

2022
**WATER
QUALITY**
ANNUAL REPORT

Central Arizona Water Conservation District
Water Transmission



YOUR WATER

Central Arizona Project (CAP) reliably delivers Colorado River water from Lake Havasu, located on Arizona’s western border, to central and southern Arizona. The total CAP system is 336 miles long and consists of open canals, inverted siphon pipelines, tunnels, pumping plants, check structures, turnouts, and the Lake Pleasant storage reservoir.

The CAP system provides a means for nearly 1.5 million acre feet (MAF) of Arizona’s Colorado River allotment (totaling 2.8 MAF) to be delivered to the most populous areas of the state and reduce the use of groundwater for municipalities, agriculture, and other activities.

Central Arizona Water Conservation District (CAWCD), with more than 80 long-term stakeholders, is Arizona’s largest supplier of renewable water. Stakeholders are categorized in three distinct user groups: municipal and industrial (M&I), agricultural, and tribal. They use CAP’s Colorado River water to run businesses, water crops, and maintain households, all of which are critical to the quality of life in Arizona.

“Water is the most critical resource issue of our lifetime and our children’s lifetime.”

- Luna Leopold



CAP WATER SOURCES

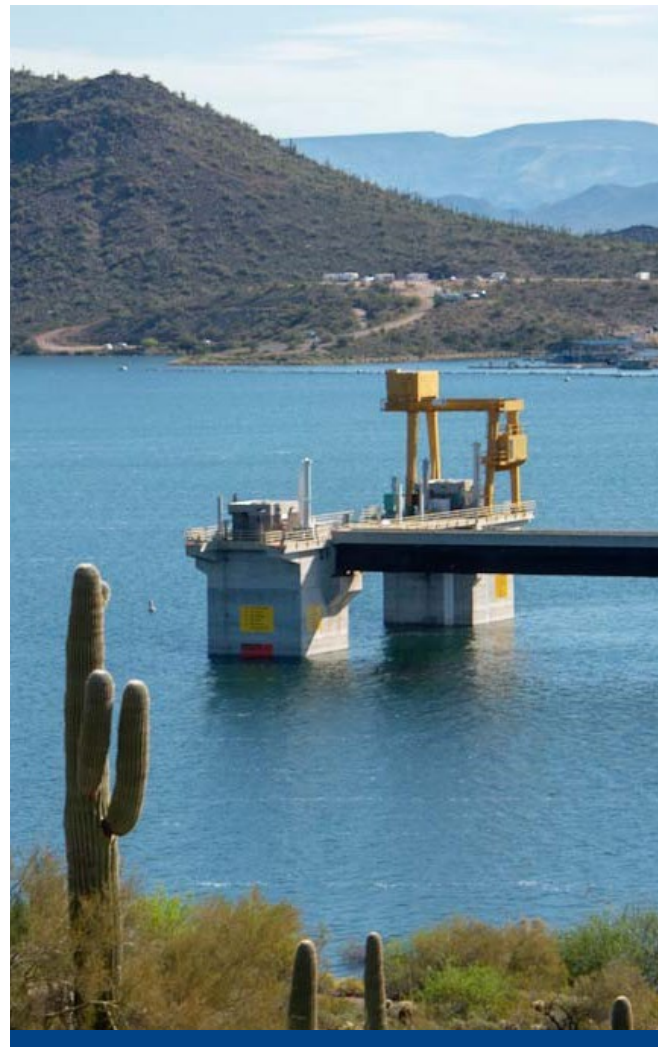
CAWCD does not provide potable water directly to the public, but supplies raw Colorado River water to its various stakeholders. The primary CAP intakes are at the southern-most portion of Lake Havasu, at a depth of approximately 24 feet.

Lake Pleasant is CAP's 10,000 surface-acre storage reservoir and is located just north of Phoenix. The reservoir is strategically utilized based on demand, while taking advantage of the lowest power rates possible. In general, Colorado River water is pumped into Lake Pleasant from October to May, and water is drawn from the reservoir during summer months. Therefore, depending on the time of year, CAP stakeholders may receive water that solely originates from the

Colorado River, or a blend of water from the river and Lake Pleasant.

Each of these sources presents its own unique challenges. The surface waters are exposed to various watershed-related events and activities, such as stormwater runoff, treated wastewater discharge, recreation, wildlife, algal blooms, and other factors that may affect water quality.

While agricultural stakeholders may directly utilize raw CAP water, municipal and industrial stakeholders filter, disinfect, and apply other necessary treatments to the water before it is delivered through distribution systems for domestic use.



CAP HISTORICAL WATER QUALITY

From 1985 to 1995, the United States Bureau of Reclamation (USBR) and CAWCD cooperated with the United States Geological Survey (USGS) to implement a water quality sampling program. USGS collected monthly and quarterly grab samples at three sites in the CAP system and tested more than 50 parameters. Historical CAP water quality data can be viewed by entering “CAP Canal” as the Site Name on the USGS Water Quality website:

[Historic Water Quality Data](#)

In 1996, CAWCD took over the water quality sampling program and expanded the scope to include additional sites and parameters. Since that time, CAWCD has produced Annual Water Quality reports, which summarize water quality measured in the canal throughout the calendar year. Reports from the past five years are available on CAP’s AquaPortal website:

[CAP AquaPortal - Annual Reports](#)

Reports from 1996–2017 reports are available upon request.



CAP WATER QUALITY PROGRAM

MISSION

The Water Quality Program (Program) provides information and recommendations to CAP Operations and Maintenance to help maintain the quality of CAP water; the Program ensures that Non-Project sources comply with established standards; the Program supports the overall goal of its Municipal Stakeholders by providing a broad understanding of raw water quality conditions; and the Program supports all other Stakeholder groups by providing valuable water quality information that helps to achieve their individual goals.

The Program employs a monitoring approach that consists of both continuous (real-time) measurements and monthly/quarterly grab samples. Sampled constituents align with the [Non-Project Water Guidance Document](#), but also includes additional constituents that may be of public interest.

A comprehensive database management system is utilized to store historical and current water quality data, and a user-friendly website has been created to make the data available to the public ([CAP AquaPortal](#)).

CONTINUOUS MEASUREMENTS

CAWCD monitors basic water quality in near real-time at two locations along the canal; CAP Headquarters (7th Street) and at the Roosevelt Water Conservation District turnout in Mesa, AZ. Both stations utilize a Hydrolab DS5X multiparameter meter to measure temperature, conductivity, pH, and dissolved oxygen. Meters are calibrated and maintained monthly to provide reasonably accurate data. Data is uploaded from each water quality meter every 15 minutes and displayed on [AquaPortal - Current Conditions](#).

