Singapore Area Coordinator Drinking Water Annual Consumer Confidence Report For Calendar Year 2023

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, Singapore Area Coordinator (SAC) 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, 2023 through December 31, 2023.

SAC is pleased to report the calendar year 2023's monitoring activities of our drinking water. Three (3) required Public Notifications (PN) are detailed at the end of this report. The PNs are 1) An inorganic contaminant exceedance that occurred in late 2023, 2) A Sanitary Survey audit review of SAC's data monitoring records found chlorine detection levels falling below required minimum levels in 2019 and 2020 that required a PN, and 3) Surface Water Treatment Rule (SWTR) compliance.

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, SAC is required to regularly test the installation's drinking water for contaminants and report the results on an annual basis.

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

In the latest compliance-monitoring period, SAC conducted tests for many contaminants, which have the potential to be present in drinking water. Table 1.0 identifies all contaminants detected in SAC 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 SAC compliant with U.S. standards. No additional water treatment is provided by SAC. 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. Aluminum 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 SAC uses EPA-certified laboratories and approved methods.

The following contaminants and parameters are monitored:

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

Table 1.0 lists contaminants detected during the last applicable sampling period. The samples were collected directly from water fixtures at selected locations throughout the SAC water distribution system

in our AOR housing and industrial areas of SAC. 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/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 SAC'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: http://water.epa.gov/lawsregs/rulesregs/sdwa/arsenic/index.cfm

Inorganic contaminants, 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: http://water.epa.gov/drink/contaminants/basicinformation/nitrate.cfm

Organic chemical contaminants, 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 has been used in a variety of industrial and consumer products around the globe, including in the U.S., since the 1940s. PFAS has been used to make coatings and products that are used as oil and water repellents for carpets, clothing, paper packaging for food, and cookware. They are also contained in some foams (aqueous film-forming foam or AFFF) currently used for fighting petroleum fires at airfields and in industrial fire suppression processes. 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 federal regulation for PFAS in drinking water?

On April 10, 2024, the US EPA established MCLs for a subset of PFAS chemicals.

Compound	MCLG (Public Health Goal)	MCL (Enforceable Limit)
PFOA	Zero	4 ppt
PFOS	Zero	4 ppt
PFHxS	10 ppt	10 ppt

PFNA	10 ppt	10 ppt
GenX (HFPO-DA)	10 ppt	10 ppt
Mixtures containing PFHxS, PFNA, GenX, and PFBS	Hazard Index: 1	Hazard Index: 1

MCL = maximum contaminant level; MCLG = MCL goal; ppt = parts per trillion or ng/L

EPA requires implementation of sampling in accordance with the new MCLs within three years of the publication date and implementation of any required treatment within five years.

These limits did not apply for the 2023 calendar year because they are yet to be published. However, the DoD proactively promulgated policies to monitor drinking water for PFAS at all installation owned and/or operated water systems at a minimum of every two years. The DoD policy states that if water sampling results confirm that drinking water contains PFOA and PFOS at individual or combined concentrations greater than the 2016 EPA health advisory (HA) level of 70 ppt, water systems must take immediate action to reduce exposure to PFOS or PFAS. For levels less than 70 ppt but above the 4 ppt level (draft at the time of policy publication), DoD committed to planning for implementation of the levels once EPA's published MCLs take effect.

Has SAC tested its water for PFAS in 2023?

Yes. In December 2023 samples were collected from Building 7-4 2nd floor SAC break room.

We are pleased to report that the drinking water test results were below the Method Reporting Limit (MRL) for all 25 PFAS compounds covered by the sampling method, including PFOA and PFOS. This means that PFAS was not detected our water system. In accordance with DoD policy, the water system will be resampled every two years for your continued protection

Water Quality Data Table
SAC 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 5090.1A. Only those contaminants detected during laboratory analysis are listed below. The water samples were collected from SAC facilities and analyzed by Marchwood Laboratory Services Pte. Ltd. an ISO / IEC 17025, 2019 Certified Laboratory.

Public Participation Opportunities and Contacts:

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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 Singapore Area Coordinator facilities. Please contact the SAC Environmental Division at DSN (315) 421 2052 for questions on drinking water in general.

Additional Information:
U.S. EPA Office of Water (www.epa.gov/safewater) 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 SAC.

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 the MCLGs as feasible using the best available treatment technology.

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

MRDL (Maximum Residual Disinfectant Level): The highest level of drinking water disinfectant routinely allowed in drinking water. Addition of a disinfectant is necessary for the control of microbial contamination.

