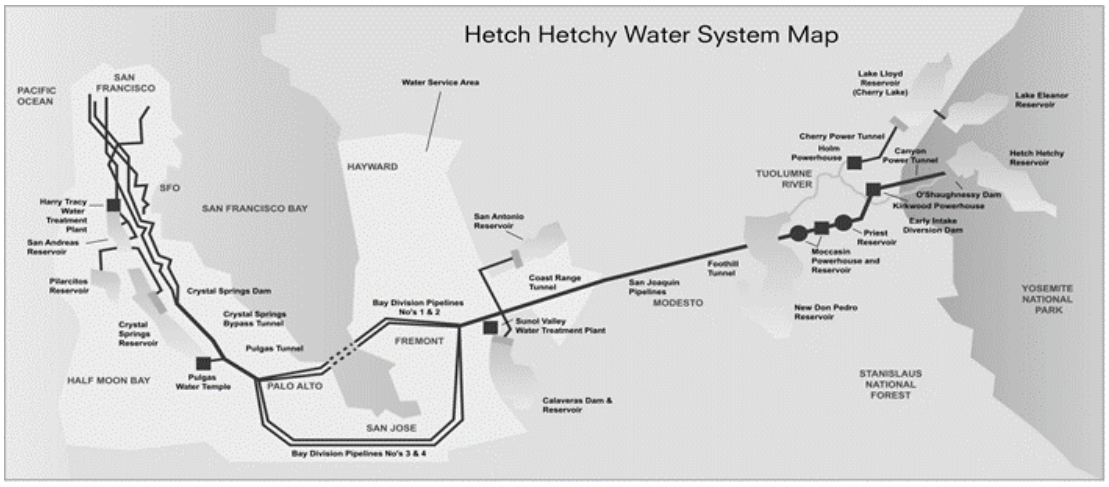
OUR DRINKING WATER QUALITY AND SOURCE

Federal and State law requires that NASA Ames Research Center make this report every year by July 1st for the previous calendar year concerning the sources and quality of the water provided to our customers by our drinking water distribution system.

This report contains important information about your drinking water. Translate it or speak with someone who understands it. For assistance in Spanish contact Arturo Gonzalez at (650) 604-1523

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo o hable con alguien que lo entienda bien. Para la ayuda en español entre en contacto con a Arturo Gonzalez en (650) 604-1523.

For calendar year 2017, the water provided by the distribution system for NASA Ames Research Center (which includes Moffett Field) was monitored and analyzed by both the supplier and NASA Ames in accordance with Federal and State regulations. This report presents the results of those analyses with the details shown on the table on the last page. Most of the data in this table is provided to us by our supplier and the NASA Ames monitoring results are shown in the shaded regions.



Supplied by the San Francisco Regional Water System (SFRWS), which is owned and operated by the San Francisco Public Utilities Commission (SFPUC), our major water source originates from spring snowmelt flowing down the Tuolumne River to storage in Hetch Hetchy Reservoir. The well protected Sierra water source is exempt from filtration requirements by the United States Environmental Protection Agency (USEPA) and State Water Resources Control Board's Division of Drinking Water (SWRCB-DDW). To meet the appropriate drinking water standards for consumption, water from Hetch Hetchy Reservoir is treated by the SFPUC using the following processes: ultraviolet light and chlorine disinfection, pH adjustment for optimal corrosion control, fluoridation for dental health protection, and chloramination for maintaining disinfectant residual and minimizing the formation of disinfection byproducts.

