Goddard Space Flight Center
Wallops Flight Facility
Main Base Waterworks

2023 Annual Drinking Water Quality Report

NASA Wallops Flight Facility (WFF) is pleased to present the 2023 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 9 of the substances tested for and found three 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 four groundwater wells located on the Main Base.
Well #1 – 260 feet deep
Well #3 – 253 feet deep
Well #4 – 265 feet deep
Well #6 – 275 feet deep

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. 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. The WFF Waterworks has not substantively changed since 2019 through 2023 and continues to have a low susceptibility to contaminants.

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	Detected 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 Cl2) (ppm)	4	4	0.85	0.02	1.59	2023	No	Water additive used to control microbes
Haloacetic Acids (HAA5) (ppb) Building N-162	NA	60	57	45	62	2023	No	By-product of drinking water chlorination
Haloacetic Acids (HAA5) (ppb) Building D-010	NA	60	38	24	50	2023	No	By-product of drinking water chlorination
TTHMs [Total Trihalomethanes] (ppb) Building N-162	NA	80	85	62	96	2023	Yes	By-product of drinking water disinfection
TTHMs [Total Trihalomethanes] (ppb) Building D-010	NA	80	96	61	96	2023	Yes	By-product of drinking water disinfection
Radioactive Contaminants								
Beta/photon emitters (pCi/L)	0	50	11.7	NA	NA	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	NA	2020	No	Erosion of natural deposits
*compliance indicator value, calculated as half (50%) of the laboratory reporting limit for gross alpha analysis								

Contaminants	MCLG or MRDLG	MCL, TT, or MRDL	Detected In Your Water	Range		Sample Date	Violation	Typical Source
				Low	High			
Inorganic Contaminants								
Arsenic (ppm)	NA	0.010	0.002	NA	NA	2022	No	Erosion of natural deposits
Sodium (optional) (ppm)	NA	NA	17.8	NA	NA	2022	No	Erosion of natural deposits; Leaching

Contaminants	MCLG	MCL or TT	Sample Date	# of Detections	Violation	Typical Source
Microbiological Contaminants						
Total Coliform (RTCR)	NA	TT	2023	1	No	Naturally present in the environment
E. coli (RTCR) - in the distribution system	0	MCL	2023	1	No*	Human and animal fecal waste
*Absent; single detection was confirmed not detected in resample: we are not in violation of the *E. coli* MCL.						

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	0.183	2023	0	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead - action level at consumer taps (ppb)	0	15	6.4	2023	1	No	Corrosion of household plumbing systems; Erosion of natural deposits
* "Your Water" for lead and copper is the 90th percentile.							

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)
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
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.
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.

Violations and Exceedances
TTHMs [Total Trihalomethanes] Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer. Testing results from three quarters of sampling taken between February and August 2023 showed that our system exceeded the standard, or maximum contaminant level (MCL), for TTHM. The standard for TTHM is 80 parts per billion (ppb). This is determined by averaging all the samples collected at each sampling location for the past 12 months. This was likely due to reduced flushing because the elevated water tank was off-line for an extended period. TTHM levels were below 80 ppb as of November 2023. WFF continues to perform system flushing to ensure TTHM levels in the distribution system below the MCL.

TT Violation	Explanation	Length	Health Effects Language	Explanation and Comment
Ground Water Rule violations	We are required to disinfect our drinking water source. On September 25, 2023, we did not meet our treatment requirement to provide sufficient levels of disinfectant at the system entry point due to a failure of the chlorine dosing pump. Chlorine was maintained in the distribution system while the pump was repaired.	September 25, 2023	Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites, which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.	The chlorine dosing pump was fixed within a few hours of the problem being identified, in time to prevent low chlorine levels in the distribution system. As a longer-term solution, WFF is installing a new chlorine dosing systems for the Main Base drinking water system, which will allow for improved control and monitoring of system chlorine levels.

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 2017, NASA, in collaboration with local, state, and federal health agencies, has routinely conducted testing of drinking water 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.

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/wallops/pfas

The table below summarizes PFAS analyses of drinking water as it entered WFF's distribution system (entry point) in 2023. Twenty-nine PFAS compounds, including PFOS and PFOA, were monitored in 2023 and five compounds were detected.

On April 10, 2024, EPA published new drinking water maximum contaminant levels (MCLs) for six PFAS compounds in drinking water. Although WFF Waterworks is not yet required to sample PFAS, WFF Waterworks did test for the six newly-regulated compounds, none of which were detected in 2023.

2023 PFAS Water Quality Data Summary

Unregulated Contaminants (ppt)	Range of Levels Detected*
PFBS	ND – 1.1 J
PFBA	ND – 0.77 J
PFHxA	ND – 0.68 J
PFHpA	ND – 0.49 J
PFPeA	0.68 J – 2.22

*The remaining 24 PFAS compounds were ND (not detected).
Values noted with a 'J' flag were detected by the laboratory but the true concentration is uncertain.
PFBS - Perfluorobutanesulfonic acid
PFBA - Perfluorobutanoic acid
PFHxA - Perfluorohexanoic acid
PFHpA - Perfluoroheptanoic acid
PFPeA - Perfluoropentanoic acid