

Grand Canyon National Park

2022 Drinking Water Quality Report

Drinking Water Standards

All sources of drinking water are subject to potential contamination by substances that are naturally occurring or man-made. As water travels over the land or through the aquifers, water can be expected to pick up contaminants such as microbes, organic and inorganic chemicals, radioactive materials, and substances resulting from the presence of animals or from human activity. Microbial contaminants, such as viruses and bacteria, may come from wastewater treatment plants, septic systems, livestock, and wildlife. Inorganic contaminants, such as salts and metals, can be naturally-occurring or result from wastewater discharges, industry, mining, or farming. Pesticides and herbicides may come from agricultural uses, runoff, and residential use. Organic chemical contaminants may come from industrial processes, runoff, and septic systems. Radioactive contaminants can be naturally-occurring or the result of mining activities.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (EPA) prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. For each contaminant, the EPA has set a maximum contaminant level (MCL). MCLs are set at very stringent levels and are well below any known health risk. A person would have to drink two liters of water every day for a lifetime at the prescribed MCL to have a one-in-a-million chance of developing the identified health problem.

Source Water Assessment

The Grand Canyon Water Utility has a Roaring Springs Water Risk Assessment that provides information on potential sources of contamination and our source protection areas. Based on the information currently available on the hydrogeological settings of and the adjacent land uses that are in the specified proximity of the drinking water source of Grand Canyon National Park, the Arizona Department of Environmental Quality (ADEQ) has given us a low risk designation for the degree to which Roaring Springs is protected. A low risk designation indicates that most source water protection measures are either already implemented, or the hydrogeology is such that the source water protection measures will have little impact on protection.



Important Health Information

All 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 the water poses a health risk. Some people may be more vulnerable to contaminants found in drinking water than the general population. Immuno-compromised people such as people with cancer undergoing chemotherapy, people who have undergone organ transplants, people with HIV / AIDS or other immune system disorders, some elderly people, and infants can be particularly at risk from infections. These people should seek advice about drinking water consumption from their health care providers. The EPA and the Centers for Disease Control provides guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants. Information is available from the EPA Safe Drinking Water Hotline (1-800-426-4791) or online at www.epa.gov/ogwdw.



Our Monitoring Program

Our drinking water is routinely monitored and tested by the Grand Canyon Water Utility according to the regulations established by the EPA, ADEQ, and the National Park Service. Our monitoring program includes testing for chemical and microbiological contaminants in order to ensure the continued safety of the drinking water. The Grand Canyon Water Utility is required to perform 40 microbiological tests of the potable water each month. The sampling sites are representative of the water quality throughout the distribution system, and have been approved by ADEQ. The Water Utility performs additional monitoring for microbiological contamination throughout the park with special attention to high-use locations. This additional monitoring includes residual chlorine, turbidity, pH, and temperature.

Definitions

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

Maximum Contaminant Level Goal (MCLG): 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.

Maximum Contaminant Level (MCL): the maximum permissible level for a contaminant in drinking water that is delivered to any person who is served by a public water system. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

(<): less than amount indicated.

Parts per Million (PPM) or Milligrams per Liter (mg/L): one part per million corresponds to one minute in two years or a single penny in \$10,000.

Parts per Billion (PPB) or Micrograms per Liter (ug/L): one part per billion corresponds to a single penny in \$10,000,000.

Turbidity

Turbidity is a measure of the cloudiness of the water caused by suspended particles. As a groundwater source, we are not required to monitor turbidity in the drinking water. However, the Grand Canyon Water Utility

continuously monitors the turbidity levels at Roaring Springs and throughout the potable water distribution system. In the spring, Grand Canyon National Park commonly experiences an increase in turbidity in the drinking water. This increased turbidity is caused by snow melt and spring rains recharging the aquifer. As water flows through rock formations, very small particles of inorganic material are dissolved and held in suspension in the water. These particles are too small to be completely removed by our separation process at the Roaring Springs pump house. This annual turbidity event has been evaluated, and no organic materials have been identified during these investigations. Although this dissolved inorganic material causes the water to be slightly cloudy, it is not a health risk to the public. However, this turbidity can interfere with the disinfection process at Roaring Springs, so we often increase the chlorine residual of the drinking water and increase our microbiological water testing until the turbidity has returned to a normal level.