Real-time turbidity sensors are currently installed at five permanent locations, including Mark

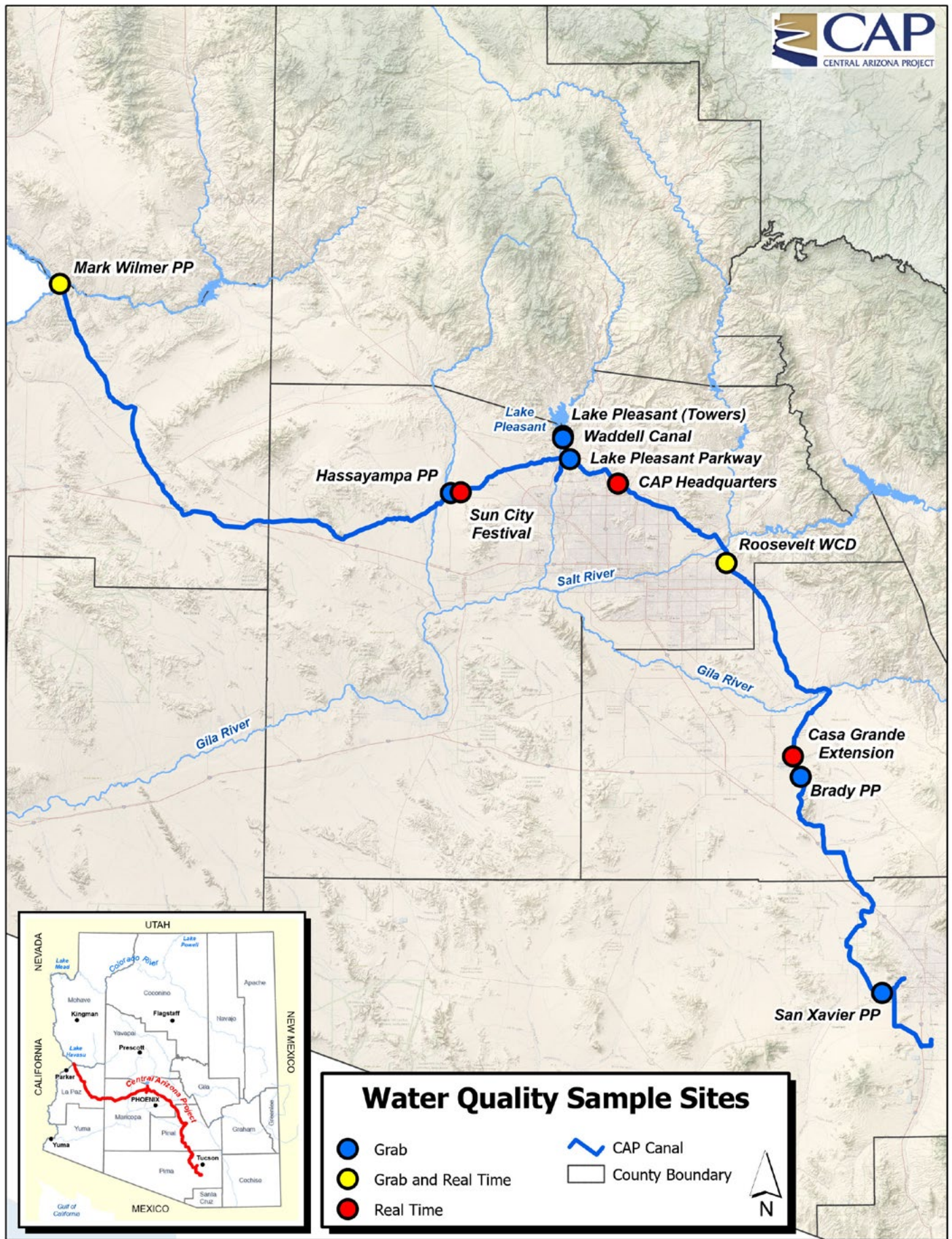
Wilmer Pumping Plant, Sun City Festival, CAP Headquarters, Roosevelt Water Conservation District Turnout, and the Casa Grande Extension Turnout (see map on Page 6). These sensors upload data to [AquaPortal - Current Conditions](#).



GRAB SAMPLES

Monthly grab samples are collected at seven locations, including Mark Wilmer Pumping Plant, Hassayampa, Waddell Canal, Lake Pleasant Parkway, Roosevelt Water Conservation District Turnout, Brady Pumping Plant, and San Xavier Pumping Plant (see map on page 6). Each monthly sample includes testing for 47 water quality “priority constituents” (as listed in Table A-1 of the Guidance Document), as well as 26 additional constituents. Quarterly samples are collected from four sites (Lake Havasu, Lake Pleasant, Lake Pleasant Parkway, and San Xavier Pumping Plant). In 2022, samples were not collected in the fourth quarter (Nov), due to laboratory complications. Quarterly samples include the monthly constituents, 198 contaminants listed in Table A-2 of the Guidance Document, and 173 additional contaminants.

CAWCD contracts with State of Arizona licensed laboratories to perform the water quality analyses. Verified results for priority constituents are posted on [AquaPortal - Data Set](#). Results for the remaining constituents, which are not commonly detected in the CAP system, are available upon request.



Water Quality Sample Sites

<ul style="list-style-type: none"> ● Grab ● Grab and Real Time ● Real Time 	<ul style="list-style-type: none"> CAP Canal County Boundary
--	--

2022 MONITORING RESULTS

Although the CAP system is not regulated as a Water of the United States, CAWCD tests for a wide range of constituents to inform stakeholders of the quality of water that they are receiving. As previously mentioned, the CAWCD baseline monitoring program aligns with the [Guidance Document](#) for Introducing Non-Project Water. The Guidance Document identifies 47 priority constituents with Introduction and Delivery standards, and nearly 200 additional contaminants that should not be introduced (non-detect).

In 2022, the third-party laboratory used by CAP was in a transitional state and subcontracted various analyses throughout much of the year. Although there is confidence in the test results, laboratories utilized varying MRL's, so comparisons of results to previous years are more difficult to interpret (see Table on pages 8-9). Regardless, seven constituents were more than 5% higher than measured in recent years, including Bromide, Chloride, Lead, Manganese, Potassium, Vanadium, and Turbidity. Increases in several of these constituents are likely related to re-suspension of sediments (compounds bound to sediment particles), but some of the increases may also be a result of biological activity (e.g. Potassium). In either case, the potential for reduced flows (due to water supply shortage) may result in a continued increase in these, and other, constituents in the CAP system.

There were occasional spikes in various other priority constituents which were likely related to the transitioning from Lake Pleasant to Colorado River water in fall, or random runoff events in spring. A complete table of priority constituent values at each sample site is included in Appendix A.

Of the 198 constituents listed in Table A-2 of the Guidance Document, just five were detected in the CAP system in 2022. Those contaminants are listed in the table on Page 10, followed by a short description of the contaminant and its potential sources.

The contracted laboratories also include an additional 173 contaminants and naturally occurring substances in quarterly reports. These substances are not included in the Guidance Document, but can be detected with the applied testing methods. In 2022, there were five natural substances detected (cyanotoxins, minerals, and nutrients), and 14 synthetic substances detected (see list on right). Each of these constituents was detected at very low levels and only sporadically throughout the system. The synthetic substances are typical of what may be found downstream of recreational water bodies.

