GODDARD SPACE FLIGHT CENTER
WALLOPS FLIGHT FACILITY
MAIN BASE WATERWORKS
PWSID #3001500

Annual Drinking Water Quality Report
Calendar Year 2019

This Annual Drinking Water Quality Report or *"Consumer Confidence Report"* for Calendar Year (CY) 2019 is designed to inform you about the drinking water quality on Wallops Flight Facility's (WFF) Main Base. Our goal is to provide a safe, dependable drinking water supply.

Drinking water must meet Federal and State requirements as administered by the U.S. Environmental Protection Agency (EPA) and the Virginia Department of Health (VDH).

NASA WFF drinking water meets all EPA and state Primary and Secondary drinking water quality standards.

If you have questions about this report or wish to obtain additional information about any aspect of WFF's drinking water, please contact:

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MAIN BASE WATERWORKS Water Quality Report

General Information

The sources of all drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. Source water for WFF's Main Base comes from groundwater pumped from deep onsite wells. Contaminants that may be present in all source water include:

(1) Microbial contaminants, such as viruses or bacteria, which may come from sewage treatment plants, septic tanks, agricultural livestock, and wildlife.
(2) Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
(3) Pesticides and herbicides, which may come from a variety of sources including agriculture, urban storm water runoff, and residential uses.
(4) Organic chemical contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and also from fueling stations, urban storm water runoff, fire fighter training, and failing septic systems.

As water travels over the ground surface or through the soil, it dissolves naturally occurring minerals. Water can also pick up substances resulting from the presence of animal or human activities. All drinking water, including bottled drinking water, may reasonably be expected to contain very small amounts of these substances. The presence of these substances does not necessarily indicate that the water poses a health risk.

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, patients who have undergone organ transplants, those with HIV/AIDS, or other immune system disorders, the elderly, and infants can be particularly at risk of infections. These individuals should seek advice from their health care provider about local drinking water.

The EPA and the Centers for Disease Control and Prevention (CDCP) developed guidelines on appropriate means to lessen the risk of infection by microbial contaminants, including *Cryptosporidium*. These guidelines are available from the **Safe Drinking Water Hotline at (800) 426-4791**.

In order to ensure that tap water is safe to drink, EPA and VDH promulgated regulations that limit the concentrations of certain contaminants in water provided by public water systems. At WFF, the water is monitored for contaminants according to these regulations. The U.S. Food and Drug Administration regulations establish limits for contaminants in bottled water that must provide the same protections.

Is WFF water treated? (Yes, by chlorination)

Groundwater sources are not required to be chlorinated unless:

(1) There is a potential source of microbial contamination,
(2) There is a failure to meet the bacteriological quality standards, or
(3) The groundwater supply is under the direct influence of surface water.

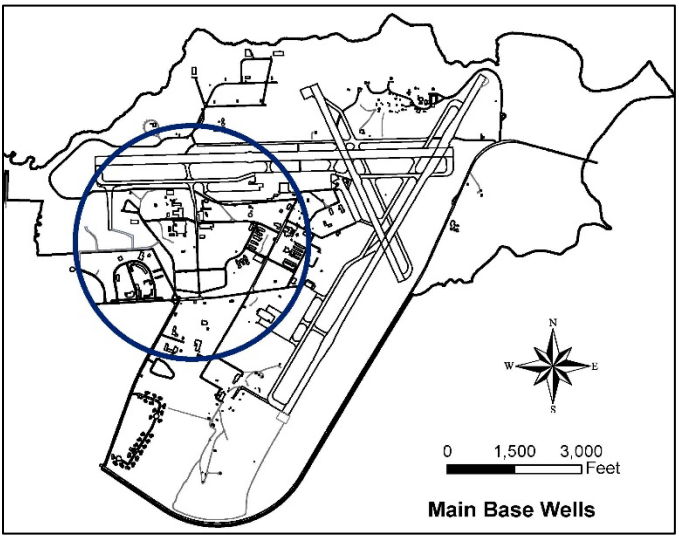
Although not a requirement, WFF chooses to treat its groundwater supply by chlorination. Since WFF utilizes chlorination as a treatment technique, the VDH requires that WFF maintain a minimum residual chlorine level of 0.16 mg/L at the entry point of its distribution system at all times to attenuate bacteria and viruses. The WFF ground storage tank is

equipped with an aeration system that reduces the levels of by-products of chlorination (TTHM and HAA5), in the finished water.