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 contamination.

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 Singapore Area Coordinator, Public Works Department, Installation Environmental Program Director Officer, Mr. Chuck Sayon at (+65) 6750 2052 (DSN 315 421 2052) or email M-FE-NAVFAC-ENV-SINGAPORE@us.navy.mil.

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IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

Public Notification

Singapore Area Coordinator (SAC) had Levels of Thallium above EPA Drinking Water Standards

This Public Notification, originally issued in February 2023, and repeated for this Consumer Confidence Report.

The SAC water system recently did not meet an EPA drinking water standard. We identified this standard during our annual routine compliance sampling collections of water provided to SAC from the Singapore Public Utility Board's (PUB) Water Treatment Plant. Although this was not an emergency, as our customers, you have a right to know what happened, what you should do, and what we are currently doing to correct this situation.

We routinely monitor for drinking water contaminants to ensure water from Singapore PUB's plant is fit for human consumption. On Jan. 4, 2024, SAC received notice that a sample collected on Dec. 6, 2023, showed that our system exceeded the standard or maximum contaminant level (MCL) for Thallium (TI). The EPA standard for Tl is an MCL of 0.002 milligrams per liter (mg/L) [or 2 parts per billion (ppb)]. The Tl sampling was tested at 0.0069 mg/L, greater than the Tl MCL of 0.002 mg/L. A re-sampling for TI was collected on Jan. 5, 2024, and the results received on Jan. 9, 2024, were "Non-Detected" for TI.

What should I do?

- There is nothing you need to do. Do not boil your water or take other corrective actions. However, consult your primary healthcare provider if you have specific health concerns.

What does this mean?

- This is not an emergency. If it had been, you would have been notified within 24 hours. However, some people who drink water containing Thallium in excess of the MCL **over many years** could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.

What has been/is being done?

- A review of SAC sampling records going back 5 years (to 2019) indicate that results were either "Non-Detected" or below 0.002 mg/L in our annual samplings of Thallium.
- A re-sampling for Thallium was collected on 05 January 2024, results received on Jan. 9, 2024 were a "Non-Detected" for Thallium.

- Going forward, sampling for Thallium will be conducted quarterly (every three months) for one year to confirm that Thallium levels do not exceed the MCL. If sampling results remain below the MCL of 0.002 mg/L for one year, we will then return to annual sampling.

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IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

Public Notification

Singapore Area Coordinator (SAC) chlorine residual concentration in the distribution system was undetectable in more than 5% of the samples for three consecutive months.

The SAC water system did not meet an EPA drinking water standard. The chlorine residual concentration in the distribution system was undetectable in more than 5 percent of the monthly samples for two consecutive months, in November 2019, December 2019, and January 2020. We identified this standard during SAC's triennial 2022 Sanitary Survey audit of compliance testing data file records. As our customers, you have a right to know what happened, what you should do, and what has been done to correct this situation.

We routinely monitor for drinking water standards to ensure water from Singapore PUB's water is fit for human consumption. The minimum detectable concentration level of chlorine is about 0.2mg/L. In November 2019, 1 of 2 samples (50%) was <0.2 mg/L; in December 2019, 1 of 2 samples (50%) was <0.2 mg/L and in January 2020, 2 of 2 samples (100%) were <0.2 mg/L.

In the years of 2019 and 2020, undetectable chlorine residual concentrations were measured. Low combined chlorine residual concentrations were frequently measured in distribution system compliance samples. In CY2019, 12 of 24 measurements were at or below 0.2 mg/L. In CY2020, 10 of 24 measurements were at or below the 0.2 mg/L detection limit. Overall, in CY2019 and CY2020, 22 of 48 measurements were below the PUB minimum total chlorine residual concentration of 0.3 mg/L at the tap (measured as combined chlorine).

Chlorine testing, at that time, was done as free residual chlorine, whereby testing should have been done as total chlorine due to the fact that PUB uses chloramine disinfection system. This inaccurate measuring protocol for chlorine residuals (free chlorine) and equipment used for free chlorine field-testing is unable to detect below 0.02 mg/L.

In October 2021, the Marchwood Laboratory began measuring the chlorine residual as "total chlorine residual."

What should I do?

- There is nothing you need to do. Do not boil your water or take other corrective actions. However, consult your primary healthcare provider if you have specific health concerns.

What does this mean?