Detected Constituents not included in Table A-2
Natural Substances
Cyanotoxins
• Cylindrospermopsin
Minerals
• Magnesium
• Silica
Nutrients
• Orthophosphate as P
• Orthophosphate as PO4
Synthetic Substances
Artificial Sweeteners
• Acesulfame-K
• Sucralose
Hormones
• Norethisterone
• Testosterone
Insect Repellents
• DEET
Medications
• Acetaminophen
• Meprobamate
• Primidone
• Propanal
• Sulfamethoxazole
• Theophylline
Steroids
• Androstenedione
Stimulants
• 1,7-Dimethylxanthine
• Caffeine

SYSTEM-WIDE RANGES AND AVERAGES

2022 Summary of Priority Constituents

Constituent	Units	MRL ¹	2022 Range	2022 Average	CAP 5-Yr Average (2017-2021)
Field Measurements					
Dissolved Oxygen	mg/L		4.84 - 11.09	9.09	9.21
pH	Units		7.14 - 8.6	8.21	8.07
Specific Conductance ²	µS/cm		809 - 943	885.10	926.54
Temperature	°F		51.8 - 89.7	67.89	67.19
Laboratory Results					
Alkalinity	mg/L	1; 2	98 - 130	125.30	123.54
Aluminum (Dissolved)	mg/L	2; 20	ND - 3.3	8.34	11.15
Aluminum (Total)	µg/L	2; 20	ND - 1300	114.24	67.82
Ammonia Nitrogen	mg/L	0.03; 0.05, 0.1	ND - 0.32	0.04	0.03
Antimony (Total)	µg/L	1	Non-Detect	Non-Detect	Non-Detect
Arsenic (Total)	µg/L	1	1.7 - 4.2	2.70	2.79
Barium (Total)	µg/L	2	110 - 150	116.86	116.27
Beryllium (Total)	µg/L	0.3; 1	Non-Detect	0.42	Non-Detect
Boron (Total)	mg/L	0.025; 0.05	0.12 - 0.17	0.14	0.13
Bromide	µg/L	5; 10	73 - 160	88.93	80.82
Cadmium (Total)	µg/L	0.5	Non-Detect	Non-Detect	Non-Detect
Calcium (Total)	mg/L	0.1; 1	57 - 95	70.84	70.22
Chloride	mg/L	0.5; 2.5; 5; 10; 20	90 - 120	98.98	90.84
Chromium (Total)	µg/L	0.9; 1	ND - 3.1	0.61	0.60
Cobalt (Total)	µg/L	2	Non-Detect	Non-Detect	1.02
Copper (Dissolved)	µg/L	1; 2	ND - 2.8	1.14	Non-Detect
Fluoride	mg/L	0.05	0.31 - 0.4	0.34	0.33
Gross Alpha	pCi/L	0.37 - 3	0.5 - 13	3.50	3.11
Gross Beta	pCi/L	2.4 - 4	ND - 20.9	5.39	5.27
Hexavalent Chromium	µg/L	0.02	ND - 0.15	0.03	0.05
Iron (Dissolved)	mg/L	0.01	ND - 0.018	0.01	0.01
Lead (Total)	µg/L	0.5	ND - 1.4	0.29	0.27
Manganese (Total)	µg/L	0.4; 2	ND - 57	7.44	5.79

¹ MRL's varied in 2022, as the primary laboratory used by CAP was in a transitional period

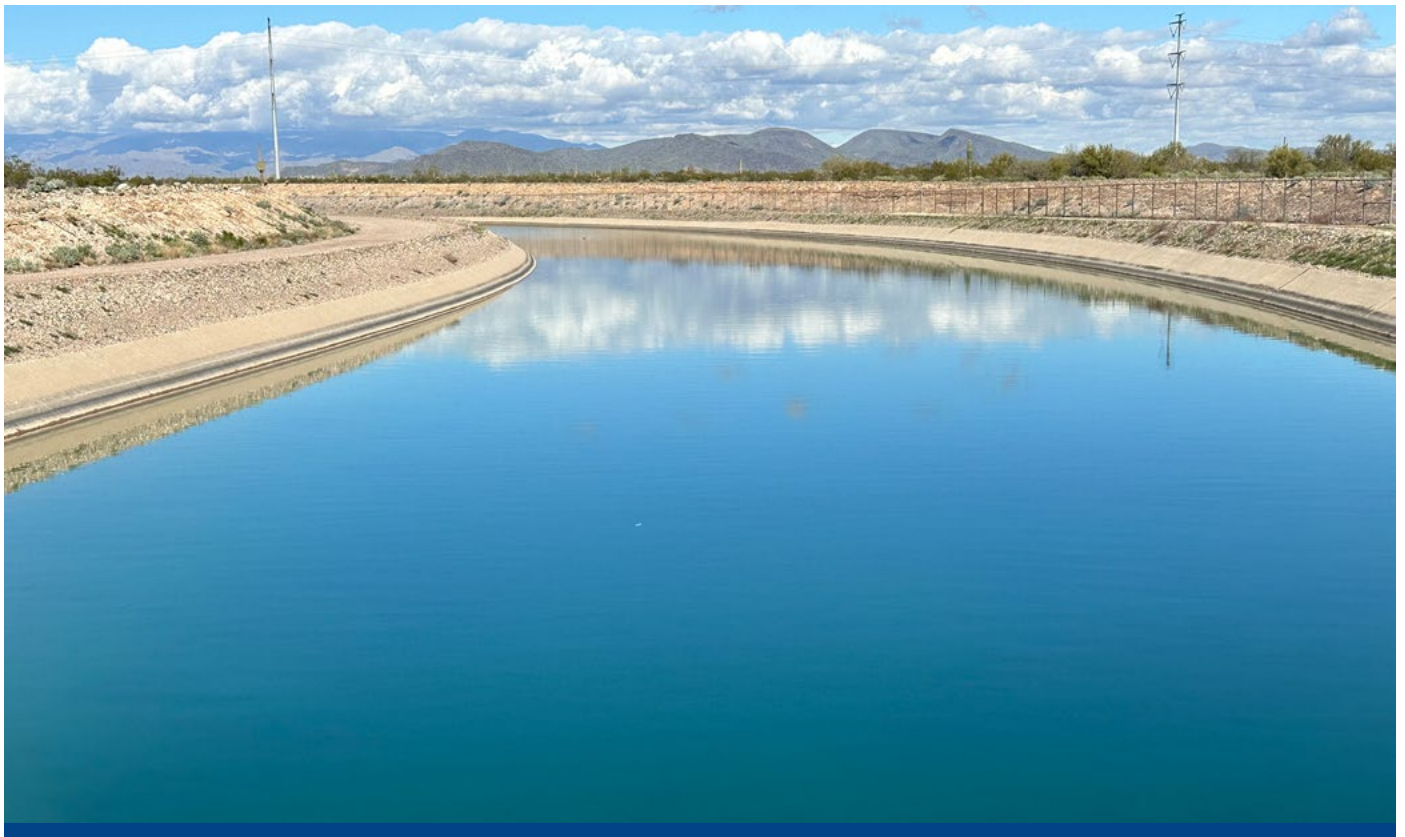
² Not included as part of the 10/26/20 DRAFT Guidance Document

RANGES AND AVERAGES (CONTINUED)

