Naval Support Activity Singapore
Drinking Water
Annual Consumer Confidence Report
For Calendar Year 2025

The U.S. Navy applies the regulations of the U.S. Safe Drinking Water Act (SDWA) to all U.S. Navy installations overseas. In accordance with the U.S. Department of the Navy regulations, Naval Support Activity Singapore (NSASG) issues an annual report describing the quality of our drinking water. This Consumer Confidence Report (CCR) reflects water quality monitoring data collected from January 1, 2025 through December 31, 2025.

NSASG is pleased to report the calendar year 2025's monitoring activities of our drinking water met all U.S. and Singapore standards for water quality.

Drinking Water Standards

To ensure water is safe to drink, the U.S. Navy complies with water quality standards set by the U.S. Environmental Protection Agency (EPA). Per Navy guidance, NSASG is required to regularly test the installation's drinking water for contaminants and report the results on an annual basis.

Last year, NSASG's drinking water met all EPA and Singapore National Environmental Agency (NEA) standards for drinking water quality. NSASG's drinking water also met the standards established by the Department of War (DoW) Overseas Environmental Baseline Guidance Document (OEBGD) and CNICINST 5090.1B U.S. Drinking Water Standards for U.S. Navy Installations Overseas.

In the latest compliance-monitoring period, NSASG conducted tests for many contaminants, which have the potential to be present in drinking water. Table 1.0 identifies all contaminants detected in NSASG water and their levels of concentration. All drinking water, even bottled drinking water, can be reasonably expected to contain minute amounts of some contaminants. The presence of contaminants in water does not necessarily indicate a health risk.

Water Sources

Singapore has built a robust, diversified, and sustainable water supply from four water sources known as the Four National Taps – water from local catchment, imported water, reclaimed water (known as NEWater) and desalinated water. The Public Utilities Board (PUB) is the Singaporean agency responsible for the production, treatment and distribution of drinking water throughout the island. Water provided by the PUB arrives at NSASG compliant with U.S. standards. No additional water treatment is provided by NSASG. The Public Works Department (PWD) routinely tests the water to ensure it meets water quality standards.

Additional information on the Four National Taps is avaialble on the PUB website:
https://www.pub.gov.sg/Public/WaterLoop/OurWaterStory

Water Treatment

Raw surface water collected from various sources within Singapore and Malaysia are conveyed by pipelines to local processing waterworks where it is chemically treated, filtered and disinfected. Treatment removes contaminants and improves water clarity and taste.

Most treatment plants use chemical coagulation to remove larger particles (i.e., dirt or debris) suspended in the raw water. A luminum sulfate is the main coagulant, and hydrated lime and polyelectrolyte are used as coagulant aids. These chemicals cause the suspended matter to settle more readily, thus facilitating removal of large particles. Rapid gravity filtration is used to remove finer particles of suspended matter.

Chlorine, and sometimes ozone, is then added to the filtered water to disinfect and remove all harmful bacteria and viruses. Ammonia is added to combine with the free chlorine to form stable chlorine residual. Activated carbon is also used to remove any bad taste and odor from the water.

Sodium silicofluoride is added to the water as it progresses from the filters to the clear water tank. Fluoridation is required by the Singapore Ministry of Health, and has been a standard water treatment practice since 1957 to prevent tooth decay (cavities). The water is then pumped into the distribution system, ready for consumption.

Water Quality Monitoring

Singapore PUB routinely monitors for contaminants using locally certified laboratories and approved methods, and NSASG uses EPA-certified laboratories and approved methods.

The following contaminants and parameters are monitored:

- Monthly – Total Coliform, E-coli, pH, Total Chlorine & Bromate.
- Quarterly – Disinfection by-products [Total Trihalomethanes (TTHM) and Haloacetic Acids (HAA5)], Volatile Organic Chemicals and Inorganic Chemicals.
- Annually – Lead, Copper, Synthetic Organic Chemicals, Total Organic Carbon, Pesticides, Herbicides, PCBs & Per- and Polyfluoroalkyl Substances (PFAS).
- Once every four years – Radionuclides.
- Once every nine years – Asbestos.