Water Quality Monitoring Tables

The EPA requires public water systems in the United States to analyze contaminants that may be found in drinking water. The Grand Canyon Water Utility adheres to the schedule established by the EPA for monthly, quarterly, and annual testing. The results of this testing are presented in the tables below.

2022 Microbiological Analysis

In 2022, the Water Utility performed over 800 microbiological tests of the drinking water to rule out bacterial contamination. Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other potentially harmful bacteria are present. We are required to monitor our drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not our drinking water meets health standards.

Substance	Unit	MCL	MCLG	Result	Violation	Major Sources
Total coliform bacteria	Absent or Present	No more than 5% of samples positive per month	0	No positive results	No	Naturally present in the environment
E. coli bacteria	Absent or Present	0	0	No positive results	No	Human and animal fecal waste

2022 Nitrate Analysis

Drinking water with nitrate levels above 10 ppm is a health risk for infants less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant, and detected nitrate levels are above 5 ppm, you should ask advice from your health care provider. The EPA requires the Water Utility to test for nitrate once per year.

Substance	MCL	MCLG	Result	Violation	Major Sources
Nitrate (as Nitrogen)	10 ppm	10 ppm	0.16 ppm	No	Runoff from fertilizer use, leaching from septic tanks, sewage, erosion of natural deposits

2022 Arsenic Analysis

If arsenic is less than or equal to the MCL, your drinking water meets EPA's standards. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems. In August 2022, the Grand Canyon Water Utility conducted arsenic monitoring at Roaring Springs.

Substance	MCL	Result	Violation	Major Sources
Arsenic	10 ppb	1.2 ppb	No	Erosion of natural deposits, runoff from orchards, runoff from glass and electronics production wastes

Monitoring and Reporting Violations

In 2022 the Public Water System experienced seven violations due to pipeline breaks and equipment failures between March and December 2022. When this occurs, customers are notified of the loss of chlorination via posted public notices. After correcting the failure and pumping resumes, water utility operators collect water samples to ensure sufficient levels of disinfectant are present in the system before resuming distribution of drinking water. A multi-year project will begin in Spring 2023 to replace the pipeline and other Public Water System infrastructure which will reduce the number of failures across the system.

3/18/22 Loss of Chlorination Roaring Springs

6/26/22 Loss of Power Supply Roaring Springs

7/13/22 Transcanyon Pipeline Break

8/29/22 Transcanyon Pipeline Break

9/3/22 Transcanyon Pipeline Break

10/2/22 Loss of Chlorination Roaring Springs

12/18/22 Loss of Chlorination Roaring Springs

2022 Lead and Copper Analysis

The EPA requires the Grand Canyon Water Utility to test tap water from consumer's homes for lead and copper every three years. The Water Utility must ensure that water from customers' tap does not exceed the action levels in at least 90 percent of the homes sampled, called the 90th percentile value. In 2019, the lead and copper levels in the drinking water were below the action levels set by the EPA. Required testing was completed in 2022. All residences sampled did not exceed the action levels for both lead and copper.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. The Grand Canyon Water Utility is responsible for providing high quality drinking water, and works to keep the corrosivity of our water as low as possible. There are actions you can take to reduce your exposure to lead. When your water has been sitting for several hours, flushing your tap for 30 seconds to 2 minutes before using water for drinking and cooking minimizes potential exposure. Use cold water for cooking and preparing baby formula.

Do not boil water to remove lead. 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.

Substance	Action Level	MCLG	90% of taps were less than or equal to this value	Violation	Major Sources
Lead	90% of homes must not exceed 15 ppb	15 ppb	Non-detect	No	Corrosion of household plumbing systems; erosion of natural deposits
Copper	90% of homes must not exceed 1.3 ppm	1.3 ppm	0.66 ppm	No	Corrosion of household plumbing systems; erosion of natural deposits

2022 Disinfection Byproduct Analysis

The Water Utility disinfects the water supply with chlorine to inactivate any possible pathogens. While the use of disinfectants is essential to preventing the spread of pathogens, disinfectants may react with natural organic and inorganic matter to produce disinfection byproducts. The EPA Disinfection Byproducts Rule requires the Water Utility to perform quarterly monitoring for two disinfection byproducts: Trihalomethanes (THM) and Haloacetic Acids (HAA5). These tests are performed quarterly at four locations throughout the park.

