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

2018 Annual Drinking Water Quality Report (2017 data)

This Annual Drinking Water Quality Report or *"Consumer Confidence Report"* covering Calendar Year (CY) 2017 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.
The 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).

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

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General Information

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.

The sources of all drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. Contaminants that may be present in 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.

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) guidelines on appropriate means to lessen the risk of infection by microbial contaminants, including *Cryptosporidium*, 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 prescribe regulations that limit the amount of certain contaminants allowed 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:

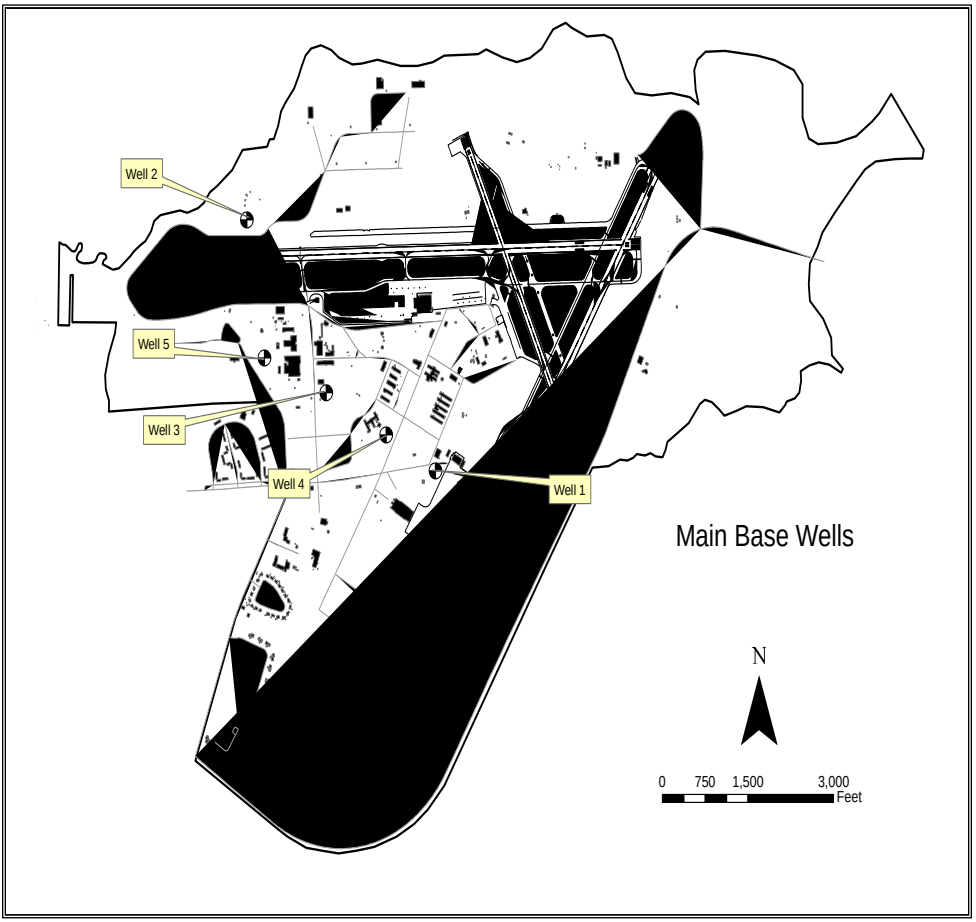
(1) There is a potential source of contamination,
(2) There is a failure to meet the bacteriological quality standards, or
(3) The groundwater supply is under the direct influence of surface water.

Although not a requirement, WFF chooses to treat its groundwater supply by chlorination. Since WFF chooses to treat by chlorination, the VDH requires that WFF maintain a minimum residual chlorine level of 0.16 mg/L throughout the distribution system at all times to attenuate bacteria and viruses.

Sources of WFF Main Base Drinking Water

The Main Base Waterworks water system has historically received its water from five groundwater wells located on the Main Base, as described and shown in the map below:
Well #1 – Between Buildings E-134 and N-159; this well is 260 feet deep.
Well #2 – Between Building D-12 and Runway 10-28; this well is 150 feet deep.*
Well #3 – Between Building F-157 and Storage Building; this well is 253 feet deep.
Well #4 – Between Building F-160 and Tennis Court; this well is 265 feet deep.
Well #5 – Between Buildings F-10 and H-100; this well is 260 feet deep.
**Well #2 was shut down in April 2017 and is not currently in use.*

VDH conducted a Source Water Assessment of the WFF Waterworks in 2013. At that time, all five wells were determined to be of low susceptibility to contamination using the criteria developed by VDH in its approved Source Water Assessment Program. 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. 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/owm/water-efficiency/index.htm



Drinking Water Monitoring

WFF drinking water is tested frequently to ensure it complies with permit requirements, and is routinely monitored in accordance with Federal and State regulations. The table on the following page includes regulated contaminants that have had some measurable level of detection within the past 5 years. Many other contaminants (both regulated and unregulated) have been tested for and were not present, results were below the laboratory equipment detection limits, or results were below Health Advisory limits.