Hetch Hetchy water is supplemented with surface water from two local watersheds. Rainfall and runoff from the 35,000-acre Alameda Watershed in Alameda and Santa Clara counties are collected in the Calaveras and San Antonio reservoirs, and delivered to the Sunol Valley Water Treatment Plant (SVWTP). Rainfall and runoff from the 23,000-acre Peninsula Watershed in San Mateo County are stored in the Crystal Springs, San Andreas and

Pilarcitos reservoirs, and are delivered to the Harry Tracy Water Treatment Plant. In addition to these local sources, the SWRCB-DDW approved the SFPUC to use the surface water in Lake Eleanor, Lake Cherry and the associated creeks all conveyed via the Lower Cherry Aqueduct, Early Intake Reservoir and Tuolumne River (collectively known as Upcountry Non-Hetch Hetchy Sources, or UNHHS) as additional drinking water sources to the SFRWS. The UNHHS water, if used, will be treated at the SVWTP prior to service to customers. In 2017, the SFRWS did not use UNHHS. Water at the two local treatment plants is subject to filtration, disinfection, fluoridation, and pH adjustment for corrosion control optimization.

PROTECTING OUR WATERSHEDS

The SFPUC conducts watershed sanitary surveys for the Hetch Hetchy source annually and local water sources every five years. The latest local sanitary survey was completed in 2016 for the period of 2011-2015. The SFPUC conducted a watershed sanitary survey for UNHHS in 2015 as part of its drought response plan efforts. These surveys evaluate the sanitary conditions, water quality, potential contamination sources and the results of watershed management activities, and were completed with support from partner agencies including National Park Service and US Forest Service.

These surveys identified wildlife, stock, and human activities as potential contamination sources. You may contact the San Francisco District office of SWRCB-DDW at (510) 620-3474 for the review of these reports.

DRINKING WATER AND LEAD

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Infants and young children are typically more vulnerable to lead in drinking water than the general population. You can minimize the potential for lead exposure, when your water has been sitting for several hours, by flushing your tap for 30 seconds to 2 minutes (or until the water temperature has changed) before using water for drinking or cooking. If you are concerned about lead levels in your water, you may wish to have your water tested. Additional information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the USEPA's Safe Drinking Water Hotline (800) 426-4791, or at www.epa.gov/lead.

Ames conducts lead and copper surveys every three years. The last survey was conducted in 2017. The majority of the water distribution system at the former NAS Moffett Field or NASA Research Park (NRP) is cast iron pipe (CIP) with lead joints and was constructed in the 1940’s and 1950’s. Additional portions of the system were added as the site expanded. Tap sampling locations were selected from Tier 2 sample criteria based on Section 64676, Title 22 of California Code of Regulations (CCR §64676).

Determination of the level of exceedance for lead and copper was based on CCR §64678. A total of 20 samples were collected and analyzed for exceedance in more than 10 percent of the samples (90^{th} percentile). Based upon the results of the sampling data, Ames did not exceed the action levels for the 90^{th} percentiles for lead or copper. However, two sampling locations were above the action level for lead concentration. As many of the samples were collected early Monday and Tuesday morning, long stand time from the weekend was suspected to be the main contributor to the higher lead concentrations at the taps. This suspicion was confirmed with supplementary sampling conducted towards the end of the week where concentrations were found to be lower than the initial test. Furthermore, even lower concentrations were observed after flushing for 2 minutes. As flushing remains to be an effective means of lowering consumer exposure to lead, building occupants will continue to be briefed on the importance of periodically flushing the taps when preceded by long durations of decreased usage. Continued monitoring for lead and copper will take place triennially as required with our next sampling event planned for September 2020.

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National Aeronautics and Space Administration

FREQUENTLY ASKED QUESTIONS

Why is my water yellow or brown?

The most common reason for discolored water is the plumbing. When water is not circulated regularly (unused over weekends), it can pick up color from the pipes. Distribution mains can also accumulate small amounts of sediment that settles out. When the Center opens hydrants this sediment can become re-suspended. Let the water run a few minutes to clear the discoloration.

Why does my water sometimes look cloudy?

Tiny air bubbles that can cause cloudy water often originates when water is pumped during distribution. The cloudy appearance should clear when the water is allowed to stand for a few minutes.

Why tap vs. bottled?

On February 28, 2005 the bottled water service was canceled, since our tap water meets Federal and State health standards. Therefore, the Center cannot expend public funds for bottled water.