Substance	MCL	1st Qtr Results	2nd Qtr Results	3rd Qtr Results	4th Qtr Results	Annual Average	Violation	Major Sources
Total Trihalomethanes (TTHM)	80 ppb	34--67 ppb	25--58 ppb	26--35 ppb	14--30 ppb	26 ppb	No	Byproduct of drinking water chlorination
Total Haloacetic Acids (HAA5)	60 ppb	6 - 19 ppb	7 - 22 ppb	6 - 9 ppb	2 - 4 ppb	18 ppb	No	Byproduct of drinking water chlorination

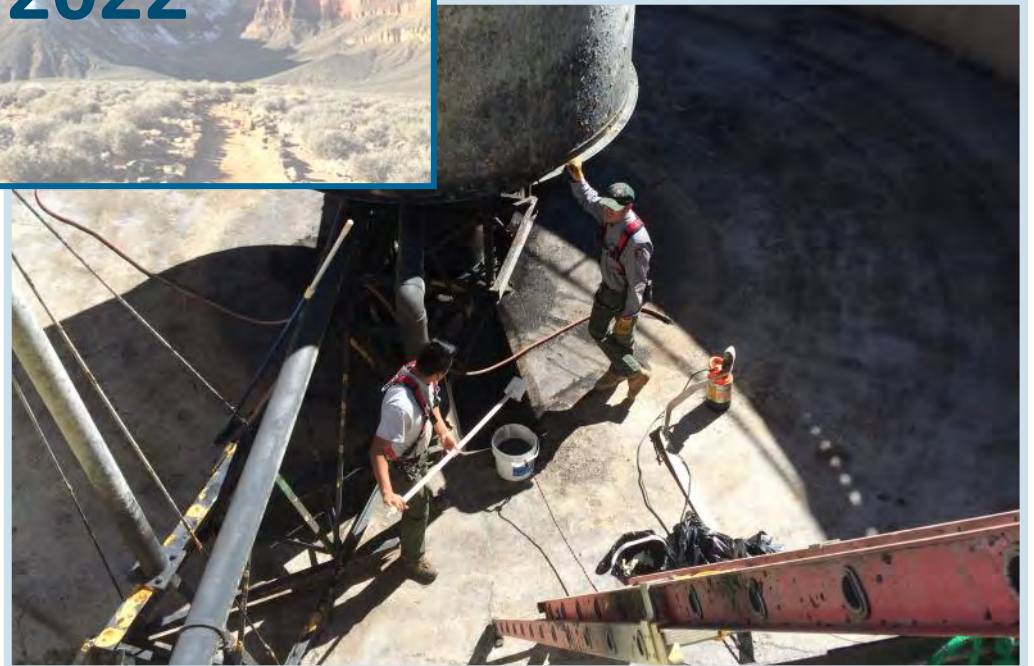
2021 Inorganic Analysis

The EPA has established monitoring cycles that require testing additional parameters every three years. The Grand Canyon Water Utility completed this monitoring in accordance with the EPA's drinking water regulations in 2021. Included in this cycle was volatile and semivolatile organizations, pesticides, herbicides, metals, and radium. There were no results above the MCLs and most results were below the detection level. The detected results of this testing are presented in the table below.

Substance	MCL	Result	Violation	Major Sources
Barium	2000 ppb	110 ppb	No	Discharge of drilling wastes or metal refineries, erosion of natural deposits
Chromium	100 ppb	<1.0 ppb	No	Discharge from steel and pump mills, erosion of natural deposits
Fluoride	4 ppm	<0.050 ppm	No	Erosion of natural deposits, discharge from fertilizer and aluminum factories