Constituent	Units	MRL	2022 Range	2022 Average	CAP 5-Yr Average (2017-2021)
Laboratory Results (cont.)					
Mercury	µg/L	0.1; 0.2	Non-Detect	Non-Detect	Non-Detect
Molybdenum (Total)	ug/L	2	4.2 - 5.5	4.60	4.54
Nickel (Total)	µg/L	1; 5	ND - 2.4	2.28	Non-Detect
Nitrate	mg/L	0.05; 0.1; 0.25; 0.5	ND - 0.38	0.18	0.09
Nitrite	mg/L	0.01; 0.05; 0.25; 0.5	ND - 0.026	0.07	0.03
Perchlorate	µg/L	0.05; 0.1; 0.25; 0.5; 2	ND - 4.1	0.99	1.49
Potassium (Total)	mg/L	0.2; 1	4.6 - 6.6	5.19	4.86
Radium 226/228	pCi/L	1; 2	ND - 1.6	0.68	1.06
Selenium (Total)	µg/L	2; 5	ND - 2.4	2.18	Non-Detect
Silver (Total)	µg/L	0.5	ND - 0.99	0.26	Non-Detect
Sodium (Total)	mg/L	1	86 - 110	92.90	88.69
Strontium (Total)	mg/L	0.01; 0.03; 2	0.98 - 1.2	1.06	1.05
Sulfate	mg/L	0.5 - 50	200 - 260	221.48	224.08
Thallium (Total)	µg/L	0.3; 1	Non-Detect	Non-Detect	Non-Detect
Total Dissolved Solids	mg/L	10; 20	540 - 660	605.91	601.62
Total Organic Carbon	mg/L	0.2; 0.3; 0.4; 0.5	2.2 - 5	3.18	3.42
Total Phosphorus as P	mg/L	0.02; 0.05	ND - 0.8	0.03	0.02
Turbidity	NTU	0.1	0.21 - 21	2.02	1.74
Uranium	µg/L	1	3.7 - 4.7	4.13	3.98
Vanadium (Total)	µg/L	2; 3	ND - 5.1	2.16	1.98
Zinc (Total)	µg/L	5; 20	Non-Detect	Non-Detect	Non-Detect

DETECTED CONTAMINANTS TABLE

Constituent	Location	Month	Value	Units	MRL	Source of Contamination
2,4-D						Agricultural/Residential runoff
	San Xavier	May	0.57	µg/L	0.1	
	San Xavier	August	0.46	µg/L	0.1	
Perfluorohexanoic acid (PFHxA)						Industrial processes
	Lake Pleasant Parkway	May	2.0	ng/L	2	
Ethylene Glycol						Pollutant (anti-freeze)
	Lake Pleasant	May	6.9	mg/L	5	
E. coli (Present)						Fecal transfer
	Lake Havasu	Feb, Aug				
	Lake Pleasant Parkway	Feb, May, Aug				
	Lake Pleasant	Feb, Aug				
	San Xavier	Feb, May, Aug				
Total Coliform						Occurs naturally, Fecal transfer
	All Sites	All Months				



DESCRIPTION OF DETECTED CONTAMINANTS

REGULATED CONTAMINANTS

2,4-D is one of the most common weed killers in the U.S. It was developed in the 1940's and is widely used in agriculture, as well as a backyard lawn treatment. It attacks the roots and leaves of weeds by making plant cells grow out of control. Although it was once thought to be safe, it is now considered a possible human carcinogen. It is an EPA regulated contaminant, but was detected only in very low levels and only at one location in 2022. Because 2,4-D was only detected in the southern part of the system (San Xavier Pumping Plant), it likely entered the system through agricultural runoff.

UNREGULATED CONTAMINANTS

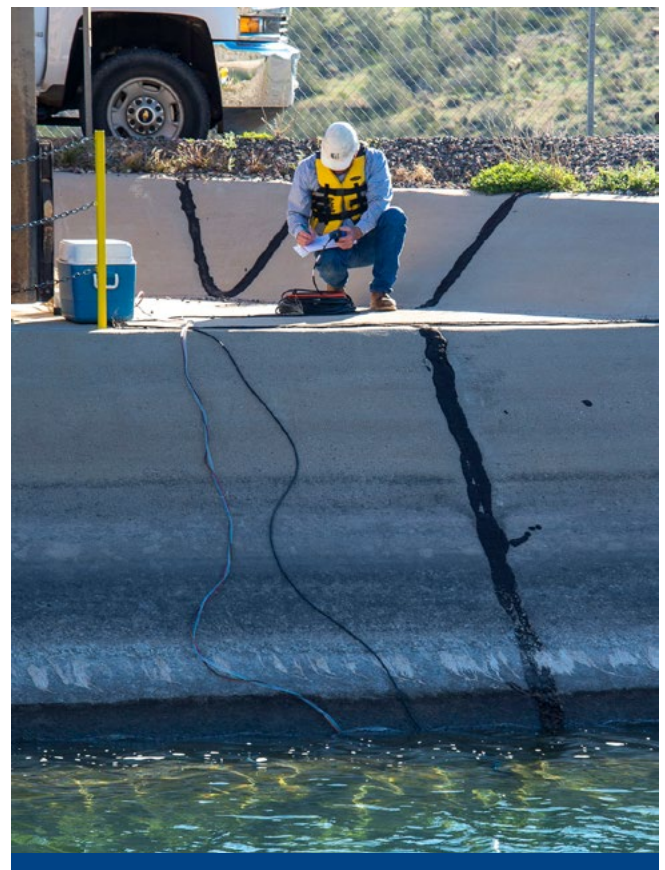
PERFLUOROHEXANOIC ACID (PFHxA) is a xenobiotic (foreign to an ecological system) and an environmental contaminant. It is part of the PFAS group that are man-made chemicals used in a variety of industries around the globe. Recently, PFAS have been identified as causing adverse human health effects. PFHxA is most commonly used as a wetting agent, corrosion inhibitor, lubricant, and foam fire extinguishant. In 2022, PFHxA was detected in a very small amount at Lake Pleasant Parkway (downstream of Lake Pleasant) in May.

ETHYLENE GLYCOL It is mainly used for two purposes, as a raw material in the manufacture of polyester fibers and for antifreeze formulations. It is an odorless, colorless, flammable, viscous liquid. It was found in Lake Pleasant in May and is likely a product of recreation boating.

MICROBIOLOGY

E.COLI is a bacterium commonly found in the intestines of humans and animals. It typically does not cause harm to humans, although some strains can cause illness. It is most easily transferred through fecal matter. Detections at Lake Havasu, Lake Pleasant, and Lake Pleasant Parkway suggest that the reservoirs are a source of contamination, while detection at San Xavier may be related to runoff from areas holding livestock.

TOTAL COLIFORM is a measurement of the coliform bacteria in a water source. Coliform bacteria occur naturally in soils, water, vegetation, and in the intestines of warm-blooded organisms. Most are harmless to humans, although some micro-organisms can cause illnesses. Due to the widespread distribution of coliform bacteria, detections in surface water samples are expected.



LAKE PLEASANT OPERATIONS

The CAP system utilizes Lake Pleasant as a seasonal pump-storage reservoir. During a typical year, Colorado River water is pumped into the reservoir from October to May when water demands and electricity costs are lower. During the summer, when water demands and electricity costs are higher, water is released from the reservoir for customer deliveries. These annual water level fluctuations may be modified based on required maintenance of the system, as well as stakeholder demand, which can vary based on rainfall and air temperature.