- This was not an emergency. If it had been, you would have been notified within 24 hours. Other drinking water standards were maintained with no exceedances in total coliform, pH and turbidity levels.
- As mentioned, free chlorine residuals and equipment used for free chlorine field-testing is unable to detect below 0.02 mg/L, while using a total chlorine protocols would have shown levels of chlorine below 0.02mg/L.

What has been/is being done?

- Sample testing is done using a total chlorine sampling protocols. Since this event, Chlorine compliance monitoring has not fallen below 0.2mg/L
- Standard Operating Procedures are now in place for immediate notification to PWD managers if total chlorine sampling should fall below 0.2mg/L so that mitigation measures (pipe-line flushing, upstream and downstream sampling collection) are initiated.

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IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

Public Notification

Singapore Area Coordinator (SAC) must meet U.S Navy Overseas Drinking Water standards as instructed by CNICINST 5090.1B and CNIC M 5090.1A, § 2.2.e: Compliance with Surface Water Treatment Requirements (SWTR).

The SWTR are robust and strict guidelines. Water systems must filter and disinfect surface water sources to achieve a certain level of microbial removal or inactivation. The SWTR sets specific performance criteria for filtration and disinfection processes. Water systems must also monitor water quality parameters, such as turbidity and disinfectant residuals, to ensure compliance with the rule.

This deficiency was previously classified as a Moderate Deficiency in 2017, before specific Navy guidance and requirements regarding SWTR compliance for overseas facilities not under Navy control. This is now classified as a Significant Deficiency. Enterprise-wide, the Navy has adopted the standardization that all SWTR sanitary survey findings are Significant Deficiencies.

SAC's water purveyor is Singapore's Public Utility Board (PUB), which is subject to its own sovereign requirements and not required to comply with the SWTR. The PUB water treatment plants provide conventional filtration and disinfection treatment and membrane filtration and disinfection treatment; however, SAC has been investigating PUB's processes for comparable and/or alternative compliance with Navy SWTR requirements.

In the meetings held with PUB in September 2023, the Navy was provided with schematic data documents and specifications regarding PUB's processes. These meetings also included interviews with PUB water processing managers. The outcome of these discussions was positive, with PUB officials indicating their awareness of the SWTR requirements and their apparent compliance with most of them. This includes meeting treatment plant design standards, turbidity performance standards for individual and combined filter effluent, membrane plant performance testing, and source and finished water monitoring.

What should I do?

- There is nothing you need to do. SAC continues to monitor PUB water quality and that SAC’s drinking water is safe and that we maintain our drinking water status as Safe and Fit for Human Consumption (ingestion, oral hygiene, cooking and bathing).

What does this mean?

- Investigation and communications with Singapore PUB officials regarding their drinking water production process are of a high quality maintained system. Monitoring data collected during the investigation and study have met SWTR compliance.

What has been/is being done?

- The success of the 2023 meetings and further review of the PUB information provided, DoN water managers were able submit a report, "Technical Report of Site-Specific Assessment of Lower Seletar and Johor WTPs dated January 2024" with analysis that supports alternative compliance with SWTR requirements are in place. In the report:
    - A description of the aspect of the current Water Treatment Process in Singapore and Malaysia and how they meet SWTR;
    - An analysis of compliance gaps, identifying how those gaps are addressed with additional information and analysis;
    - An analysis of the laboratory data from the additional monitoring for E. coli, turbidity, residual chlorine, and total chlorine to confirm effectiveness of PUB's water treatment; and
    - Consideration of information presented in the past sanitary surveys and risk assessment study.

Going forward, CNIC's Water Quality Oversight Council (WQOC) is in review of the technical report. We are expecting either WQOC approval that SAC's water system complies with the SWTR and/or that further recommendations will be forthcoming.