Table 1.0 lists contaminants detected, above the laboratory detection limit, during the last applicable sampling period. The samples were collected directly from water fixtures at selected locations throughout the NSASG water distribution system in our AOR housing and industrial areas of NSASG. Only contaminants detected during sampling are listed in the tables.

Important Health Information

Some individuals may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised people, such as those undergoing chemotherapy, those who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, the elderly, and infants can be particularly at risk from infections. These individuals should seek advice about drinking water from their health care providers. The U.S. Environmental Protection Agency (EPA) and the Center for Disease Control (CDC) and Prevention have established guidelines on the appropriate means to lessen the risk of infection by cryptosporidium and other microbial contaminants. This information is obtainable by calling the EPA Safe Drinking Water Hotline at 1-800-426-4791. Additional information is available from the CDC: https://www.cdc.gov/drinkingwater/causes/?CDC_AAref_Val=https://www.cdc.gov/healthywater/drinking/contamination.html

Substances Expected in Drinking Water

The drinking water sources are from surface waters including rivers, lakes, streams, ponds and reservoirs. 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, which may be present in NSASG's water (listed alphabetically):

Arsenic occurs in inorganic and organic forms. Inorganic arsenic compounds (such as those found in water) are highly toxic while organic arsenic compounds (such as those found in seafood) are less harmful to health. Additional information on arsenic in drinking water is available from the EPA: https://www.epa.gov/dwreginfo/chemical-contaminant-rules

Inorganic chemicals, such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Lead can come primarily from materials and components associated with service lines and home plumbing. Singapore ended the practice of using lead-containing materials in water systems over 20 years ago, though plumbing components over 20 years old may still contain lead. Elevated levels of lead in water can cause serious health problems, especially for pregnant women and young children.

When water in a pipe has been sitting for several hours, one can minimize the potential for lead exposure by running the tap for 30 seconds to two minutes before using water for drinking or cooking. Additional information on lead in drinking water is available from the EPA: https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Nitrate is an inorganic chemical that is naturally present in soil, water and food. Major sources of nitrate in drinking water include fertilizers, sewage and animal manure. Nitrates themselves are relatively nontoxic; however, when swallowed, convert to nitrites that can react with hemoglobin in the blood, creating methemoglobin. Infants convert approximately ten percent of ingested nitrates to nitrites, double the conversion rate of older children and adults. High enough concentrations of nitrate in drinking water can result in a temporary blood disorder in infants called methemoglobinemia, commonly called "blue baby syndrome." In severe, untreated cases, brain damage and eventually death can result from suffocation due to lack of oxygen. Additional information on nitrate in drinking water is available from the EPA: https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations

Organic chemical, including synthetic and volatile organic chemicals, are by-products of industrial processes and petroleum production, as well as gas stations, urban storm water runoff, and septic systems.

Radioactive contaminants that can be naturally occurring or be the result of oil and gas production and mining activities.

What are per- and polyfluoroalkyl substances and where do they come from?

Per- and polyfluoroalkyl substances (PFAS) are a group of thousands of man-made chemicals. PFAS have been used in a variety of industries and consumer products around the globe, including in the U.S., since the 1940s. PFAS are found in many consumer products, as well as in industrial products, like certain firefighting agents called aqueous film forming foam (AFFF). PFAS is also found in essential use applications such as in microelectronics, batteries, and medical equipment. PFAS chemicals are persistent in the environment, and some are persistent in the human body – meaning they do not break down and they can accumulate over time.

Is there a regulation for PFAS in drinking water?

