



Goddard Space Flight Center Wallops Flight Facility Main Base Waterworks

2021 Annual Drinking Water Quality Report

NASA Wallops Flight Facility (WFF) is pleased to present the 2021 Annual Water Quality Report (Consumer Confidence Report) as required by the Safe Drinking Water Act (SDWA). This report is designed to provide details about where your water comes from, what it contains, and how it compares to standards set by regulatory agencies. This report is a snapshot of last year's water quality. Last year, we conducted tests for over 50 substances. We only detected 8 of those substances tested for and found two exceedances of action levels or limits. (For more information see the section labeled Violations and Exceedances at the end of the report.)

Do I need to take special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the **Safe Water Drinking Hotline (800-426-4791)**.

Where does my water come from?

WFF's water for the Main Base comes from three groundwater wells located on the Main Base.

Well #1 – 260 feet deep

Well #3 – 253 feet deep

Well #4 – 265 feet deep

Wells #2 and #5 were taken out of service in April 2017 and February 2019 respectively. Construction of a new well (Well #6) is currently in progress to help compensate for the two wells taken out of service. Well #6 construction is expected to be complete in 2022.

Source water assessment and its availability

The Virginia Department of Health (VDH) conducted a Source Water Assessment of the WFF Waterworks in 2019. 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, 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). Information on how you can help conserve water and protect your water supply can be found on page 3 of this report.

Why are there contaminants in my drinking water?

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. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's (EPA) Safe Drinking Water Hotline (800-426-4791).

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, which 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, which 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, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems; and radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, EPA prescribes regulations that limit the amount of certain contaminants in water provided by waterworks. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

How can I get involved?

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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Water Conservation Tips

Did you know that the average U.S. household uses approximately 400 gallons of water per day or 100 gallons per person per day? Luckily, there are many low-cost and no-cost ways to conserve water. Small changes can make a big difference - try one today and soon it will become second nature.

- Take short showers - a 5-minute shower uses 4 to 5 gallons of water compared to up to 50 gallons for a bath.
- Shut off water while brushing your teeth, washing your hair, and shaving and save up to 500 gallons a month.
- Use a water-efficient showerhead. They're inexpensive, easy to install, and can save you up to 750 gallons a month.
- Run your clothes washer and dishwasher only when they are full. You can save up to 1,000 gallons a month.
- Water plants only when necessary.
- Fix leaky toilets and faucets. Faucet washers are inexpensive and take only a few minutes to replace. To check your toilet for a leak, place a few drops of food coloring in the tank and wait. If it seeps into the toilet bowl without flushing, you have a leak. Fixing it or replacing it with a new, more efficient model can save up to 1,000 gallons a month.
- Adjust sprinklers so only your lawn is watered. Apply water only as fast as the soil can absorb it and during the cooler parts of the day to reduce evaporation.
- Teach your kids about water conservation to ensure a future generation that uses water wisely. Make it a family effort to reduce next month's water bill!
- Visit www.epa.gov/watersense for more information.

Source Water Protection Tips

Protection of drinking water is everyone's responsibility. You can help protect your drinking water sources, both at WFF and in your community, in several ways:

- Eliminate excess use of lawn and garden fertilizers and pesticides - they contain hazardous chemicals that can reach your drinking water source.
- Pick up after your pets.
- If you have your own septic system, properly maintain your system to reduce leaching to water sources or consider connecting to a public water system.
- Dispose of chemicals properly; take used motor oil to a recycling center.
- Volunteer in your community. Find a watershed or wellhead protection organization in your community and volunteer to help. If there are no active groups, consider starting one. Use EPA's Adopt Your Watershed to locate groups in your community or visit the Watershed Information Network's How to Start a Watershed Team.
- Organize a storm drain stenciling project with your local government or water supplier. Stencil a message next to the street drain reminding people "Dump No Waste - Drains to River" or "Protect Your Water." Produce and distribute a flyer for households to remind residents that storm drains dump directly into your local water body.

