Drinking Water Quality
Annual Report for Calendar Year 2022

Gwangju Air Base
(Published: June 2023)

This annual report summarizes the quality of water delivered by Gwangju Air Base (AB). Under the "Consumer Confidence Reporting Rule" of the federal Safe Drinking Water Act (SDWA) and Overseas Environmental Baseline Guidance Document, community water systems are required to report this water quality information to the consuming public. Presented in this report is information on the source of our water, its constituents, and the health risks associated with any contaminants. The goal of any water system is to provide the public with a safe and dependable supply of drinking water. At Gwangju AB, the drinking water system is safe and reliable.

"This report contains important information regarding your drinking water. Therefore, please have someone who can understand this report translate it for you. Please call Bioenvironmental Engineering at DSN: 315-782-6541 if you have any question regarding this report"

"이 보고서에는 귀하의 식수에 대한 중요한 내용이 실려있습니다. 그러므로 이 보고서를 이해할 수 있는 사람한테 번역해 달라고 부탁하시기 바랍니다. 보고서에 대한 질문은 생물환경공학과 315-782-6541 로 문의 하시기 바랍니다."

1. Drinking Water Sources for Gwangju Air Base

The primary water source for Gwangju AB is the Hwang Yong River. The water supplied to Gwangju AB is treated at the Duknam Water Treatment Plant (WTP). The Duknam WTP receives its water from the Juam Reservoir, which is supplied by the Hwang Yong River. The water then undergoes flocculation, settling, filtration, GAC (granulated activated carbon) filtration, and chlorination. There is a water treatment plant on Gwangju AB that performs disinfection of the water by chlorine addition prior to distribution to the base. For more information on these water sources, please contact Bioenvironmental Engineering (BE) Flight (8 OMRS/SGXB) at DSN 315-782-6541.

2. Common Sources of Drinking Water Contamination

Common sources of drinking water (both tap 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 human activity. Contaminants that may be present in source or untreated water include:

- ***Microbial contaminants***, such as viruses and bacteria, which 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 storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- ***Pesticides and herbicides***, which may come from agriculture, urban storm water runoff, and residential uses.
- ***Organic chemical contaminants***, including synthetic and volatile organics, which are by-products of industrial processes and petroleum production, and can come from gas stations, urban storm water runoff, and septic systems.
- ***Radioactive Contaminants***, which can be naturally occurring or the result of oil/gas production and mining activities.

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

Analysis is conducted by certified laboratories. The Drinking Water Working Group (DWWG), required by AFI 48-144 is held quarterly in the BE Conference Rm (Bldg. 409) and attended by members of the Water and Fuels Maintenance Shop (8 CES/CEOIU), Civil Engineering Environmental Element, and BE. The DWWG meets to address all local drinking water issues involving compliance, risk reduction, and continuous improvement. The DWWG has the authority to call a special meeting with Public Affairs (PA), Base Legal (JA), or other related members as needed. Consumers are welcome to attend this meeting; please call 315-782-6541 for more information.

3. Water Safety and Quality Assurance Responsibilities

Republic of Korea Air Force (ROKAF) manages the maintenance and operation of the primary drinking water supply and distribution system. ROKAF personnel operate on 24-hour work shifts to ensure the system is pressurized and that disinfectant levels are adequate at all times.

The BE Flight monitors the quality of the drinking water provided to consumers and addresses any health related concerns. Analysis is conducted by EPA-certified laboratories for all contaminants. Additionally, microbial contaminants analysis is conducted in the BE Lab (Bldg. 409, Rm 212) on a monthly basis.

The DWWG meets to address all local drinking water issues involving compliance, risk reduction, and continuous improvement. The DWWG has the authority to call a special meeting with Public Affairs (PA), Base Legal (JA), or other related members as needed. Consumers are welcome to attend this meeting. Please call 315-782-6541 for more information.

4. Drinking Water Monitoring

Kunsan AB BE Flight routinely monitors for over 80 contaminants using certified laboratories and approved methods in accordance with the 2020 Korean Environmental Governing Standards (KEGS) and EPA regulations.