In 2022, pumping and releasing (generating) during spring and summer were typical of most years, but fall releases were affected by both power prices and conservation measures. As a result, much lower volumes of water were released from the lake. As in 2021, a more gradual transition from Lake Pleasant to Colorado River water was employed in early September to minimize impacts caused by the re-suspension of sediments. This approach has been effective in reducing downstream turbidity and total organic carbon levels during the fall.

During summer months, the reservoir stratifies, with a thermocline developing at a depth of approximately 40–60 feet below the water surface (see monthly profiles, Page 13). This usually occurs during May through November. The prolonged thermocline creates an oxygen deficit near the bottom of the lake, which will typically become completely anoxic (0 mg/L) by the end of September.

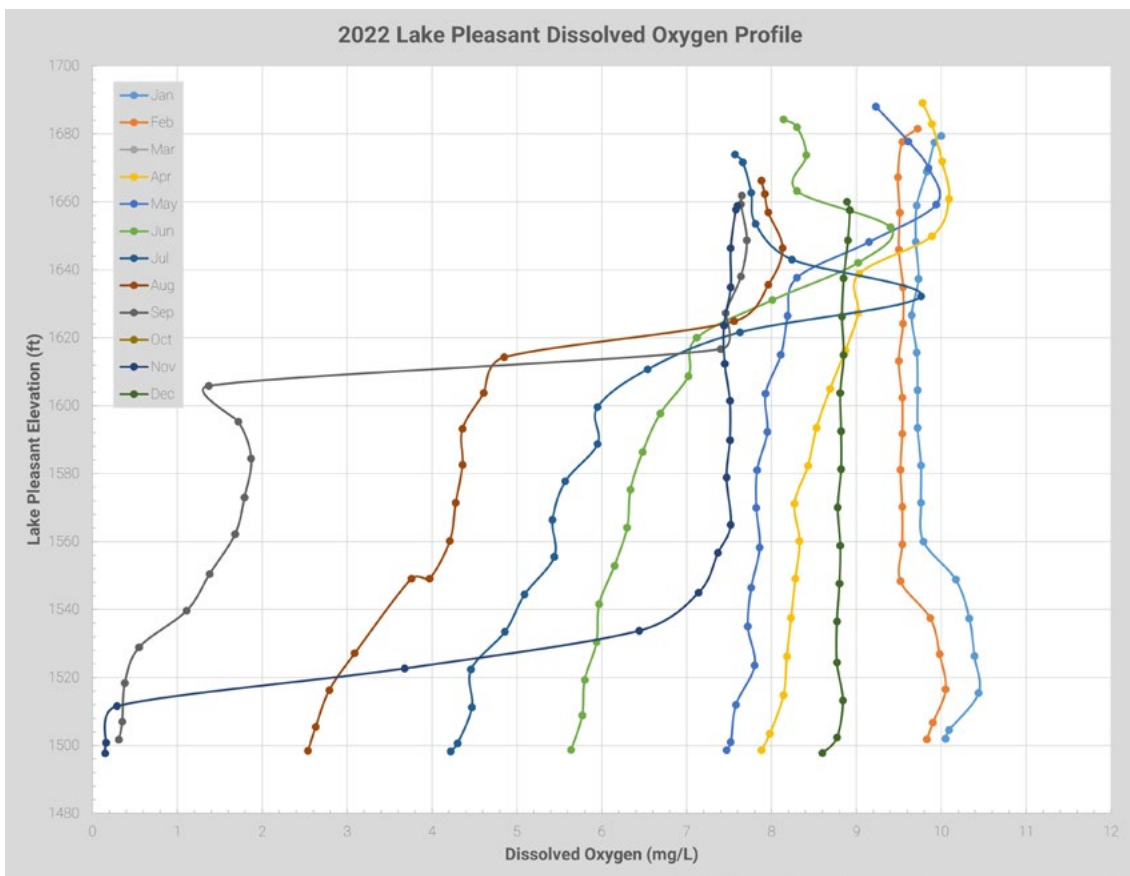
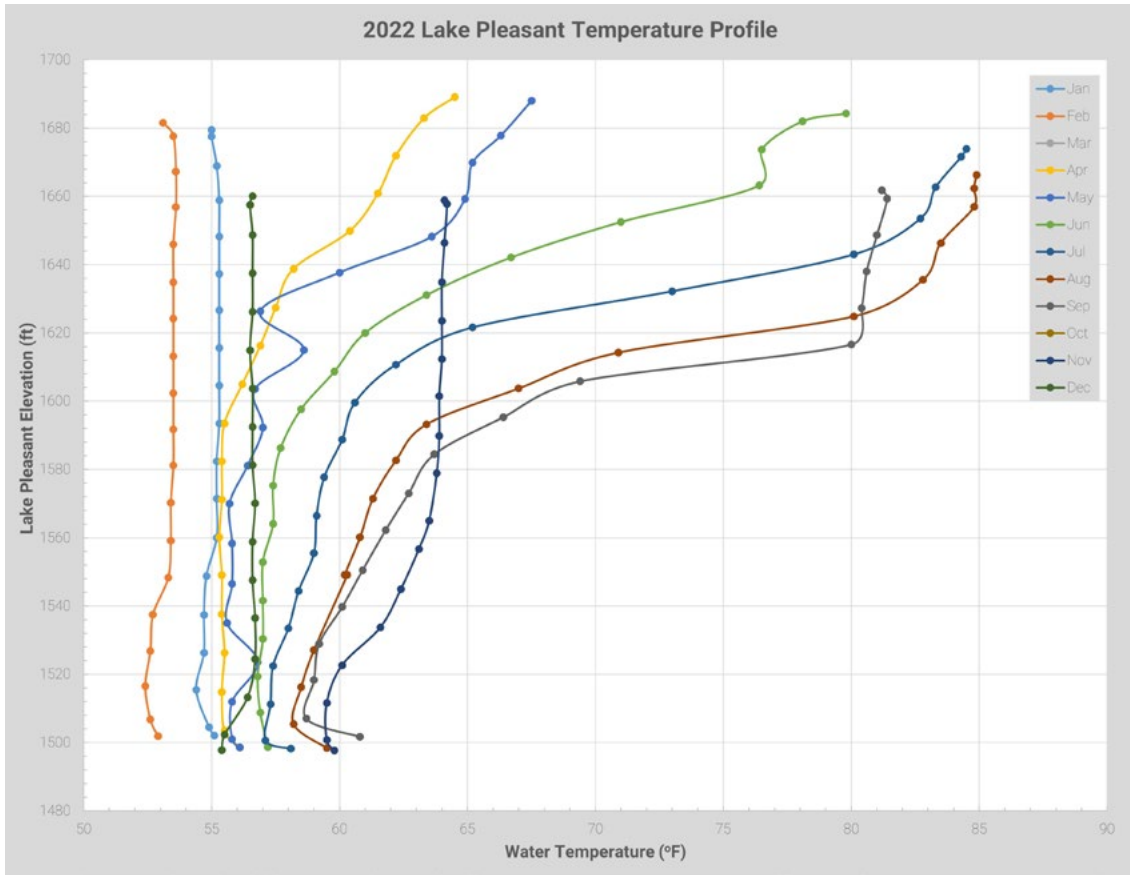
Although the intake portals at Waddell Dam are set at two different levels, CAP only utilizes the lower portals (elevation 1,515 feet) to best manage water quality and reduce taste and odor issues associated with anoxic water. Retaining the oxygen-rich epilimnetic water in the reservoir improves the overall quality of water to delivered to CAP stakeholders.

