

Drinking Water Quality Annual Report for Calendar Year 2023



Kunsan Air Base (Published: 1 July 2024)

This annual report summarizes the quality of water delivered by Kunsan 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.

"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 Kunsan Air Base

During calendar year 2023, Kunsan AB used a direct connection with the regional water purveyor (Gunsan City), K-Water, which obtains water from the Yongdam Reservoir. This surface water source is the secondary water source for Kunsan AB. The primary source of potable water supplied to the Kunsan Water Treatment Plant comes from the Okgu Reservoir. Okgu Reservoir is a surface water source primarily used for agriculture and is located approximately 2.5 kilometers northeast of Kunsan AB. The secondary water source was used for the entirety of 2023 due to the Kunsan Water Treatment Plant undergoing renovations. Please contact the Bioenvironmental Engineering (BE) Flight (8 OMRS/SGXB) at DSN 315-782-6541 for more information on these water sources.

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 (1-800-426-4791). The EPA prescribes regulations that limit the amounts 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.

3. Water Safety and Quality Assurance Responsibilities

The Water and Fuels System Maintenance (WFSM) Flight manages the maintenance and operation of the primary drinking water supply and distribution system. These personnel operate on 24-hour work shifts to ensure the system is pressurized and disinfectant levels are always adequate. The BE Flight monitors the drinking water quality provided to consumers on base and addresses any health-related concerns. Analysis is conducted by certified laboratories for all contaminants. Additionally, BE personnel analyze water samples for microbial contaminants on a monthly basis.

Department of Air Force Instruction 48-144 requires the Drinking Water Working Group (DWWG) to meet semi-annually and include representation from the WFSM Flight (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.

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 United States Forces Korea Regulation 201-1, also known as the Korean Environmental Governing Standards (KEGS) and EPA regulations. A breakdown of the categories of contaminants we monitor is as follows:

- ➤ *Microbial contaminants*: Sampling is conducted monthly at distribution points such as the fire department, dining facility, BX and various other administrative and industrial work centers on base to include analysis for the levels of chlorine in the water. During 2023, a total of 60 microbiological samples were taken with NO samples testing positive for contaminants.
- > Inorganic compounds: This list is in KEGS Chapter 3, Page 41, Table 3-4
- ➤ Volatile organic compounds: This list can be found in KEGS Chapter 3, Page 44, Table 3-7.
- > Synthetic volatile organic compounds: This list can be found in KEGS Chapter 3, Page 47, Table 3-8. This includes pesticides and insecticides which are administered by Installation Pest Management.
- Disinfection By-Products: These contaminants form in water from the reaction of chlorine with chemicals in the water. See Chapter 3 of the KEGS, page 48, Table 3-9.
- Lead and Copper: Lead and copper are present in older sections of the water distribution system. See Chapter 3, Page 42-43, Table 3-6 of the KEGS.
- **Radiological Compounds:** See Chapter 3, Page 51, Table 3-10 of the KEGS.
- > **PFOS/PFOA:** Monitoring requirements are based on DoD Policy.

Table 1. Contaminant Groups and Monitoring Frequencies as of 2023

Contaminant	Chemical Names	Monitoring Frequency	Sampling Location
Microbial	Total coliform, Fecal coliform, pH, Free Available Chlorine	Monthly	Fire Dept., Food Facilities, etc.
Inorganic	Metals: antimony, arsenic, barium, beryllium, cadmium, chromium, mercury, nickel, selenium, sodium, thallium	Annually	Entry Point (Bldg. 980)
Compounds	Nitrate, Nitrite, Fluoride, Cyanide	Annually	(Blug. 980)
	Asbestos	Once every 9 years	
VOCs	1,1,1-Trichloroethane, Chlorobenzene, cis-1,2-Dichloroethene, 1,1,2-Trichloroethane, 1,1-Dichloroethene, Benzene, 1,2,4-Trichlorobenzene, Ethylbenzene, p-Xylene, 1,2-Dichlorobenzene, Styrene, Tetrachloroethene 1,2-Dichloroethane, trans-1,2-Dichloroethene, Trichloroethylene, 1,2-Dichloropropane 1,4-Dichlorobenzene, Trichloroethene {TCE} Vinyl chloride, Carbon Tetrachloride, toluene	Quarterly Entry Point	
SVOCs	Pesticides, Herbicides, PCBs, etc.	Quarterly	Entry Point
DBPs	Total Trihalomethanes (TTHM) Total Haloacetic Acids (HAA5)	Quarterly	Entry Point Bldg. 3506
Lead & Copper	Lead, Copper	Semi-annually	40 locations
Radiological Compounds	Gross Alpha and Beta Radium 226, Uranium 228	Every 4 years (all 4 quarters)	Entry Point
PFAS Compounds	Per- and polyfluoroalkyl substances (PFAS) (29 compounds)	Semi-annually	Entry Point