Sources of WFF Main Base Drinking Water

The Main Base Waterworks water system obtains supply water from three groundwater wells located on the Main Base.
Well #1 – 260 feet deep
Well #3 – 253 feet deep.
Well #4 –265 feet deep
Well #5 –260 feet deep**
***Well #5 was taken out of service in February 2019.*

VDH conducted a Source Water Assessment of the WFF Waterworks in May 2020. At that time, all wells evaluated were determined to be of low susceptibility to contamination using the criteria developed by VDH in its approved Source Water Assessment Program. Well #2 was out of service and not evaluated. The report consists of maps showing the Source Water Assessment area, an inventory of Land Use Activity Sites in Zone 1, a Susceptibility Explanation Chart, and Definitions of Key Terms. A copy of the report can be obtained by contacting the VDH Southeast Virginia Field Office (757-683-2000). Additional information on how you can help conserve water and protect your water supply can be found at the EPA website: http://www.epa.gov/sourcewaterprotection



Drinking Water Monitoring

WFF drinking water is tested frequently to ensure it complies with permit requirements, and the blended water from the groundwater wells is routinely monitored at the point of distribution in accordance with Federal and State regulations. The Water Quality Data Summary Table presents regulated contaminants that have had some measurable level of detection within the past 5 years. Other contaminants (both regulated and unregulated) have been tested for and were below the laboratory equipment detection limits or were below Health Advisory limits.

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State regulations require several regulated contaminants to be monitored less than once per year because the concentrations of these contaminants do not change frequently. The Table includes monitoring periods from January 2015 through December 2019.

Water Quality Data Summary

Regulated Contaminant (Units)	Goal (MCLG)	Max. Allowed (MCL)	No. of Samples Indicating Presence of Bacteria	Violation	Violation Date	Sources of Substance
Total Coliform Bacteria	0	1 positive monthly sample	0	No	N/A	Naturally present in the environment
E. coli	0	0 positive monthly samples	0	No	N/A	Human and animal fecal waste

Regulated Contaminant (Units)	Goal (MCLG)	Max. Allowed (MCL or AL)	Detected Level (DL)	Range of Detected Levels	Violation	Detected Date	Sources of Substance
Chlorine, Cl_2 (ppm)	4 MRDL	4 MRDLG	0.95	0.11-2.13	No	CY 2019	Water additive to control microbes
TTHM (ppb)	0	80 (MCL)	80	71-80	No	CY 2019	By-product of drinking water chlorination
HAA5 (ppb)	0	60 (MCL)	35	28-35	No	CY 2019	By-product of drinking water chlorination
Copper, Cu (ppm)	1.3	1.3 (AL)	0.254 [A]	0.034 - 0.548	No	CY 2019	Corrosion of plumbing systems; Erosion of natural deposits;
Lead, Pb (ppb)	0	15 (AL)	13.5 [B]	ND-29.4	No	CY 2019	Corrosion of plumbing systems; Erosion of natural deposits

Unregulated Contaminant (Units)	Goal	Detected Level (DL)	Date	Sources of Substance
Sodium	NA	14.1 [C]	CY 2019	Erosion of natural deposits widely distributed in nature, discharge from softeners, human or animal waste disposal, leachate from landfill or seawater intrusion

Table Footnotes

All results reported in the table above are for samples taken in 2015-2019. Samples taken in 2019 are part of required four-quarter or annual running averages.

[A] All copper samples were significantly below the Action Level for the previous five-year period.

[B] At least 90% of the samples were at or below this level in the December 2019 sampling event. Lead levels were found to be elevated above the AL at one site in May 2019 and at two sites in December 2019.

[C] There is presently no established standard for sodium in drinking water. For individuals on a very low sodium diet (500 mg/day), EPA recommends that drinking water sodium should not exceed 20 mg/L. The World Health Organization has established a drinking water guideline of 200 mg of sodium/L on the basis of esthetic considerations (i.e. taste)

Additional Health Information:

Certain contaminants (such as arsenic, *Cryptosporidium*, **lead**, nitrate, radon, **TTHM or PFAS)**, when present in drinking water, may be of special concern to some consumers.

Lead (Pb):

EPA and VDH regulations require that the 90th percentile lead concentration not exceed the action level of 15 ppb (90% of samples collected do not contain lead above the action level). For example, when 10 samples are collected, the 90th percentile would be the 2nd highest sample result. WFF conducted two sampling events for twenty buildings in May and December of 2019. As shown in the Water Quality Data Summary table column entitled *Range of Detected Levels*, results ranged from not detected to 29.4 ppm for both sampling events, including three values higher than the action limit (15.6 ppb, 15.8 ppb, and 29.4 ppb). WFF did not exceed the lead action level in 2019, as the 90th percentile (3rd highest) result for both sampling events was below the action level (90th percentile values for May and December were 7.5 ppb and 13.5 ppb, respectively). The most recent notice with all results can be found at:
https://code200-external.gsfc.nasa.gov/250-WFF/node/30

The action level for lead was last exceeded in 2018, where WFF conducted a single sampling event with ten buildings. In the 2018 report, the range of values was reported as not detected to 80.2 ppm. This range included results of 37.2, 59.8, and 80.2 ppm. As such, WFF exceeded the action level for lead with a 90th percentile result of 59.8 ppm.