2022 Lake Pleasant Operations	
Average Water Elevation	1,677.42 (ft)
Highest Water Elevation (3/30/21)	1,693.53 (ft)
Lowest Water Elevation (9/30/21)	1,661.93 (ft)
Change in Elevation:	31.06 (ft)



Lake Pleasant average daily inflow/outflow (cfs) and volume (acre-feet). Positive levels represent when water is pumped into Lake Pleasant from the CAP (pumping), while negative values represent when water is discharged from Lake Pleasant into the CAP canal (generating).

LAKE PLEASANT MONTHLY PROFILES



ALAMO DAM RELEASES

Releases from Alamo Dam often create a degradation of water quality in both the Bill Williams River and in the southernmost portions of Lake Havasu. Due to the proximity of the CAP intakes to the Bill Williams River, this degradation of water quality can have significant impacts to the CAP system and its stakeholders. During past events, the increase in suspended sediments has resulted in increased maintenance to critical infrastructure, clogging of recharge basins, and an increase in costs related to operational changes. For CAP stakeholders, past high flow events have led to increased maintenance frequency and costs, as well as increases in treatment costs related to high turbidity, total organic carbon (TOC) and alkalinity.

In June 2021, there was a 1,300 acre fire upstream of the Bill Williams National Wildlife Refuge. The fire severely burned a majority of the riparian vegetation along a stretch of the Bill Williams River. Any releases from the Dam would likely bring significant ash and sediment to Lake Havasu. However, there were no scheduled or emergency releases in 2022 and there are none planned for 2023.

The United States Corps of Engineers, who constructed and operate Alamo Dam, continue to work on an update to their Water Control Manual. The Manual details the operation of the Dam, specifies frequency of dam maintenance, and outlines conditions for releases of water from the dam. Release of the DRAFT manual has been delayed for several years, but is expected to be available for public comment at some point in 2023, with a final release date later in the year.

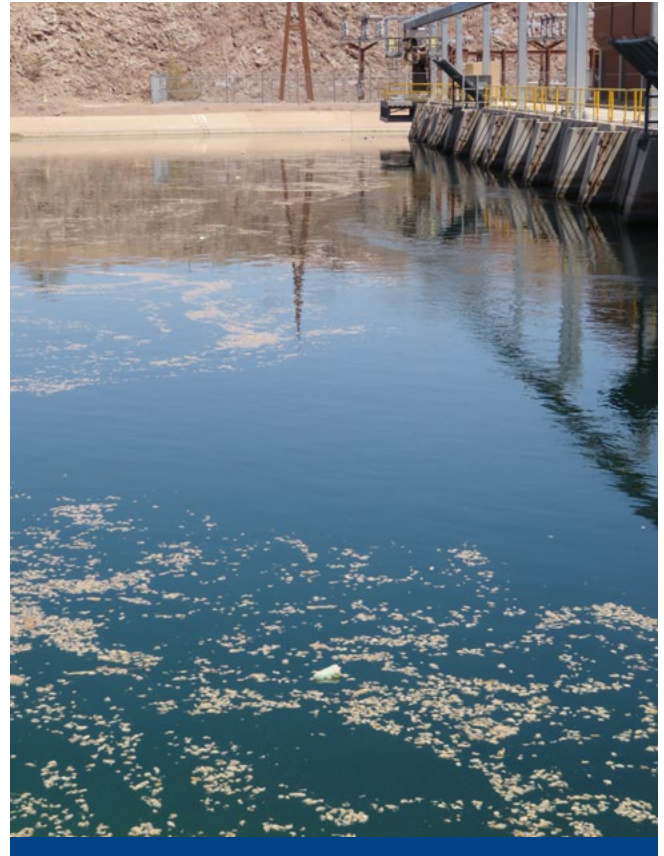


ALGAE STUDIES

Since the time of their discovery in the CAP (1997), stalk-forming diatoms (single-celled algae) have occasionally become a nuisance for both CAP and its stakeholders. When attached to the canal liner, the long stalks create excessive friction and reduce the flow of water. This impacts the ability of CAP Operations to deliver the requested volume of water to downstream water users. When floating on the surface, the mats of organic material may be drawn into pumping plants. Critical filters, strainers, and pumps have the potential to become clogged, which in turn affects the ability to properly cool motor components and provide service water throughout the plant. CAP stakeholders can also be impacted, as clogged intakes, filters, strainers, and pumps reduce their ability to effectively deliver water to end users.

Although diatoms are one of the most prolific groups of algae in the world, relatively little is known about the factors that contribute to their growth and life cycle. Because of this, CAP partnered with the Arizona Center for Algae Technology and Innovation (AzCATI) at ASU in 2020 to further study the diatoms and other algal species found in canal. The study is scheduled to be completed in 2023.

In 2022, AzCATI researchers intensively sampled the canal to “ground-truth” the data measured by the MiProbe sensors. A monitoring system was also deployed in Lake Pleasant to measure algal activity near the intake towers. In the upcoming year (2023), AzCATI researchers will continue to monitor algal activity in the canal and the lake, and will measure the impacts of altered canal operations on algae growth.





SALINITY CONTROL PROGRAM

The Colorado River provides domestic and industrial water to approximately 27 million people in the western United States and is used to irrigate approximately 4 million acres of land. However, salinity levels in the river water have historically been high, which can reduce crop yields, limit the choice of crops that can be grown, make the land unsuitable for agricultural purposes, and kill riparian vegetation.

In 1975, the seven Colorado River Basin states adopted a salinity standard for the Colorado River. That standard, which was approved by the EPA, is composed of numeric criteria for total dissolved solids and a plan of implementation to meet the criteria. Since the program's implementation, salinity in the river has been reduced by approximately 100 mg/L. For CAP stakeholders, this translates to approximately 220,000 tons of salt that did not enter the CAP service area.

CAWCD participates with Arizona and the other Basin States and Federal Agencies in the implementation of the Program. CAWCD also works with the Colorado River Basin Salinity Control Forum and the Forum's technical workgroup to address funding and other issues associated with program implementation.

GROUNDWATER RECHARGE

CAWCD has developed and currently operates six recharge projects:

1. Pima Mine Road Recharge Project
2. Lower Santa Cruz Recharge Project
3. Agua Fria Recharge Project
4. Hieroglyphic Mountain Recharge Project
5. Tonopah Desert Recharge Project
6. Superstition Mountains Recharge Project

The Tucson Active Management Area (AMA) recharge facilities have a cumulative operational capacity of 58,500 acre-feet per year and include the Pima Mine Road and Lower Santa Cruz Recharge Projects. In the Phoenix AMA, there are four facilities: the Tonopah Desert, Hieroglyphic Mountains, Agua Fria, and Superstition Mountains Recharge Projects, with a combined annual operational capacity of 233,000 acre-feet.