Water Quality Data Table

In order to ensure that tap water is safe to drink, EPA has regulations that limit the amount of contaminants in water provided by public water systems. The table below lists all of the drinking water contaminants that were detected during the calendar year of this report. Although many more contaminants (such as bacteria) were tested, only those substances listed below were found in your water. All sources of drinking water contain some naturally occurring contaminants. At low levels, these substances are generally not harmful in our drinking water. A few naturally occurring minerals may actually improve the taste of drinking water and have nutritional value at low levels.

Unless otherwise noted, the data presented in this table is from testing done in the calendar year of the report. VDH requires WFF to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not vary significantly from year to year, or the system is not considered vulnerable to this type of contamination. As such, some of the data, though representative, may be more than one year old. In this table you will find terms and abbreviations that might not be familiar to you. To help you better understand these terms, definitions are provided below the table.

Contaminants	MCLG or MRDLG	MCL, TT, or MRDL	Detect In Your Water	Range		Sample Date	Violation	Typical Source
				Low	High			
Disinfectants & Disinfection By-Products (There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants)								
Chlorine (as Cl ₂) (ppm)	4	4	0.78	NA	1.14	2021	No	Water additive used to control microbes
TTHMs [Total Trihalomethanes] (ppb)	NA	80	70	64	70	2021	No	By-product of drinking water disinfection
HAA5 [Haloacetic acids] (ppb)	NA	60	68	32	68	2021	Yes	By-product of drinking water disinfection
Inorganic Contaminants								
Sodium (ppm)	NA		14.1	NA	NA	2019	No	Erosion of natural deposits widely distributed in nature, discharge from softeners, human or animal waste disposal, leachate from landfill or seawater intrusion
Radioactive Contaminants								
Beta/photon emitters (pCi/L)	0	50**	11.7	NA	11.7	2020	No	Decay of natural and man-made deposits. The EPA considers 50 pCi/L to be the level of concern for Beta particles.
Radium (combined 226/228) (pCi/L)	0	5	0.2*	NA	0	2020	No	Erosion of natural deposits

Contaminants	MCLG	AL	Your Water	Sample Date	# Samples Exceeding AL	Exceeds AL	Typical Source
Inorganic Contaminants							
Copper - action level at consumer taps (ppm)	1.3	1.3	0.352	January to June 2021	0	No	Corrosion of household plumbing systems; Erosion of natural deposits
Copper - action level at consumer taps (ppm)	1.3	1.3	0.489	July to December 2021	1	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead - action level at consumer taps (ppb)	0	15	15.7	January to June 2021	3	Yes	Corrosion of household plumbing systems; Erosion of natural deposits
Lead - action level at consumer taps (ppb)	0	15	11	July to December 2021	2	No	Corrosion of household plumbing systems; Erosion of natural deposits