On April 26, 2024, the United States Environmental Protection Agency (EPA) published a National Primary Drinking Water Regulation (NPDWR) final rule on drinking water standards for six PFAS under the Safe Drinking Water Act (SDWA). The rule establishes the following maximum contaminant levels (MCLs):

- perfluorooctane sulfonic acid (PFOS) = 4 ppt
- perfluorooctanoic acid (PFOA) = 4 ppt
- hexafluoropropylene oxide dimer acid (HFPO-DA, commonly known as GenX) = 10 ppt
- perfluorononanoic acid (PFNA) = 10 ppt
- perfluorohexane sulfonic acid (PFHxS) = 10 ppt
- HI MCL for PFHxS, PFNA, perfluorobutane sulfonic acid (PFBS), and GenX = 1 (unitless).

Under the NPDWR, regulated public water systems (PWS) are required to complete initial monitoring by April 26, 2027. Beginning April 26, 2027, regulated PWSs will conduct ongoing compliance monitoring in accordance with the frequency dictated by the rule and as determined by the initial compliance monitoring results. Regulated PWSs must demonstrate compliance with the Maximum Contaminant Levels (MCLs) by April 26, 2029.

In order to provide safe drinking water to all Department of War (DoW) personnel, OSD policy extends this requirement to all DoW systems which provide drinking water for human consumption, regardless of size of the drinking water system. In addition to the six regulated compounds, DoW-owned systems are required by DoW policy to monitor for all 25 compounds detected when using EPA Method 533.

Protecting the health of our personnel, their families, and the communities in which we serve is a priority for the Department. DoW is committed to complying with requirements of the NPDWR and the continued provision of safe drinking water to those that work and live on DoW installations.

Has NSASG tested its water for PFAS in 2025?

Yes. In March, Jun & September 2025 samples were collected from Building 7-4 2nd floor NSASG break room.

PFAS Below Maximum Contaminant Limit (MCL)

We are pleased to report that drinking water testing results, for the six regulated PFAS, were all below their respective MCL. Of the additional PFAS monitored two compounds, PFBS & PFBA, was detected at 3.4 ng/L & 4.2 ng/L. This PFAS is not regulated so therefore there is no MCL. No action needs to be taken at this time.

What is next?

NSASG will continue to monitor for PFAS in accordance with the EPA regulation and DoW policy. Once required initial monitoring information is available, we will calculate the Running Annual Averages (RAA) for the regulated PFAS and will compare those numbers to the MCL and Hazard Index (HI) trigger levels. This will determine what our continuing monitoring requirements will be beginning in 2027, and if needed, we will plan operational or infrastructure changes to ensure our water complies with the PFAS MCLs and HI by April 2029 in accordance with the SDWA.

Water Quality Data Table
NSASG conducts extensive monitoring to ensure your water meets all water quality standards. The results of the monitoring are reported in the tables on the following pages.

The presence of a contaminant does not necessarily indicate a health risk. Please note the PWD monitors many contaminants, in addition to the ones listed below, per the OEBGD and CNICINST 5090.1B. Only those contaminants detected, above the laboratory detection limit, during laboratory analysis are listed below except for PFAS where the results for all PFAS analyzed are shown. Lead is also included in the table although not detected. The water samples were collected from NSASG facilities and analyzed by Chugai Technos Corporation an ISO / IEC 17025, 2019 Certified Laboratory.

Public Participation Opportunities and Contacts:
The Installation Commanding Officer has established an Installation Water Quality Board tasked with ensuring there is a reliable supply of drinking water for all people using NSASG facilities Please contact the NSASG Environmental Division at (+65) 6750 2911 for questions on drinking water in general.

Additional Information:
U.S. EPA Office of Water (https://www.epa.gov/ground-water-and-drinking-water) and the Center for Disease Control and Prevention (www.cdc.gov) websites provide information on many issues relating to water resources, water conservation, and public health.

Table Definitions and Abbreviations

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

AOR (Area of Responsibility): Buildings, housing and office facilities managed by NSASG.

HFPO-DA: Hexafluoropropylene oxide dimer acid.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.