Since August 2005, the WFF waterworks has been adding small amounts of zinc orthophosphate (ZNOP) to the water distribution system. ZNOP works by forming a protective lining inside pipes and plumbing fixtures to prevent metals such as lead and copper from leaching into drinking water. ZNOP is VDH approved, recognized as safe by the Food and Drug Administration, and is certified for use in drinking water treatment by the National Sanitation Foundation. NASA WFF has placed filters on drinking water fountains and kitchen faucets to remove or minimize metals, including lead and copper. Additional information regarding lead and copper in WFF's drinking water has been distributed in notices to all employees and the documents have also been posted in all WFF buildings.

The following information is provided in compliance with 40CFR141.154(d)(2) and 12VAC5-590-545.D.5. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. WFF is responsible for providing high quality drinking water but cannot control the variety of materials used in plumbing. Water standing in metal pipes for several hours presents an increased risk of metals leaching into drinking water.

According to VDH, long term exposure to elevated levels of lead in drinking water can cause serious health risks, especially for pregnant women and young children. Infants and children who drink water containing lead in excess of the **action level** over a long period of time could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.

You can minimize these risks by flushing your tap until the water becomes cold and reaches a steady temperature before using it for drinking or cooking. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at:
http://water.epa.gov/drink/info/lead/index.cfm

Total Trihalomethanes (TTHM):
TTHM are by-products of drinking water chlorination. TTHM dissipate rapidly in open containers exposed to air. According to VDH, some people who drink water containing elevated TTHM over many years have a slightly increased risk of experiencing problems with their livers, kidneys, or central nervous systems, and may have an increased risk for certain cancers.

Per-and Poly-fluoroalkyl Substances (PFAS):
In 2016, the EPA issued updated Lifetime Health Advisory (LHA) guidelines of 70 parts per trillion for PFAS compounds PFOS and PFOA in drinking water because of potential adverse health concerns. In collaboration with local, state, and federal agencies, NASA immediately began monitoring the WFF Main Base groundwater and drinking water wells, along with the Town of Chincoteague's drinking water wells located on NASA property. NASA has continued monitoring the drinking water for these compounds since 2017.

For additional information on PFAS, visit EPA's dedicated website: https://www.epa.gov/pfas

For past Wallops Information Sheets on PFAS testing, please see: https://www.nasa.gov/content/information-on-wallops-pfas-testing. .

Below is data from sampling events performed in 2019. Fourteen other PFAS compounds including PFOS were not detected in 2019.

2019 PFAS Water Quality Data Summary

Unregulated Contaminant (units)	Lifetime Health Advisory (LHA) [A]	Range of Levels Tested
PFOA (ppt)	70	ND – 0.72J
PFHpA (ppt)	NC	ND – 3.3
PFHxS (ppt)	NC	ND – 1.5J
PFHxA (ppt)	NC	0.71J - 1.81J

Table Footnotes
Values noted with a 'J' flag are estimated by the laboratory. Although they were detected, the estimated concentration is below the analytical method quantitation limit.

[A] The EPA drinking water LHA of 70 ng/L (or ppt) applies to PFOA and PFOS, individually or combined concentration of both compounds.

KEY TERMS: *We've defined these water-quality terms, unique to the water industry, to help you better understand test results.*

AL (Action Level) - The concentration of a contaminant that, if exceeded, triggers treatment or actions that a water system must take (i.e. repeat testing).

DL (Detected Level) - The concentration of analyte observed in water sample during testing.

HAA5 (Haloacetic Acids) - The sum of the five haloacetic acids that are regulated by EPA. Haloacetic Acids form in drinking water after the addition of chlorine as disinfection byproducts.

J – Estimated value

LHA – Lifetime Health Advisory

MCL (Maximum Contaminant Level) - The highest level of a contaminant that is allowable in drinking water. MCLs are set as close to the MCLGs (see definition below) as feasible by using the best available treatment technology.

MCLG (Maximum Contaminant Level Goal) - The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety set by EPA.

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

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

NA - Not Applicable

NC - No Criteria

ND (Not Detected) - The contaminant concentration in the sample was below the detection limit.

ppb (parts per billion) - Concentration in parts per billion, or micrograms per liter (ug/L); this is equivalent to a single penny in ten million dollars.

ppm (parts per million) - Concentration in parts per million, or milligrams per liter (mg/L); this is equivalent to a single penny in ten thousand dollars.

ppt (parts per trillion) - Concentration in parts per trillion, or nanograms per liter (ng/L), equivalent to one penny in ten billion dollars.

PFAS (Per or Poly-flouroalkyl substances) - Manmade compounds used extensively in a wide variety of consumer products and are also components of firefighting foams.

PFOA - Perfluorooctanoic acid

PFOS - Perfluorooctane sulfonic acid

PFHpA - Perfluoroheptanoic acid

PFHxS - Perfluorohexane sulfonic acid

PFHxA - Perfluorohexanoic acid

Source of Substance - Explains the typical natural or manmade origins of the contaminant.

TT (Treatment Technique) - An enforceable procedure or level of technological performance that public water systems must follow to ensure control of a contaminant.

TTHM (Total Trihalomethanes) - The sum of the four constituent compounds that form in drinking water by reactions of chlorine with natural organic material, creating disinfection byproducts.

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