What should I consider before buying bottled water?

Consider why you are buying bottled water. Many people choose bottled water because of its taste. One of the key taste differences between tap water and bottled water is based on the disinfection method. Tap water can be disinfected with chlorine, chloramine, ozone, or ultraviolet light. Generally, bottlers prefer ozone because it does not leave a taste. Bottled water is not necessarily safer than tap water and costs hundreds of times more than tap water on a per gallon basis. Consumers who choose to purchase bottled water should carefully read its label to understand what they are buying, whether it is a better taste, or a certain method of treatment.

Drinking tap water is a sustainable choice. Bottled water manufacturing processes use oil, release carbon dioxide emissions, and use fuel for transportation and delivery.

WATER QUALITY

The SFPUC's Water Quality Division (WQD) regularly collects and tests water samples from reservoirs and designated sampling points throughout the system to ensure the water delivered to you meets or exceeds federal and state drinking water standards. In 2017, WQD staff conducted more than 55,273 drinking water tests in the transmission and distribution systems. This is in addition to the extensive treatment process control monitoring performed by the SFPUC's certified operators and online instruments. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. In order to ensure that tap water is safe to drink, the USEPA and SWRCB-DDW prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulations and California law also establish limits for contaminants in bottled water that provide the same protection for public health.

FLUORIDATION AND DENTAL FLUROSIS

Mandated by State law, water fluoridation is a widely accepted practice proven to be safe and effective for preventing and controlling tooth decay. The SFPUC's fluoride target level in the water is 0.7 milligram per liter (mg/L, or part per million, ppm), consistent with the May 2015 State regulatory guidance on optimal fluoride level. Infants fed formula mixed with water containing fluoride at this level may still have a chance of developing tiny white lines or streaks in their teeth. These marks are referred to as mild to very mild fluorosis, and are often only visible under a microscope. Even in cases where the marks are visible, they do not pose any health risk. The Centers for Disease Control (CDC) considers it safe to use optimally fluoridated water for preparing infant formula. To lessen this chance of dental fluorosis, you may choose to use low-fluoride bottled water to prepare infant formula. Nevertheless, children may still develop dental fluorosis due to fluoride intake from other sources such as food, toothpaste and dental products. Contact your health provider or SWRCB-DDW if you have concerns about dental fluorosis. For additional information about fluoridation or oral health, visit the CDC website www.cdc.gov/fluoridation or SWRCB-DDW website www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Fluoridation.shtml.

SPECIAL HEALTH NEEDS

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as those with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly people and infants, can be particularly at risk from infections.

These people should seek advice about drinking water from their health care providers. USEPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the USEPA's Safe Drinking Water Hotline (800) 426-4791 or at www.epa.gov/safewater.

SOURCES OF WATER AND CONTAMINANTS

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include: microbial contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife; inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming; pesticides and herbicides, that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses; organic chemical contaminants, including synthetic and volatile organic chemicals, that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems; radioactive contaminants, that can be naturally-occurring or be the result of oil and gas production and mining activities.

BORON DETECTION ABOVE NOTIFICATION LEVEL IN SOURCE WATER

In 2017, boron was detected at a level of 1.74 ppm in the raw water stored in one of SFRWS's approved sources, Pond F3 East, in Alameda Watershed. Although the detected value is above the California Notification Level of 1 ppm for source water, the corresponding treated water boron level from the SVWTP was only 0.2 ppm.

Cryptosporidium is a parasitic microbe found in most surface water. The SFPUC regularly tests for this waterborne pathogen, and found it at very low levels in source water and treated water in 2017. However, current test methods approved by the USEPA do not distinguish between dead organisms and those capable of causing disease. Ingestion of *Cryptosporidium* may produce symptoms of nausea, abdominal cramps, diarrhea, and associated headaches. *Cryptosporidium* must be ingested to cause disease, and it may be spread through means other than drinking water.