State regulators allow WFF to monitor several regulated contaminants less than once per year because the concentrations of these contaminants do not change frequently. Some of the data included in the table below is more than one year old, but is still considered valid for these contaminants. The table includes monitoring periods from January 2013 through December 2017.

Water Quality Data Summary

Regulated Contaminant (Units)	Goal (MCLG)	Max. Allowed (MCL)	No. of Samples Indicating Presence of Bacteria	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 Levels Tested	Violation	Date	Sources of Substance
Chlorine, Cl_2 (ppm)	4 MRDL	4 MRDLG	0.95	0.06-5.80	Yes[8]	CY 2017	Water additive to control microbes
Arsenic[5] (ppb)	NA	10	2	NA	No	CY 2015	Erosion of natural deposits; runoff from orchards; runoff form glass & electronics production wastes
TTHM[1] (ppb) Running Annual Average	0	80 (MCL)	61	39-70	No	CY 2017	By-product of drinking water chlorination
HAA5[2] (ppb) Running Annual Average	0	60 (MCL)	32	21-32	No	CY 2017	By-product of drinking water chlorination
Copper, Cu[3] (ppm)	1.3	1.3 (AL)	0.039	ND-0.044	No	CY 2015	Corrosion of plumbing systems; Erosion of natural deposits; Leaching from wood preservatives
Lead, Pb[4] (ppb)	0	15 (AL)	ND	ND-7.67	No	CY 2015	Corrosion of plumbing systems; Erosion of natural deposits
Beta particles[6,7] (pCi/L)	0	50	13.5	NA	No	CY 2014	Erosion of natural deposits
Nitrate/ Nitrite (ppm)	0	10 (MCL)	0.05	NA	No	CY 2017	Runoff from agricultural fields

Table Footnotes

All results reported in the table above are for samples taken in 2013-2017. Samples taken in 2017 are part of required four-quarter or annual running averages.

[1,2] The highest detected level of THM and HAA based on a specific location's four-quarter running average. The range numbers are the results from individual samples.
[3,4] At least 90% of the samples were at or below this level. None of the individual samples exceeded the Action Level. Because lead and copper levels are low, testing is every three years.
[5] The MCL for Arsenic was reduced from 50 ppb to 10 ppb on 01/23/06. While our drinking water meets EPA's standard for arsenic, it does contain low levels of arsenic.
[6] The MCL for beta particles is 4 mrem/yr. EPA considers 50 pCi/L to be the level of concern for beta particles.
[7] Because the beta particle results were below 50 pCi/L, no testing for individual beta particle constituents was required.
[8] The violation occurred on August 30, 2017, when a chemical metering pump failed to add sufficient chlorine to the groundwater storage tank resulting in the chlorine residual level falling below 0.16 mg/L for a few hours.

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, 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.
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
ND (Non-Detect) - 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-Perfluoro-octanoic acid
PFOS-Perfluorooctanesulfonic acid
Source of Substance - Explains the typical natural or manmade origins of the 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.

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):

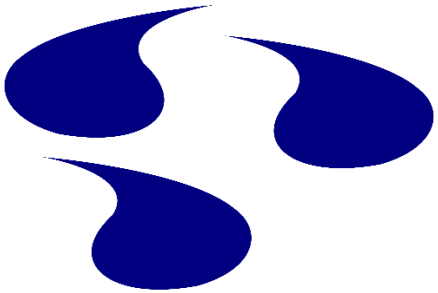
Since August 2005, the WFF waterworks has been adding small amounts of zinc orthophosphate (ZNOP) to the water distribution system. Zinc orthophosphate works by forming a protective lining inside pipes and plumbing fixtures to prevent metals such as lead and copper from leaching into drinking water. 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.

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.

If elevated levels of lead are present in drinking water, they can cause serious health risks, especially for pregnant women and young children. 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. If you are concerned about lead in your water, you should have your water tested. 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. However, it should be noted that 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):

Background

PFAS are manmade compounds used extensively in a wide variety of consumer products and are also components of firefighting foams. NASA conducted training with a commonly-used firefighting foam containing PFAS chemicals at a firefighter training area located on the Wallops Main Base, starting in the 1980's. This resulted in PFAS contamination of shallow groundwater in associated areas. NASA, in collaboration with local, state, and federal agencies, is monitoring the facility's groundwater and drinking water wells, along with the Town of Chincoteague's drinking water wells--located on NASA property.

In 2016, the EPA issued updated lifetime Health Advisory (HA) level guidelines of 70 parts per trillion (ppt) for two PFAS compounds, PFOS and PFOA, in drinking water. NASA conducted 15 sampling events in CY 2017 on 15 separate dates, with duplicates for each sample. NASA had one detection for PFOS at a concentration of 6.09 parts per trillion and no detections of PFOA in CY 2017.

What Else is NASA Doing?

NASA will continue to monitor drinking water supplies for the Wallops Flight Facility and the Town of Chincoteague. The agency will continue to share all drinking water sampling results with local officials, EPA, Virginia Department of Environmental Quality (VDEQ) and the Virginia Department of Health (VDH), and will provide information to the public.

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

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

This 2018 Drinking Water Quality Report (2017 data) was prepared by: LJT & Associates, Inc.

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