5. 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/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

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. Gunsan City 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 www.epa.gov/safewater/lead.

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 30-60 seconds before consumption after the faucet has remained unused for four or more hours.

6. Monitoring Results in Calendar Year 2023

Monitoring results are summarized in the following tables.

Table 2. 2023 Detected Lead and Copper

Substance	Violation? Yes / No	Your Water (90 th Percentile)	KEGS Action Level (EPA Action Level)	# of Sites Above Action Level ²	EPA MCLG	Date Sampled	Common Potential Sources in Drinking Water	
Lead	No	2.94 ppb	15 ppb (15 ppb)	0 of 32 sites	0	Feb 2023	Corrosion of plumbing	
Lead	No	4.89 ppb	15 ppb (15 ppb)	2 of 38 sites	0	Aug 2023	systems; Erosion of natural deposits	
Copper	Yes ¹	1.09 ppm	1.0 ppm (1.3 ppm)	5 of 32 sites	1.3	Feb 2023	Corrosion of plumbing	
Copper	Yes ¹	1.12 ppm	1.0 ppm (1.3 ppm)	6 of 38 sites	1.3	Aug 2023	systems; Erosion of natural deposits	

¹ Refer to the paragraphs below and Table 6 for further details about this exceedance.

Lead and Copper Notice:

During the semi-annual water sampling events conducted in February and August 2023, Bioenvironmental Engineering (BE) collected water samples from base housing and dormitories to test for lead and copper levels in the drinking water. During these periods, the KEGS Action Level (AL) was exceeded. In recent years, a trend in higher copper levels has been observed through water quality monitoring records that exceeds the conservative KEGS AL for copper but has not always exceeded the EPA AL for copper. Note that during both monitoring periods in Table 2 above, the results were still below the EPA AL.

An AL exceedance is not a violation but can trigger other requirements that include water quality parameter (WQP) monitoring, corrosion control treatment, public education, and service line replacement. More information about these, and other requirements is described in the following paragraphs and in Table 6 of this report.

Should I be concerned?

Both EPA and United States Forces Korea (USFK) environmental regulations set conservative action levels (ALs). The AL is a measure of the effectiveness of the corrosion control treatment in water systems. The AL is not a standard for establishing safe levels of lead and copper in a home.

The AL for copper is exceeded if the concentration of copper in more than 10 percent of tap water samples collected during a monitoring period is greater than the 1.0 mg/L (KEGS drinking water requirement). If the AL for copper is exceeded, the

² 40 sites were sampled in accordance with KEGS guidance. However, during each sampling event a small number of samples were invalidated due to reasons such as lab error, mishandling, etc.

operator of that public water system (PWS) must take action to make the water in its drinking water distribution system less corrosive. Additionally, the EPA has established a copper maximum contaminant level goal (MCLG) of 1.3 mg/L. A MCLG is the level of a contaminant in drinking water below which there is no known or expected health risk. MCLGs allow for a margin of safety and are non-enforceable public health goals. The water monitored at Kunsan Air Base during calendar year 2023 was NOT higher than the EPA's MCLG, so there is no concern for your health.

Health Effects Information

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 could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.

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 experience signs or symptoms and believe it may be due to copper or lead exposure, please contact the 8th MDG at DSN 315-782-2273.

What is being done?