Grand Canyon Water Utility 2022



Roaring Springs



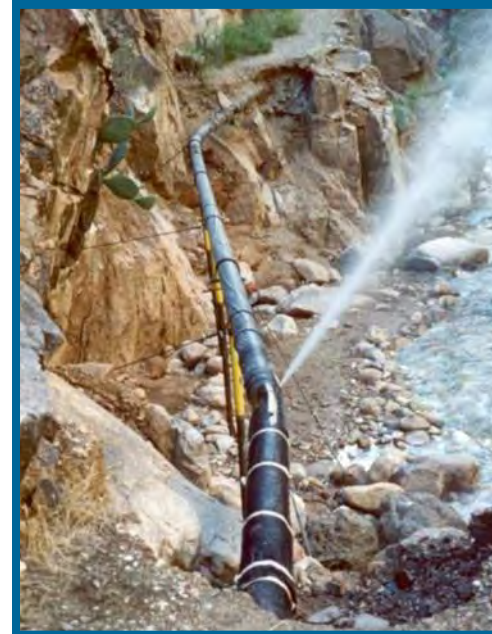
The source of Grand Canyon National Park's water is Roaring Springs, a spring from an underground aquifer on the north side of the Grand Canyon. This source water is classified as a groundwater supply, and provides over 400 million gallons of water per year to Grand Canyon National Park and some of the surrounding areas. At the Roaring Springs pump house, the water goes through a centrifugal separation process to remove any sand, grit, and rocks, and chlorine is added before the water is pumped to the North Rim or flows into the trans-canyon pipeline to travel to the South Rim.





Inner-Canyon Water Distribution

The trans-canyon pipeline is a 16 mile long pipe that moves 1.2 million gallons of water per day. Water moves through the pipeline by gravity from Roaring Springs to Havasupai Gardens. Breaks in the line occur several times each year, and are fixed as quickly as possible by Water Utility crews. After the intake valves at Roaring Springs and other in-line valves are closed and the pipe is drained, repairs can begin. Crews dig out the pipeline, cut out the broken section, and weld a new section of pipe. Once the pipeline is repaired, the valves are opened and the pipeline is flushed to remove any air, dirt, or contaminants that may have entered the line. Additional microbiological testing is performed during and immediately after pipeline breaks throughout the Park to ensure the continued safety of the drinking water.



Transcanyon Pipeline Replacement Project

Grand Canyon National Park prepares for \$208 million multi-year repair to Transcanyon Waterline that supplies water for local community and millions of park visitors

GRAND CANYON, Ariz. –The National Park Service (NPS) is preparing for a multi-year \$208 million rehabilitation of the Transcanyon Waterline (TCWL) and related upgrades to the associated water delivery system within the inner canyon and South Rim of Grand Canyon National Park. This critical investment will ensure the park is able to meet water supply needs for the next 50 plus years, supporting 6 million annual visitors and approximately 2,500 year-round residents.

Initial activity in late spring and summer 2023 will focus on establishing construction infrastructure and staging areas in the Grand Canyon Village Area on the park's South Rim. The NPS does not anticipate restrictions or closures in 2023 that would impact visitors. The TCWL replacement is projected for completion in 2027.

"This huge undertaking is an example of the work taking place in national parks across the country to repair or replace vital infrastructure that provides visitors with safer and more enjoyable experiences," **National Park Service Director Chuck Sams** said. "For too long, large scale needs in national parks could not be properly addressed due to a lack of funding. Bipartisan commitment from funding sources, including the Great American Outdoors Act and the Federal Lands Recreation Enhancement Act, is truly making a difference and enabling the National Park Service to effectively tackle critical upgrades."

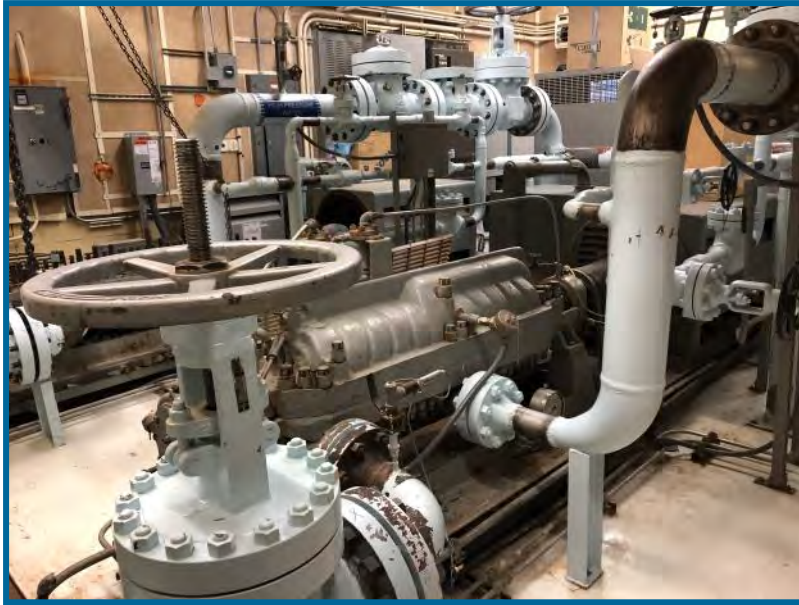
"It's taken years of planning, public involvement, design work and coordination to reach this milestone, and we're excited to work through the next phase to complete such a critical project that is the lifeline for our staff, residents and visitors," said **Grand Canyon National Park Superintendent Ed Keable**.