KEY WATER QUALITY TERMS

The following are definitions of key terms referring to standards and goals of water quality noted on the data table.

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency. PHG and Maximum Contaminant Level Goal (MCLG) essentially mean the same thing, the first being a California definition and the second a USEPA definition.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the USEPA.

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs or MCLGs as is economically and technologically feasible. Secondary MCLs (SMCLs) are set to protect the odor, taste, and appearance of drinking water.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Primary Drinking Water Standard (PDWS): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements and water treatment requirements.

Regulatory Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

Secondary Drinking Water Standard (SDWS): MCLs for contaminants that may adversely affect the taste, odor, or appearance of drinking water. These are aesthetic considerations that are not considered as health concerns.

Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

Turbidity: A water clarity indicator that measures cloudiness of the water and is also used to indicate the effectiveness of the filtration system. High turbidity can hinder the effectiveness of disinfectants.

YOUR VIEWS ARE WELCOME

If you have any questions, please let us know. Technical staff investigate drinking water complaints.

REQUIREMENTS

The Center ensures that a clean, constant supply of drinking water is provided by testing the water, maintaining the distribution systems, and reporting on the water quality.

FOR QUESTIONS ABOUT:

Water Quality, contact Garrett Turner at (650) 604-1406, garrett.turner@nasa.gov or Tony Zhang at (650) 604-0296, tony.zhang@nasa.gov

Maintenance, contact the Ames Trouble Desk at (650) 604-5212

Health & Safety, contact your representative.

2017 Water Quality Report

National Aeronautics and Space Administration

(Data based on Hetch Hetchy water and effluents from both SVWTP and HTWTP)

NASA Ames Research Center - Water Quality Data for Year 2017 (1)

DETECTED CONTAMINANTS	Unit	MCL	PHG or (MCLG)	Range or Level Found	Average or [Max]	Major Sources in Drinking Water
TURBIDITY						
Unfiltered Hetch Hetchy Water	NTU	5	N/A	0.3- 1.1 (2)	[2.7]	Soil runoff
Filtered Water from Sunol Valley Water Treatment Plant (SVWTP)	NTU	1 (3)	N/A	-	[1]	Soil runoff
	-	Min 95% of samples ≤ 0.3 NTU (3)	N/A	99% - 100%	-	Soil runoff
Filtered Water from Harry Tracy Water Treatment Plant (HTWTP)	NTU	1 (3)	N/A	-	[0.1]	Soil runoff
	-	Min 95% of samples ≤ 0.3 NTU (3)	N/A	100%	-	Soil runoff
DISINFECTION BYPRODUCTS AND PRECURSOR						
Total Trihalomethanes	ppb	80	N/A	**29.0-65.0**	**[60.8]** (4)	Byproduct of drinking water disinfection
Haloacetic Acids	ppb	60	N/A	**4.0-54.0**	**[43.5]** (4)	Byproduct of drinking water disinfection
Total Organic Carbon (5)	ppm	TT	N/A	1.6 - 5.3	2.4	Various natural and man-made sources
MICROBIOLOGICAL						
Total Coliform (6)	-	NoP ≤ 5.0% of monthly samples	(0)	**ND**	**0**	Naturally present in the environment
Giardia lamblia	cyst/L	TT	(0)	0 - 0.22	0.05	Naturally present in the environment
INORGANICS						
Fluoride (source water) (7)	ppm	2.0	1	ND - 0.6	0.2 (8)	Erosion of natural deposits; water additive to promote strong teeth
Chloramine (as chlorine)	ppm	MRDL = 4.0	MRDLG = 4	**0.99-2.07**	**[1.59]** (9)	Drinking water disinfectant added for treatment