The BE flight is working with Civil Engineering on long-terms solutions. Kunsan Air Base has many old buildings whose water pipes have copper or lead components. Each year, several of these older buildings are decommissioned and replaced with new construction that does not have copper or lead in their water pipes. For calendar year 2024, a new Dining Facility and Dormitory are under construction to replace the current Dining Facility and an older Dormitory. Additionally, the Kunsan Water Treatment Plant (WTP) is undergoing renovation in 2024 and will include the replacement of components containing lead or copper. The new WTP will also include corrosion control treatment capabilities. We will continue sampling for lead and copper every six months per Table 3.6 of the KEGS. BE, in coordination with Airmen Dorm Leaders (ADLs), will keep all residents posted on findings and recommendations. To notify and educate installation personnel, all new members arriving to Kunsan in 2023 were briefed at the Korea Readiness Orientation on the presence of copper in their drinking water, and the recommendation to flush their taps to reduce this concentration in their drinking water.

What should I do?

We recommend residents run their faucet for at least 60 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 running your tap for 30-60 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. Boiling does not remove copper from drinking water.

	Walatian 9		Detected Level		Average		MCL	Last	Common Potential		
Substances	Violation? Yes / No	Units	Highest	Lowest	of all samples	of all MCLG		MCLG	EPA (KEGS)	Last Sampled	Sources in Drinking Water
Total Trihalomethanes ¹ (TTHM)	No	ppb	46.8	27	37.3	N/A	80 (80)	Dec 2023	By-product of drinking water disinfection		
Haloacetic Acids ² (HAA5)	No	ppb	29.4	0	7.35	N/A	60 (60)	Dec 2023	By-product of drinking water disinfection		

Table 3. 2023 Detected Disinfection By-Products

Health Effects Information:

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

¹⁾ 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.

Table 4. 2023 Detected Metals and Inorganic Chemicals

Substances	Violation? Yes / No	Units	Your Water	Range	MCLG	MCL	Last Sampled	Common Potential Sources in Drinking Water
Nitrate	No	ppm	4.99	N/A	10	10	Dec 2023	Runoff from fertilizer use; leaks from septic tanks, sewage; erosion of natural deposits
Barium	No	ppm	0.0095	N/A	2	2	Dec 2023	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Toluene ³	No	ppm	0.0308	N/A	1	1	Dec 2023	Discharge from petroleum factories
Sodium	No	ppm	41.4	N/A	N/A	N/A	Dec 2023	Occurs naturally
Fluoride ⁴	No	ppm	0.051	N/A	4	4	Dec 2023	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories.

Health Effects Information:

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 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 such as aqueous film-forming foam, or AFFF, used for fighting petroleum fires at airfields and in industrial fire suppression processes. PFAS compounds 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?

In May 2016, the EPA established a lifetime health advisory (LHA) level at 70 parts per trillion (ppt) for individual or combined concentrations of perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). Both compounds are types of PFAS. On 10 April 2024, the EPA published new drinking water standards for certain PFAS under the Safe Drinking Water Act (SDWA). AF is reviewing the EPA's new rule now and will incorporate these standards into future sampling and analysis efforts.

Out of an abundance of caution, DoD pursued PFAS testing and response actions beyond EPA SDWA requirements. In 2020, the DoD established a policy to monitor drinking water for 17 PFAS compounds at all service owned and operated water systems. If results confirmed the drinking water contained PFOA and PFOS at individual or combined concentrations greater than 70ppt, water systems quickly took action to reduce exposures. While not a SDWA requirement, in 2023, DoD improved upon its 2020 PFAS drinking water monitoring policy by expanding the list of PFAS compounds monitored to 29, implementing continued monitoring of systems with detectable PFAS over the laboratory Method Reporting Limits (MRL), and requiring initial mitigation planning actions.

³⁾ Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.

⁴⁾ Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling also known as dental fluorosis, may include brown staining and/or pitting of the teeth., and occurs only in developing teeth before they erupt from the gums.

Has Kunsan AB tested its water for PFAS?

Yes. In 2023, samples were collected during the dates and timeframes outlined in Table 5 below. We are informing you that 2 of the 29 PFAS compounds covered by the sampling method were detected above the Method Detection Limit (MDL). PFOA and PFOS were detected, but below 70ppt. Since PFOA and PFOS were below 70ppt, there is no immediate cause for concern, and we will continue to monitor the drinking water closely. In accordance with DoD policy, Kunsan AB will collect semi-annual samples for PFAS, and provide timely updates on the Kunsan Air Base website: https://www.kunsan.af.mil/About-Us/Environmental-Info/

Table 5. Per-and Polyfluoroalkyl Substances (PFAS)