- **Microbial contaminants**: Sampling is conducted monthly at distribution points (such as the water treatment plant, flight line clinic, BX and various other administrative and industrial work centers on base) to include analysis for the levels of chlorine in the water. During 2022, a total of 36 microbiological samples were taken with NO samples testing positive for contaminants.
- **Other contaminants (inorganic, pesticides & herbicides, organic chemical, and radioactive contaminants)**: Monitored at different frequencies as shown below on Table 1.

Table 1. Contaminant Groups and Monitoring Frequencies <as of 2022>

Contaminant	Chemical Name	Monitoring Frequency	Sampling Location
Microbial	Total coliform, Fecal coliform, pH, Free Available Chlorine	Monthly	Entry Point Bldg.2106 BX Food-court
Inorganic Compounds[1]	Metals, (e.g. lead, copper, selenium, arsenic, mercury, nickel, sodium, etc.)	Annually	Entry Point
	Nitrate, Nitrite	Annually	
	Asbestos	Once every 9 years	
Volatile Organic Compounds[2] (VOC)	Benzene, Trichloroethylene, Carbon Tetrachloride, etc.	Annually	Entry Point
Synthetic Volatile Organic Compounds[3] (SVOC)	Pesticides, Herbicides, PCBs, etc.	Annually	Entry Point
Disinfectant By-Products[4]	Total Trihalomethanes (TTHM) Total Haloacetic Acids (HAA5)	Annually	Entry Point
Lead & Copper[5]	Lead, Copper	Semi-annually	Gwangju AB: 7 locations
Radiological Compounds[6]	Gross Alpha and Beta, Radium 226 /Uranium 228	Every 4 years (all 4 quarters)	Entry Point
Non-Regulated Compounds[7]	PFOS/PFOA	Quarterly	Entry Point

[1]Inorganic compound list can be found in KEGS Chapter 3, Pg. 41, Table 3-4
[2]Volatile organic compound list can be found in KEGS Chapter 3, Pg. 44, Table 3-7
[3]Synthetic volatile organic compounds list can be found in KEGS Chapter 3, Pg. 47, Table 3-8
[4]Disinfectant By-Products monitoring frequency based on KEGS in Chapter 3, Pg. 48, Table 3-9
[5]Lead and Copper monitoring frequency based on KEGS in Chapter 3, Pg. 42-43, Table 3-6
[6]Radiological Compounds monitoring requirements based on KEGS in Chapter 3, Pg. 61, Table 3-10
[7]PFOS/PFOA monitoring requirements based on DoD Policy

5. Special Precautions

Although our water is safe to drink and meets all water quality standards, some individuals are more susceptible to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer and 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. These people should seek advice about drinking water from their health care providers.

Lead is a toxic material known to be harmful to human health if ingested or inhaled. Lead in the body can cause damage to the brain, kidneys, nervous system, and red blood cells. Children, infants, pregnant women, and their unborn children are especially vulnerable to lead. In children, lead has been associated with impaired mental and physical development as well as hearing problems. The harmful effects of lead in the body can be subtle and may occur without any obvious signs of lead poisoning. Blood levels as low as 10 micrograms per deciliter (ug/dL) are associated with harmful effects on children's learning and behavior. Minimizing sources of exposure to lead can help reduce the number of children with elevated blood lead levels. Although drinking water is not typically the primary source of lead exposure in children, it can contribute to total lead exposure. Lead can also be introduced into the body through soil and air, which contributes to the total amount of lead exposure. In response, the EPA has set a cumulative blood lead level of less than 10 ug/dL. Therefore, reducing the amount of lead in the drinking water is an important part of reducing a child's overall exposure to lead in the environment.