A portion of the permitting process and regulatory compliance for these projects requires periodic water quality monitoring. The sampling results are compiled into an annual report, which is a matter of public record and is submitted to the Arizona Department of Water Resources. Copies of the reports, or portions of the reports, are available by contacting:

Phillip Pagels

CAP Water Transmission Department

(623) 869-2252

ppagels@cap-az.com





CENTRAL ARIZONA PROJECT

23636 North 7th Street
Phoenix, Arizona 85024
(623) 869-2474

GET SOCIAL WITH US!



www.CentralArizonaProject.com

FOR MORE INFORMATION:

Scott Bryan
(623) 869-2474
sbryan@cap-az.com

Phillip Pagels
(623) 869-2252
ppagels@cap-az.com

APPENDIX A. WATER QUALITY TABLES

LAKE HAVASU 2022 (MARK WILMER PUMPING PLANT)

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements													
Dissolved Oxygen	mg/L	10.06	10.06	10.04	9.18	8.72	8.85	9.1	8.36	7.17	7.26	9.42	9.9
pH	Units	7.79	8.16	7.69	7.72	8.25	8.45	7.39	8.22	8.18	8.18	8.23	8.12
Conductivity	us/cm	914	931	989	922	922	922	936	951	954	991	975	977
Temperature	degF	53.7	54	59	65	70.7	79.7	82.6	81.7	81.5	77.9	59.3	54.9

Primary Analytes													
Alkalinity	mg/L	130	130	130	130	130	130	120	130	130	130	130	130
Aluminum (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	68	100	94	160	71	56		ND		95	150	150
Ammonia Nitrogen	mg/L	ND	ND	ND	ND	0.015	0.015	0.015	0.015	0.015	ND	ND	ND
Antimony (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Arsenic (Total)	ug/L	2.4	2.4	2.5	2.6	2.2	2.6		2.9		2.7	2.8	ND
Barium (Total)	ug/L	110	120	120	110	110	110		120		120	120	130
Beryllium (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Boron (Total)	mg/L	0.13	0.13	0.13	0.13	0.13	0.14	0.13	0.14	0.14	0.14	0.14	0.16
Bromide	ug/L	81	84	83	85	88	86	85	100	92	91	160	93
Cadmium (Total)	ug/L	ND	ND	ND	ND	0.25	0.25		0.25		ND	ND	ND
Calcium (Total)	mg/L	71	75	73	73	73	73	68	70	72	73	72	74
Chloride	mg/L	94	96	96	97	98	90	100	100	100	99	110	98
Chromium (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Cobalt (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Copper (Dissolved)	ug/L	ND	ND	ND	ND		ND		ND	ND	ND	1.5	1.4
Fluoride	mg/L	0.34	0.33	0.32	0.32	0.33	0.32	0.32	0.33	0.33	0.34	0.34	0.34
Gross Alpha	pCi/L	ND	ND	3.8	3.8	3.2	2.8	4		4	3.6	3.2	3
Gross Beta	pCi/L	5	5.6	6.7	8.3	ND	6.2	5.4		6.3	6.3	8	
Hexavalent Chromium	ug/L	0.025	0.028	0.02	0.028	0.031	0.044	0.047	0.027	0.027	0.028	ND	0.037
Iron (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Manganese (Total)	ug/L	4.8	5.3	5.4	8.4	4.6	3.7		9.1		12	8.3	6.5
Mercury	ug/L	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND
Molybdenum (Total)	ug/L	4.4	4.5	4.6	4.4	4.3	4.3		4.5		4.4	4.5	4.5
Nickel (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	1.6	1
Nitrate	mg/L	0.26	0.34	0.38	0.35	0.31	ND	ND	ND	ND	ND	0.2	0.23

LAKE HAVASU 2022 (CONTINUED)

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Nitrite	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perchlorate	ug/L	ND	ND	ND	ND	1	1	1	1	1	ND	0.92	1
Potassium (Total)	mg/L	4.7	5.1	5.1	4.9	4.8	4.7	4.7	5.2	5	5	5.3	5.6
Radium 226/228	pCi/L	ND	ND	ND		ND	ND	ND		ND	ND		
Selenium (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Silver (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Sodium (Total)	mg/L	89	93	92	92	90	92	92	91	92	92	86	96
Strontium (Total)	mg/L	1	1.1	1.1	1	1	1.1	1	1	1.1	1.1	1.1	1.1
Sulfate	mg/L	210	210	210	220	220	200	220	220	220	220	240	220
Thallium (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND		ND
Total Dissolved Solids	mg/L	590	600	580	590	620	590	590	600	600	600	640	660
Total Organic Carbon	mg/L	3	3.83	2.6	3.4	2.64	2.9	3.4	2.8	3.7	2.5	2.3	2.4
Total Phosphorus	mg/L	ND	ND	ND	ND	ND	ND	0.098	ND	ND	ND	ND	ND
Turbidity	NTU	2.1	1.6	1.5	2.7	0.5	0.95	0.65	0.8	0.95	2.4	3.7	2.9
Uranium	ug/L	3.9	4.2	4.3	4.1	3.9	3.8		3.8		4	4.2	4.3
Vanadium (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	2.8	2.5
Zinc (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	#N/A	ND

HASSAYAMPA PUMPING PLANT 2022

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements													
Dissolved Oxygen	mg/L	10.61	10.25	10.02	9.74	9.23	8.76	10.98	9.54	7.61	7.54	9.69	9.79
pH	Units	7.94	7.87	8	8.18	8.15	8.31	8.53	8.53	8.17	8.1	7.95	8.37
Conductivity	us/cm	912	926	945	959	920	914	903	901	957	956	987	983
Temperature	degF	54.2	51	57.5	66.8	71.2	81.3	87.3	87.7	85.6	79.9	59.5	57
Primary Analytes													
Alkalinity	mg/L	130	130	130	130	130	120	110	100	120	130	130	130
Aluminum (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	370	130	170	74	230	26	ND			1300	590	65
Ammonia Nitrogen	mg/L	ND	ND	ND	ND	ND	0.034	0.015	0.015	0.015	ND	ND	ND
Antimony (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND			ND	ND	ND
Arsenic (Total)	ug/L	2.9	2.4	2.5	2.4	2.5	2.7	3.2			3.8	3	2.4
Barium (Total)	ug/L	130	120	120	110	110	110	120			150	130	120
Beryllium (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND			ND	ND	ND
Boron (Total)	mg/L	0.14	0.13	0.14	0.14	0.14	0.13	0.14	0.14	0.14	0.15	0.15	0.13
Bromide	ug/L	82	80	83	78	83	85	89	90	100	90	81	80
Cadmium (Total)	ug/L	ND	ND	ND	ND	ND	0.25	0.25			ND	ND	ND
Calcium (Total)	mg/L	83	74	75	77	79	70	62	59	65	95	80	73
Chloride	mg/L	92	96	96	94	94	99	98	110	110	110	98	100
Chromium (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND			1.4	ND	ND
Cobalt (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND			ND	ND	ND
Copper (Dissolved)	ug/L	ND	ND	ND	ND		ND	ND		ND	ND	ND	1.6
Fluoride	mg/L	0.33	0.33	0.34	0.33	0.31	0.33	0.33	0.31	0.32	0.33	0.32	0.33
Gross Alpha	pCi/L	3.9	13	3.5	3.1		ND	2.6	4.1	2.7	3.3	4.2	3.2
Gross Beta	pCi/L	6.9	4.1	ND	ND		5.2	ND	ND	6.9	5.1	8.3	
Hexavalent Chromium	ug/L	0.023	0.026	0.027	0.027	0.029	0.068	0.028	0.026	0.027	0.027	0.028	0.029
Iron (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	0.6	ND	ND	ND	ND	ND	ND			1.4	0.77	ND
Manganese (Total)	ug/L	13	4	9.3	4.4		3.7	6.8			57	25	3.4
Mercury	ug/L	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND
Molybdenum (Total)	ug/L	4.2	4.5	4.9	4.5	4.2	4.4	5.1			4.2	4.5	4.9
Nickel (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND			ND	2.1	2
Nitrate	mg/L	ND	0.28	0.33	0.32	ND	ND	ND	ND	ND	ND	0.17	0.22
Nitrite	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perchlorate	ug/L	ND	ND	ND	ND	ND	1	1		1	ND	1	1