The NPS is replacing the TCWL because it is beyond its expected useful life, experiences frequent failures, and requires expensive and continuous inner canyon maintenance work to repair leaks. Since 2010, there have been over 85 major breaks in the TCWL that have each disrupted water delivery. Costs for a single isolated break often exceed \$25,000. Conditions in the inner canyon include extreme terrain and high temperatures which increase risk to employees during repair operations. The system also supplies water for fire suppression for all South Rim and inner canyon facilities, including over 800 buildings listed in the National Register of Historic Places.

Originally built in the 1960s, the TCWL is a 12 ½-mile waterline that provides the potable water for all facilities on the South Rim and inner canyon facilities within the park. The TCWL project will relocate the water intake for the water delivery system from Roaring Springs to Bright Angel Creek near Phantom Ranch. This location will greatly reduce the length of the TCWL and eliminate a portion of the current waterline north of Phantom Ranch that experiences the most frequent failures. The water intake at Roaring Springs will continue to provide water to the North Rim. The project includes:

- Construction of an auxiliary hangar, helicopter landing pad, and contractor support area at the park helicopter base in order to support inner canyon construction.
- Construction of a 1 million-gallon per day water treatment plant at the South Rim and a smaller water treatment plant at Phantom Ranch.
- Replacement of the water distribution system at Havasupai Gardens.
- Replacement of approximately 3 miles of waterline and the upgrade of approximately 3 miles of electrical supply line from Havasupai Gardens to Phantom Ranch.
- Construction of a water intake system and pumping station and local water treatment plant for the Phantom Ranch area.

Havasupai Gardens Pumphouse



Tank Farm

Water is pumped from the Havasupai Gardens Pump House to the tank farm on the South Rim. When full, potable water storage tanks on the South Rim hold a combined 14 million gallons of water. Water is then pumped to Desert View and distributed throughout the South Rim. The Water Utility monitors the water usage and water quality throughout the Park.

Water Haul Operation



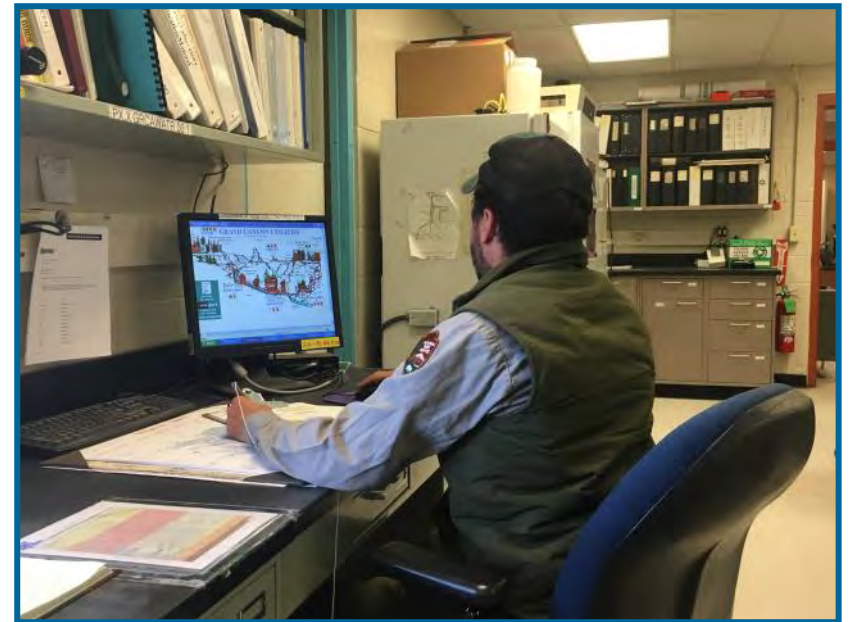
The Water Utility provides drinking water to all developed areas within the Park, including four sites which are not on the potable water distribution system, and the surrounding Kaibab National Forest Service areas.