Copper: The primary sources of copper in drinking water are corrosion of household plumbing systems and erosion of natural deposits. Copper enters the water (leaches) through contact with the plumbing. Copper leaches into water through corrosion –the dissolving or wearing away of metal caused by a chemical reaction between water and plumbing. Copper can leach into water primarily from pipes, but fixtures, faucets (brass), and fittings can also be a source of copper contaminants. The amount of copper in your water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the water's acidity and its temperature. When water sits in copper pipes or plumbing containing copper for several hours or more, the copper may dissolve into the water. This means the first water drawn from the tap for the day may contain elevated levels of copper. **As a precaution, consumers are encouraged to flush water from their faucets for 60 seconds before consumption after the faucet has remained unused for four or more hours.**

6. Monitoring Results in Calendar Year 2022

Monitoring results are summarized in Table 2 (Gwangju AB Water System) and Table 3 (Non-Regulated Compounds).

Table 2. 2022 Gwangju AB Water System Detected Contaminants
<Detected Chemicals Only>

Substances	Violation? Yes / No	Units	Detected Level	MCLG	MCL	Last Sampled	Common Potential Sources in Drinking Water
			Annual Average		EPA (KEGS)		
Lead and Copper Monitoring Frequency: Semi-Annual							
Lead[1]	**No**	ppb	14	0	**15** (15)	Nov 2022	Leaching from pipes into water
Copper[2]	**Yes**	ppb	1,610	1,300	**1,300** (1,000)	Nov 2022	Leaching from pipes into water

Disinfectant By-Products Monitoring Frequency: Quarterly							
Total Trihalomethanes[3] (TTHM)	**No**	ppb	**29.5**	N/A	**80** (80)	Nov 2022	By-product of drinking water disinfection
Haloacetic Acids[4] (HAA5)	**No**	ppb	**12.9**	N/A	**60** (60)	Nov 2022	

Health Effects Information:

[1]Infants and children who drink water containing lead in excess of the action level may experience delays in their physical or mental development. Children may show slight deficits in attention span and learning abilities. Adults who drink this water over many years may develop kidney problems or high blood pressure.

[2]Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time may experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years may suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.

[3]Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience liver, kidney, or central nervous system problems, and may have an increased risk of getting cancer.

[4]Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.

Lead and Copper Notice:

During the semi-annual water sampling event conducted November 2022, Bioenvironmental Engineering (BE) collected water samples from base dormitories to test for lead and copper levels in the drinking water. Copper levels were over the EPA's Maximum Contaminant Level (MCL) 90th percentile for this monitoring period.

Should I be concerned?

Both EPA and United States Forces Korea (USFK) environmental regulations set advisory levels at very conservative action points and sampling protocols to find worst-case situations. The intent is to warn populations of potential health risk. In addition, the **health advisory level is based on a lifetime exposure of an individual consuming 2 liters of water every day. Considering that most individuals at Gwangju AB are stationed here for a less than a year, adverse health effects are highly unlikely.**

The results are high enough for us to notify consumers but are not high enough to be a concern for your health. Very high copper and lead levels are most harmful to adolescents/children and some adults with pre-existing conditions. Signs and symptoms associated with short-term exposure to elevated copper or lead levels include nausea, vomiting, diarrhea, stomach irritation and headaches. If you are experiencing signs or symptoms and believe it may be due to copper or lead exposure, please contact the 8th MDG at DSN 782-2273.

What is being done?

BE will continue sampling for lead and copper on a six-month-basis. BE, in coordination with Gwangju AB CE, will keep all residents posted on findings and recommendations.

What should I do?

BE recommends for residents to run their faucet for at least 30 seconds before consuming water. This action will flush out most copper particles – empirical evidence shows that copper levels decrease to negligible levels in the line by just letting your tap run for 30 seconds. NOTE: The risk of copper ingestion exposure from showering, washing hands, cleaning dishes, brushing teeth, and washing face is minimal. Please continue to adhere to flushing your lines prior to consuming water for drinking or cooking purposes.

Non-Regulated Compounds: Gwangju AB

Per-and Polyfluoroalkyl Substances (**PFAS**): Perfluorooctanoic Acid (PFOA), Perfluorooctane Sulfonate (PFOS) and 16 other substances. (EPA Method 537.1 for PFAS analysis)

Table 3. 2022 Gwangju AB Water System

<PFAS>

Location	Substances	Violation ? Yes / No	Units	Detected Level		EPA Health Advisory	MCL	Last Sampled	Common Potential Sources in Drinking Water
				Highest	Lowest		KEGS		
Non-Regulated Compounds Monitoring Frequency: Quarterly									
Water Entry Point	**PFOS/PFOA**	**No**	ppt	7	ND	**70**	N/A	Nov 2022	Synthetic fluorinated organic compounds, nonstick cookware, stain-resistant fabric and carpet, some food packaging and the Firefighting agent Aqueous Film Forming Foam AFFF.