CONSTITUENTS WITH SECONDARY STANDARDS	Unit	SMCL	PHG	Range	Average	Major Sources of Contaminant
Aluminum (10)	ppb	200	600	ND - 99	ND	Erosion of natural deposits; some surface water treatment residue
Chloride	ppm	500	N/A	<3 - 17	9.0	Runoff / leaching from natural deposits
Color	unit	15	N/A	<5 -13	<5	Naturally-occurring organic materials
Specific Conductance	µS/cm	1600	N/A	29 - 256	168	Substances that form ions when in water
Sulfate	ppm	500	N/A	0.9 - 34	17	Runoff / leaching from natural deposits
Total Dissolved Solids	ppm	1000	N/A	<20 - 122	76	Runoff / leaching from natural deposits
Turbidity	NTU	5	N/A	0.1 - 1	0.4	Soil runoff

LEAD AND COPPER	Unit	AL	PHG	Range	90th Percentile	Major Sources in Drinking Water
Copper	ppb	1300	300	**21-180** (11)	**100**	Internal corrosion of household water plumbing systems
Lead	ppb	15	0.2	**0.46-25** (12)	**15**	Internal corrosion of household water plumbing systems

OTHER WATER QUALITY PARAMETERS	Unit	ORL	Range	Average
Alkalinity (as $CaCO_3$)	ppm	N/A	6 - 131	52
Boron	ppb	1000 (NL)	ND - 203	ND
Bromide	ppb	N/A	<5 - 30	13
Calcium (as Ca)	ppm	N/A	2 - 31	16
Chlorate (13)	ppb	800 (NL)	51 - 180	86
Hardness (as $CaCO_3$)	ppm	N/A	7 - 82	51
Magnesium	ppm	N/A	0.2 - 11	6.2
pH	-	N/A	7.4 - 9.8	9.2
Potassium	ppm	N/A	0.2 - 2	1.0
Silica	ppm	N/A	4.6 - 12	7.6
Sodium	ppm	N/A	2.3 - 31	18
Strontium	ppb	N/A	12 - 234	111

KEY:	
< / ≤	= less than / less than or equal to
AL	= Action Level
Max	= Maximum
Min	= Minimum
N/A	= Not Available
ND	= Non-detect
NL	= Notification Level
NoP	= Number of Coliform-Positive Sample
NTU	= Nephelometric Turbidity Unit
ORL	= Other Regulatory Level
ppb	= part per billion
ppm	= part per million
µS/cm	= microSiemens/centimeter

Footnotes:

(1) Confirmed by NASA Ames Research Center shown in shaded regions

(2) These are monthly average turbidity values measured every 4 hours daily.

(3) There is no turbidity MCL for filtered water. The limits are based on the TT requirements for filtration systems.

(4) This is the highest locational running annual average value.

(5) Total organic carbon is a precursor for disinfection byproduct formation. The TT requirement applies to the filtered water from the SVWTP only.

(6) Since <40 samples are collected per month, the highest number (not the percentage) of positive samples collected in any one month is reported.

(7) In May 2015, the SWRCB recommended an optimal fluoride level of 0.7 ppm be maintained in the treated water. In 2016, the range and average of the fluoride levels were 0.5 ppm - 0.8 ppm and 0.6 ppm, respectively.

(8) The natural fluoride level in the Hetch Hetchy supply was ND. Elevated fluoride levels in the SVWTP and HTWTP raw water are attributed to the transfer of fluoridated Hetch Hetchy water into the local reservoirs.

(9) This is the highest running annual average value.

(10) Aluminum also has a primary MCL of 1,000 ppb.

(11) The most recent Lead and Copper Rule monitoring was in 2017. 00 of 20 site samples collected at consumer taps had copper concentrations above the AL.

(12) The most recent Lead and Copper Rule monitoring was in 2017. 02 of 20 site samples collected at consumer taps had lead concentrations above the AL.

(13) The detected chlorate in the treated water is a degradation product of sodium hypochlorite used by the SFPUC for water disinfection.

Note: Additional water quality data may be obtained by calling the NASA Ames Research Center water system phone numbers at (650) 604-1406 or (650) 604-0296.