State-Certified Environmental Laboratory

The Water Utility runs a laboratory certified by the Arizona Department of Health Services to perform water, wastewater, and solid waste analyses, including microbiological testing for drinking water. The laboratory staff submit over 100 compliance reports each year.



Our Supervisory Control and Data Acquisition (SCADA) program allows for the monitoring and operational control of all utility sites throughout the Park.





Wastewater Treatment

The Grand Canyon Water Utility operates an extensive wastewater collection system and four wastewater treatment plants. Operators run the plants 365 days per year to treat the wastewater of residents and visitors to Grand Canyon National Park.

Vault Toilet Operation

Operators pump, clean, and maintain twenty-five 1,000 gallon vault toilets every day. The use of vault toilets means that the Park uses less potable water and protects our groundwater resources.



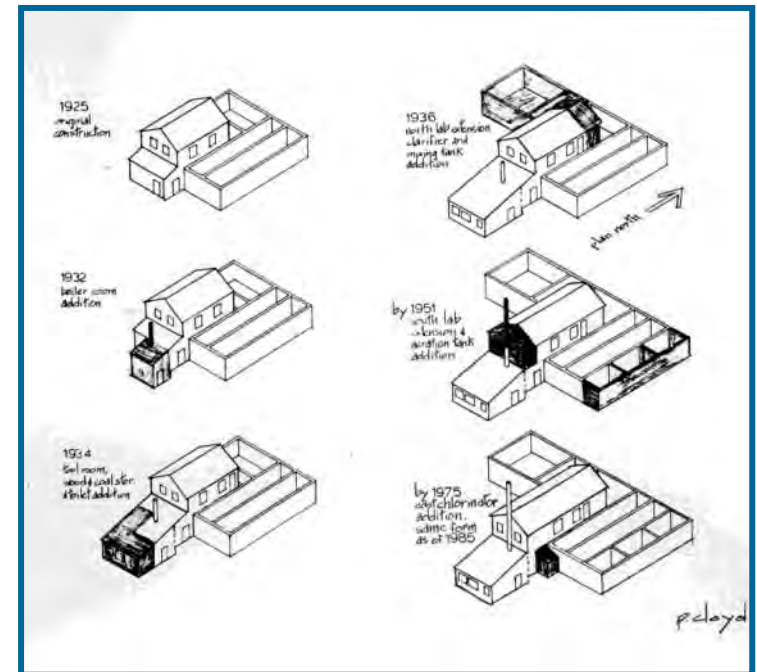
Water Conservation

Reclaim water use at Grand Canyon began in 1926, when one of the first reclaim water plants in the United States was built just west of the village. It was originally built because of concerns over water shortages in the development of Grand Canyon National Park. In the 1970s, an updated reclaim treatment plant was built next to the South Rim Wastewater Treatment Plant. The current reclaim water treatment plant treats the South Rim wastewater to a level that is approved for irrigation, construction, toilets, and other non-drinking purposes. The South Rim of Grand Canyon uses approximately 40 million gallons of reclaim water each year. Our use of treated reclaim water allows us to reduce the amount of water we take from Roaring Springs.



The Grand Canyon Water Utility is committed to water conservation and the economical uses of resources. All of Grand Canyon's water comes from a single spring and we value this water resource. The Water Utility works hard to ensure that our water is used efficiently.

Several times throughout the year, it may be necessary to implement water use restrictions, and even restrict use to essential services only. This is often due to pipeline breaks or maintenance of the water pumps at Havasupai Gardens. We appreciate your cooperation during these times.



We are pleased to present the 2022 Grand Canyon Water Utility Drinking Water Quality Report. This report includes information about where our water comes from and how our water quality compares to State standards. In 2022, as in years past, our tap water met all drinking water health standards set by the Arizona Department of Environmental Quality and U.S. Environmental Protection Agency (EPA). We want you to be confident in the quality of the drinking water supplied to your tap, and to understand the efforts that we make to continually improve the water treatment processes and to protect our water resources.

If you have any questions or comments about this water report or your public water supply, please contact the GRCA Water Utility at (928) 638-7898 or (928) 638-7790.