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

PFAS are a group of thousands of man-made chemicals. PFAS have been used in a variety of industrial and consumer products around the globe, including in the U.S., for decades. Due to their widespread use and environmental persistence, most people in the United States have been exposed to certain PFAS. PFAS have 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) used for fighting petroleum fires.

Is there a federal regulation for PFAS in drinking water?

There is currently no federal drinking water standard for any PFAS compounds. In 2016, the U.S. Environmental Protection Agency (EPA) established a lifetime drinking water health advisory (HA) level at 70 parts per trillion (ppt) for individual or combined concentrations of PFOA and PFOS.
In 2020, Department of Defense (DoD) issued a policy to monitor drinking water for PFAS at all DoD owned and operated water systems at a minimum of every three 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 HA level, water systems would 1) take immediate action to reduce exposure to PFOS or PFOA, to include providing alternative drinking water; and 2) undertake additional sampling to assess the level, scope, and localized source of contamination.

What about the EPA's 2022 interim Health Advisories or proposed regulations?

EPA issued interim Health Advisories for PFOS and PFOA in 2022. However, these newer levels are below quantifiable limits (i.e., below detection levels). EPA announced a proposed regulation on PFAS drinking water standards for public comment on March 14, 2023. The Department supports EPA taking regulatory actions to address PFAS, including a drinking water standard for PFAS that will apply to all drinking water suppliers once final. DoD respects and values the public comment process on this proposed nationwide drinking water rule and looks forward to the clarity that a final regulatory drinking water standard for PFAS will provide.

In anticipation of this EPA drinking water regulation and to account for emerging science that shows potential health effects of PFOS and PFOA at levels lower than 70 ppt, DoD is evaluating its efforts to address PFAS in drinking water, and what actions we can take to be prepared to incorporate this standard, such as reviewing our current data and collecting additional sampling where necessary. The DoD remains committed to communicating and engaging with our communities throughout this process.

We are informing you that PFOA and PFOS were detected but below the 2016 EPA HA. Other PFAS compounds covered by the sampling method were detected above the method reporting limit (MRL) but EPA does not have a HA for these compounds at this time. PFOA and PFOS were below the 2016 EPA HA of 70 parts per trillion, we will continue to monitor the drinking water quarterly. In accordance with DoD policy, Gwangju AB will collect quarterly samples for PFAS for one year and then every two years thereafter as long as the results are below the 2016 EPA HA.

Terms Defined

DoD - Department of Defense.
EPA - United States Environmental Protection Agency.
HAA5 - Haloacetic Acids (bromochloroacetic acid, dichloroacetic acid, monobromoacetic acid, monochloroacetic acid, and trichloroacetic acid)
KEGS - Korean Environmental Governing Standards (KEGS).
Maximum Contaminant Level (MCL) - 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.
Maximum Contaminant Level Goal (MCLG) - The level of a contaminant in drinking water below which there is no expected health risk. MCLGs allow for a margin of safety.
N/A - Not applicable, No MCL established.
ND - Means not detected and indicates that the substance was not found by laboratory analysis.
Part per million (ppm) – 1/1,000,000; One ppm corresponds to 1 minute in 2 years, or a single penny in $10,000.
Part per billion (ppb) – 1/1,000,000,000; One ppb corresponds to 1 minute in 2,000 years, or a single penny in $10,000,000.
Part per trillion (ppt) – 1/1,000,000,000,000; One ppt corresponds to 1 minute in 2,000,000 years, or single penny in $10,000,000,000
TTHM - Total Trihalomethanes

For more information

Organization	DSN	Service Area
8 OMRS Bioenvironmental Engineering	782-6541	Drinking water quality concerns

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