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 and are non-enforceable public health goals.

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.

MRDLG (Maximum Residual Disinfectant 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.

N/A: Not applicable.

ND: Not detected.

mg/L (milligrams per liter): One part substance per million parts water (parts per million).

ng/L (nanograms per liter): One part substance per trillion parts water (parts per trillion)

µg/L (micrograms per liter): One part substance per billion parts water (parts per billion)

pCi/L (picocuries per liter): Measurement of the natural rate of disintegration of radioactive contaminants in water (also beta particles).

mrem/yr (millirem per year): One thousandth of a rem. Measurement of dose of absorbed energy adjusted to be equivalent for different kinds of radiation.

MFL (million fibers per liter): Measurement of the presence of asbestos fibers that are longer than 10 micrometers.

PFAS: Polyfluoroalkyl Substances.

PFHxS: Perfluorohexanesulfonic Acid.

PFNA: Perfluorononanoic Acid.

PFOA: Perfluorooctanoic Acid.

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

90th percentile: Represents the highest value found out of 90 percent of the samples taken. If the 90th percentile value is greater than the AL, a treatment evaluation and/or mitigation actions must be conducted on the water system.

How to Read the Data Tables:
Starting with a "Substance", read across. "MCL" shows the highest level of substance (contaminant) allowed in drinking water. "MCLG" is the goal level for that substance (this may be lower than what is allowed). A "No" under "Violation" means the amount of the substance met government requirements. "Possible Source of Contamination" tells where the substance usually originates.

Unregulated substances are measured, but maximum allowed contaminant levels have not been established by the U.S.

Concerns/Additional Copies:
For questions, information, and /or additional copies, please contact Acting installation Environmental Program Director, Mr. Teo Kok Sing at COMM: +65-6750-2911 or email: kok.s.teo3.ln@us.navy.mil.

Table 1: Drinking Water Constituents Detected						
Substance	**Unit of Measurement**	**Level Detected**		**Regulated Levels (OEBGD and CNICINST 5090.1B)**	**Violation**	**Possible Sources of Contamination**
		Low	**High**		**Yes / No**	
Inorganic Chemicals						
Arsenic	**mg/L**	0.0013	0.0013	MCL = 0.010 MCLG = 0	No	Erosion of natural deposits; runoff from orchards, runoff from glass and electronics production wastes
Barium	**mg/L**	0.022	0.029	MCL = 2 MCLG = 2	No	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Cyanide, total	**mg/L**	0.0027	0.0027	MCL = 2 MCLG = 2	No	Discharge from steel/metal factories; discharge from plastic and fertilizer factories
Fluoride	**mg/L**	0.41	0.46	MCL = 4 MCLG = 4	No	Water additive which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories
Nitrate (as Nitrogen)	**mg/L**	0.57	0.76	MCL = 10 MCLG = 10	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Nitrite (as Nitrogen)	**mg/L**	0.023	0.068	MCL = 1 MCLG = 1	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Total Nitrite & Nitrate (as Nitrogen)	**mg/L**	0.64	0.79	MCL = 10 MCLG = 10	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Sodium*	**mg/L**	4.8	9	MCL = N/A MCLG = N/A	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Total Organic Carbon	**mg/L**	1.1		MCL = 4 MCLG = 4	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Disinfectant/Disinfection Byproducts						
Haloacetic Acids	**mg/L**	0.028	0.038	MCL = 0.06 MCLG = N/A	No	Byproduct of drinking water disinfection
Trihalomethanes (Total)	**mg/L**	0.045	0.06	MCL = 0.08 MCLG = N/A	No	Byproduct of drinking water disinfection
Total Chlorine	**mg/L**	0.35	2.06	MRDL = 4 MRDL = 4	No	Byproduct of drinking water disinfection
Microorganisms						
Total coliform / E. coli	**Positives Samples per Month**	ND		MCL = 5.0% MCLG = 0	No	Coliforms are naturally present in the environment; as well as feces; fecal coliforms and E. coli only come from human and animal fecal waste.