TABLE 1.0: Drinking Water Constituents Detected						
Substance	**Unit of Measurement**	**Level Detected**		**Regulated Levels (OEBGD and CNICINST M-5090.1)**	**Violation**	**Possible Sources of Contamination**
		Low	**High**		**Yes / No**	
Inorganic Contaminants						
Arsenic	**mg/L**	0.0036		MCL = 0.010 MCLG = 0	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Barium	**mg/L**	0.028		MCL = 2.0 MCLG = 2.0	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Mercury	**mg/L**	0.00016		MCL = 0.002 MCLG = 0.002	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Sodium*	**mg/L**	3.17		MCL = N/A MCLG = N/A	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Nickel*	**mg/L**	0.00069		MCL = N/A MCLG = N/A	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Antimony	**mg/L**	0.055		MCL = 0.006 MCLG = 0.006	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Thallium	**mg/L**	0.0069		MCL = 0.002 MCLG = 0.0005	Yes	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Fluoride	**mg/L**	0.49		MCL = 4.0 MCLG = 4.0	No	Water additive which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories
Nitrate (as Nitrogen)	**mg/L**	0.210	0.790	MCL = 10 MCLG = 10	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Nitrite (as Nitrogen)	**mg/L**	0.050	0.460	MCL = 1.0 MCLG = 1.0	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Total Nitrite & Nitrate (as Nitrogen)	**mg/L**	0.670	0.860	MCL = 10 MCLG = 10	No	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits
Disinfectant/Disinfection Byproducts						
Haloacetic Acids	**mg/L**	0.011	0.049	MCL = .06 MCLG = N/A	No	Byproduct of drinking water disinfection
Trihalomethanes (Total)	**mg/L**	0.025	0.057	MCL = .08 MCLG = N/A	No	Byproduct of drinking water disinfection
Total Chlorine	**mg/L**	0.22	2.01	MRDL = 4.0 MRDL = 4.0	No	Water additive used to control microbes
Microorganisms						
Total Coliform	**positive samples per month**	<1	<1	MCL = 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
Radionuclide						
Gross Alpha	**pCi/L**	1.96		MCL = 15 MCLG = 0.0	No	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation
Combined Radium-226 and -228	**pCi/L**	0.888		MCL = 5 MCLG = 0.0	No	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation

Beta particle and Photon Radioactivity (Gross Beta)	**pCi/L(screening testing)** Note: Additional testing and calculation for mrem/yr required if screening testing results >50pCi/L	3.31	MCL = 4 mrem/yr MCLG = 0.0 mrem/yr	No	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation

Volatile Organic Compounds (VOCs)						
Dichloromethane*	**mg/L**	<0.0005	0.0015	MCL = 0.005 MCLG = 0	No	Discharge from petroleum factories

Lead and Copper							
Substance	**Unit of Measurement**	**Level Detected**		**Regulated Levels (OEBGD and CNICINST 5090.1)**	**Violation**	**90th percentile**	**Possible Sources of Contamination**
		Low	**High**		**Yes / No**		
Copper	**mg/L**	0.0069	0.041	AL = 1.3 MCLG = 1.3	No	0.067	Corrosion of household plumbing systems: erosion of natural deposits
Lead	**mg/L**	<0.015		AL =0.015 MCLG = 0.0	No	<0.015	Corrosion of household plumbing systems: erosion of natural deposits

Per- and polyfluoroalkyl substances (PFAS)		
Constituent (ppt)	**Health Advisory Level (HA)**	**Locations sampled on 20 Dec 2023**
		Bldg. 7-4
1. 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	NA	ND
2. 1H, 1H, 2H, 2H-Perfluorodecane sulfonic acid (8:2FTS)	NA	ND
3. 1H, 1H, 2H, 2H-Perfluorohexane sulfonic acid (4:2FTS)	NA	ND
4. 1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2FTS)	NA	ND
5. 4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NA	ND
6. 9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	NA	ND
7. Hexafluoropropylene oxide dimer acid (HFPO-DA/GenX)	NA	ND
8. Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NA	ND
9. Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA)	NA	ND
10. Perfluoro-3-methoxypropanoic acid (PFMPA)	NA	ND
11. Perfluoro-4-methoxybutanoic acid (PFMBA)	NA	ND
12. Perfluorobutane sulfonic acid (PFBS)	NA	ND
13. Perfluorobutanoic acid (PFBA)	NA	2.3 ng/L
14. Perfluorodecanoic acid (PFDA)	NA	ND
15. Perfluorododecanoic acid (PFDoA)	NA	ND
16. Perfluoroheptane sulfonic acid (PFHpS)	NA	ND
17. Perfluoroheptanoic acid (PFHpA)	NA	ND
18. Perfluorohexane sulfonic acid (PFHxS)	NA	ND
19. Perfluorohexanoic acid (PFHxA)	NA	ND
20. Perfluorononanoic acid (PFNA)	NA	ND

21. Perfluorooctane sulfonic acid (PFOS)	70	ND
22. Perfluoro-octanoic acid (PFOA)	70	ND
23. Perfluoropentane sulfonic acid (PFPeS)	NA	ND
24. Perfluoropentanoic acid (PFPeA)	NA	ND
25. Perfluoroundecanoic acid (PFUnDA)	NA	ND

Notes: *Sodium and Nickel have no established MCL per OEGBD. Monitoring is required so concentration levels can be made available on request. This is one time sample with no high or low