Analyte	Source Water	Location	Result (ppt)	2016 EPA Health Advisory Level	Last Sampled	Violation? Yes / No
Perfluorooctanoic acid (PFOA)	Okgu	D14~ 2005	1.0	70 ppt (individual or com- bined)	Aug 23	No
Perfluorooctanesulfonic acid (PFOS)	Reservoir	Bldg 2005	4.0			No
Perfluorooctanoic acid (PFOA)	City	Bldg 980	1.1	70 ppt (individual or com- bined)	Aug 23	No
Perfluorooctanesulfonic acid (PFOS)	Supply		0.52			No
Perfluorooctanoic acid (PFOA)			ND	70 ppt		No
Perfluorooctanesulfonic acid (PFOS)	City Supply	Bldg 980	ND	(individual or com- bined)	Dec 23	No
Per- and polyfluoroalkyl substances (PFAS) (all 27 other chemicals)	.17		ND	N/A		No

Table 6. 2023 Kunsan AB Monitoring Violations

Monitoring Violation	Explanation	Health Effects	Steps Taken to Correct the Violation
Missed monitoring for asbestos	Monitoring for Asbestos is required once every 9 years in accordance with provisions in the KEGS and the EPA's Primary Drinking Water Regulations. A sample due for collection during calendar year 2021 was not collected on time but was collected in 2024.	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.	A sample for Asbestos was collected in April 2024, and results will be reported as part of next year's CCR. There is no risk to consumers and consumers do not need to take any further actions.
Failure to notify public of detectable PFAS levels	PFAS substances were detected in small amounts from a sampling event in Aug 2023, and results were still beneath Health Advisory Levels. However, a public notification of detectable PFAS levels was not issued in accordance with current DoD policy.	Current scientific research suggests that exposure to certain PFAS may lead to adverse health outcomes. However, research is still ongoing to determine how different levels of exposure to different PFAS may lead to a variety of health effects.	The drinking water from the city supply was re-sampled in Dec 23 and no detectable levels of PFAS were found. Water from the reservoir was not re-sampled since the base is currently not supplied by the reservoir. However, key stakeholders from Kunsan AB are evaluating future compliance risks and possible mitigation measures associated with the reservoir. There is no risk to consumers and consumers do not need to take any further actions.
Failure to make public notifications for Copper action level (AL) exceed- ances	Notification requirements outlined in the KEGS were not followed for copper action level exceedances discovered from sampling events in Feb and Aug 2023. The USFK medical authority, Lead Environmental Component (LEC), & installation personnel (U.S. and ROK) must be notified within 14 days.	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 could experience gastrointestinal distress. Some people who drink water contain- ing copper in excess of the action level over many years could suf-	Quality assurance checks for important water quality monitoring requirements have been implemented by Bioenvironmental Engineering (BE) to ensure that public notification procedures are not missed in the future.
Missed monitoring of additional water quality parameters	Follow-up monitoring for WQPs was not accomplished after the Feb and Aug 2023 sampling events.	fer liver or kidney damage. Peo- ple with Wilson's Disease should consult their personal doctor.	The BE Flight historically monitors WQPs as part of its standard sampling schedule. However, AL follow-up monitoring requires

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(WQPs) following a	Samples must be taken in duplicate	specific sampling protocols outlined in the
copper action level	at specific sites for pH, alkalinity,	KEGS. In the future, the BE flight will con-
(AL) exceedance	calcium, conductivity, water temper-	duct follow-up monitoring of WQPs after any
	atures, and other parameters to allow	AL exceedance per the KEGS.
	a corrosivity determination. This	
	corrosivity data was obtained during	
	each monitoring period, but not in	
	the manner prescribed in the KEGS.	

Terms Defined

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

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.

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 a single penny in \$10,000,000,000.

SWDA – The U.S. Safe Drinking Water Act is a law passed by Congress in 1974 to protect public health by regulation public drinking water supplies. This law contains multiple provisions and details are available at https://www.epa.gov/sdwa.

TTHM - Total Trihalomethanes

For more information

<u>Organization</u>	<u>DSN</u>	Service Area
8 OMRS Bioenvironmental Engineering	315-782-6541	Drinking water quality concerns
8 CES Water & Fuel Systems Maintenance	315-782-5519	Water treatment and distribution

E-mail: usaf.kunsan.8-mdg.mbx.8-omrs-sgxb@health.mil