Violations and Exceedances
<p>Haloacetic Acids (HAA5) Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer over and above the current risk of any individual developing cancer in their lifetime. Haloacetic acids are a group of disinfection byproducts (DBPs) that are formed when chlorine compounds used in the process of disinfecting water react with other chemicals found naturally within water. Within disinfected drinking water, there are five significant HAA, and this combined concentration is what we refer to as HAA5. Two samples of HAA5 were taken in November of 2021. One of the samples exceeded the EPA MCL of 60 ppb. The second sample was approximately half of the MCL. WFF reduced the amount of chlorine disinfectant used in treating the water to help lower the amount of DBPs produced in the system. Aeration at the ground storage tank was also increased to help dissipate DBPs as they are formed. WFF will be increase sampling of DBPs from annually to quarterly in 2022.</p>
<p>Lead - action level at consumer taps Infants and children who drink water containing lead in excess of the action level 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.</p> <p>EPA and VDH regulations require 90% of all sample concentrations, referred to as the “90th percentile,” to be below the 15 ppb lead action level. The 90th percentile sample concentration for 20 samples is the 3rd highest sample concentration.</p> <p>WFF sampled drinking water for lead in twenty buildings in both March and September 2021. As shown in the Water Quality Summary Table column entitled Range of Levels Detected, concentrations in the 40 samples ranged from non-detected to 43.6 ppb. Five of the 40 samples contained lead concentrations above the 15 ppb action limit, three of which were from the first semiannual sampling event (15.7, 19.7, and 28.7 ppb), and the remaining two were from the second semiannual sampling event (31.0 and 43.6 ppb). The action level was exceeded in the 90th percentile sample (third highest result; 15.7 ppb) for the first round of sampling in March 2021. The action level was not exceeded in the 90th percentile sample (third highest result; 11 ppb) for the second round of sampling in September 2021. The most recent notice with all results can be found at: https://code200-external.gsfc.nasa.gov/250-WFF/program-areas-drinking-water</p> <p>WFF implements several measures to mitigate lead levels in the drinking water system. Starting in 2005, WFF began 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 water inside the pipes. 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.</p>

Violations and Exceedances
Additionally, WFF maintains filters on drinking water fountains and kitchen faucets to remove or minimize metals, including lead and copper (the samples in the table above were taken prior to filtration). WFF also conducts routine flushing of water distribution lines. 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.

Unit Descriptions	
Term	Definition
ppm	ppm: parts per million, or milligrams per liter (mg/L)
ppb	ppb: parts per billion, or micrograms per liter (µg/L)
ppt	ppt: parts per trillion
pCi/L	pCi/L: picocuries per liter (a measure of radioactivity)
% positive samples/month	% positive samples/month: Percent of samples taken monthly that were positive
J	J: Less than the stated laboratory quantitation limit; is considered an estimated value
NA	NA: Not applicable
ND	ND: Not detected
NR	NR: Monitoring not required but recommended.

Important Drinking Water Definitions	
Term	Definition
MCLG	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.
MCL	MCL: Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
TT	TT: Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.
AL	AL: Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
Variances and Exemptions	Variances and Exemptions: State or EPA permission not to meet an MCL or a treatment technique under certain conditions.
MRDLG	MRDLG: Maximum residual disinfection level goal. 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.
MRDL	MRDL: Maximum residual disinfectant level. 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.
MNR	MNR: Monitored Not Regulated
MPL	MPL: State Assigned Maximum Permissible Level

Additional Information for Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Wallops Flight Facility is responsible for providing high quality drinking water but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to 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://www.epa.gov/safewater/lead>

Results of voluntary monitoring

Per- and Polyfluoroalkyl Substances (PFAS):

Since 2016, NASA, in collaboration with local, state, and federal agencies, has routinely conducted testing of the facility's wells and drinking water wells for the presence of per- and polyfluoroalkyl substances (PFAS). NASA continues to track EPA and the scientific and community's progress toward establishing new testing and treatment methods and is committed to expanding our PFAS testing as additional analytical methods of detection are established and approved by the EPA, or as EPA modifies the reporting requirements.

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

For WFF Information Sheets on PFAS testing, please see:

<https://www.nasa.gov/content/information-on-wallops-pfas-testing>

The table below summarizes PFAS analyses of drinking water as it entered WFF's distribution system (entry point) in 2021. Eighteen PFAS compounds, including PFOS and PFOA, were monitored in 2021. Since Wells 2 and 5 were taken offline, detection of PFAS compounds has continued to decline or the compounds have been undetected.

2021 PFAS Water Quality Data Summary

Unregulated Contaminant (units)	Range of Levels Detected*
PFOA (ppt)	ND – 1.1 J
PFOS (ppt)	ND
PFHpA (ppt)	ND – 2.7
PFHxA (ppt)	ND – 3.9
PFHxS (ppt)	ND – 0.84 J

*The remaining 13 PFAS compounds were ND (not detected).