Lead and Copper						
Copper	**mg/L**	0.0067	0.099	AL = 1.3	No	Corrosion of household plumbing systems: erosion of natural deposits
		90th Percentile: 0.084		MCLG = 1.3		
Lead	**mg/L**	0.00054	0.0012	AL =0.010	No	Corrosion of household plumbing systems: erosion of natural deposits
		90th Percentile: 0.00054		MCLG = 0.0		
Volatile Organic Compounds (VOCs)						
Styrene	**mg/L**	ND	0.00045	MCL = 0.1, MCLG = 0.1	No	Discharge from rubber and plastic factories; leaching from landfills
Toluene	**mg/L**	ND	0.00013	MCL = 1, MCLG = 1	No	Discharge from petroleum factories

Per- and Polyfluoroalkyl Substances (PFAS)					
Constituents	**Level Detected ng/L (ppt)**	**Regulated Levels EPA MCLs**	**Calculated Hazardous Index***	**Violation Yes / No**	**Possible Sources of Contamination**
Perfluorooctane sulfonic acid (PFOS)	ND	4 ng/L	NA	No	Discharge from manufacturing and industrial chemical facilities, use of certain consumer products, occupational exposures, and certain firefighting activities.
Perfluoro-octanoic acid (PFOA)	ND	4 ng/L	NA	No	
Hexafluoropropylene oxide dimer acid (HFPO-DA/GenX)	ND	10 ng/L	0	No	
Perfluorononanoic acid (PFNA)	ND	10 ng/L			
Perfluorohexane sulfonic acid (PFHxS)	ND	10 ng/L			
Perfluorobutane sulfonic acid (PFBS)	3.4	NA			
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	ND	NA	NA	NA	
1H, 1H, 2H, 2H-Perfluorodecane sulfonic acid (8:2FTS)	ND	NA	NA	NA	
1H, 1H, 2H, 2H-Perfluorohexane sulfonic acid (4:2FTS)	ND	NA	NA	NA	
1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2FTS)	ND	NA	NA	NA	
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	NA	NA	NA	
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	ND	NA	NA	NA	
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	NA	NA	NA	
Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA)	ND	NA	NA	NA	
Perfluoro-3-methoxypropanoic acid (PFMPA)	ND	NA	NA	NA	
Perfluoro-4-methoxybutanoic acid (PFMBA)	ND	NA	NA	NA	
Perfluorobutanoic acid (PFBA)	4.2	NA	NA	NA	
Perfluorodecanoic acid (PFDA)	ND	NA	NA	NA	
Perfluorododecanoic acid (PFDoA)	ND	NA	NA	NA	
Perfluoroheptane sulfonic acid (PFHpS)	ND	NA	NA	NA	
Perfluoroheptanoic acid (PFHpA)	ND	NA	NA	NA	
Perfluorohexanoic acid (PFHxA)	ND	NA	NA	NA	
Perfluoropentane sulfonic acid (PFPeS)	ND	NA	NA	NA	
Perfluoropentanoic acid (PFPeA)	ND	NA	NA	NA	
Perfluoroundecanoic acid (PFUnDA)	ND	NA	NA	NA	

Notes:

a. Sodium does not have an established MCL per OEGBD. Monitoring is required so concentration levels can be made available on request.

b. The Hazard Index is calculated by dividing the detected concentration of FHxS, PFNA, HFPO-DA (GenX), or PFBS (in ng/L or ppt) by its associated Health Based Water Concentration. The MCL for HI is 1 (unitless).

c. The Hazard Index is a tool used to address the cumulative risk of PFAS mixtures. It applies to mixtures containing two or more of the following: PFHxS, PFNA, GenX Chemicals, and PFBS. A PFBS level of 3.4 ppt by itself does not exceed any regulatory limit.