HASSAYAMPA PUMPING PLANT 2022 (CONTINUED)

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Potassium (Total)	mg/L	4.9	4.8	5.2	5.2	5.2	4.7	5	4.9	5.2	5.5	5.3	5.4
Radium 226/228	pCi/L	ND	ND	ND			1.6	ND	ND	ND	ND		
Selenium (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND			ND	ND	ND
Silver (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND			ND	0.99	ND
Sodium (Total)	mg/L	91	90	91	94	92	92	95	94	91	97	91	89
Strontium (Total)	mg/L	1.1	1	1.1	1.1	1.1	1	1	1	1	1.2	1.1	1.1
Sulfate	mg/L	210	210	220	220	210	220	220	230	210	220	220	230
Thallium (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND			ND		ND
Total Dissolved Solids	mg/L	590	610	600	580	580	540	590	580	600	600	640	640
Total Organic Carbon	mg/L	4.5	3.5	2.8	3.6	2.94	3.15	3.88	5	3.8	3.8	2.4	2.5
Total Phosphorus	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	0.044	ND	ND
Turbidity	NTU	4.4	0.96	3.2	2	1.7	0.6	0.6	0.75	0.55	21	12	1.1
Uranium	ug/L	4.1	3.9	4.4	4.1	3.8	3.8	4.2			4.2	4.3	4.4
Vanadium (Total)	ug/L	3	ND	3.2	ND	ND	ND	ND			5.1	3.4	2.4
Zinc (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND			ND	ND	ND

WADDELL PUMPING PLANT 2022

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements													
Dissolved Oxygen	mg/L	10.7	10.52	10.75	10.57	9.2	6.28	7.1	4.32	ND	5.84	9.78	9.62
pH	Units	7.93	7.9	7.67	8.12	8.26	7.65	7.8	7.51	7.53	7.71	7.97	8.16
Conductivity	us/cm	914	864	941	962	911	902	848	877	868	939	985	839
Temperature	degF	54.4	51.7	56.4	68.2	72.3	57.2	61.1	62.1	69.1	76.3	60.4	60.1

Primary Analytes													
Alkalinity	mg/L	130	130	130	130	130	130	130	130	120	130	130	130
Aluminum (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	3	ND	ND	ND
Aluminum (Total)	ug/L	ND	37	31	25	33	27	46		3	ND	52	10
Ammonia Nitrogen	mg/L	ND	ND	ND	ND	0.015	0.015	0.015	0.015	0.05	0.22	ND	ND
Antimony (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND
Arsenic (Total)	ug/L	2.2	2.5	2.4	2.6	2.7	3	2.9		3.2	3.9	2.9	2.3
Barium (Total)	ug/L	110	120	120	110	110	110	120		110	120	120	120
Beryllium (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND
Boron (Total)	mg/L	0.13	0.13	0.12	0.13	0.13	0.14	0.14	0.15	120	0.15	0.15	0.13
Bromide	ug/L	78	81	78	78	83	98	98	98	97	100	81	79
Cadmium (Total)	ug/L	ND	ND	ND	ND	0.25	0.25	0.25		0.25	ND	ND	ND
Calcium (Total)	mg/L	71	72	71	70	70	69	70	70	68	72	70	73
Chloride	mg/L	90	97	95	96	95	95	98	100	100	120	97	100
Chromium (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND		1.6	ND	ND	ND
Cobalt (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND
Copper (Dissolved)	ug/L	ND	2.3	ND	ND		ND	ND		2.8	ND	1.1	1.5
Fluoride	mg/L	0.31	0.33	0.33	0.33	0.31	0.36	0.35	0.37	0.35	0.34	0.33	0.33
Gross Alpha	pCi/L	ND	3.8	3	3	3	ND	2.5	3.7	4.3	6.6	4.5	
Gross Beta	pCi/L	5.6	5.5	ND	6.3	ND	4.7	ND	7.2	9	8.4	8.2	
Hexavalent Chromium	ug/L	ND	0.025	0.024	0.029	0.024	ND	0.022	0.023	0.022	0.046	0.022	0.024
Iron (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND	0.014	ND	ND	ND	ND	ND
Lead (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND
Manganese (Total)	ug/L	1	2	2.4	3.4		6.4	8.2		15	17	2.5	ND
Mercury	ug/L	ND	ND	ND	ND		ND	ND		ND	ND	ND	ND
Molybdenum (Total)	ug/L	4.5	4.7	4.7	4.6	4.4	4.7	5			4.7	4.6	4.5
Nickel (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND			ND	1.4	1.5
Nitrate	mg/L	ND	0.27	0.34	0.33	0.25	ND	ND	ND	ND	ND	0.14	0.23
Nitrite	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perchlorate	ug/L	ND	ND	ND	ND	1	1	1		0.46	ND	0.89	0.9

WADDELL PUMPING PLANT 2022 (CONTINUED)

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Potassium (Total)	mg/L	4.8	4.6	4.8	4.9	4.6	5.1	5.3	5.5	5.8	5.4	5.2	5.5
Radium 226/228	pCi/L	ND	ND	ND		ND	ND	ND	ND	ND	ND		
Selenium (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND		2.4	ND	ND	ND
Silver (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND
Sodium (Total)	mg/L	90	88	88	88	89	93	93	96	89	94	95	92
Strontium (Total)	mg/L	1	1	1	1	1	1.1	1.1	1.1		1	1	1.1
Sulfate	mg/L	210	210	210	220	210	220	230	230	220	230	220	220
Thallium (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND		ND	ND		ND
Total Dissolved Solids	mg/L	580	600	610	580	600	580	620	590	630	650	640	640
Total Organic Carbon	mg/L	3.6	3.4	2.7	3.4	3.44	2.96	3.76	3.2	2.6	3.9	2.4	2.2
Total Phosphorus	mg/L	ND	ND	ND	ND	ND	ND	ND	0.46	0.025	ND	ND	ND
Turbidity	NTU	0.63	0.26	0.68	0.62	0.95	0.85	2.5	0.6	0.25	0.75	1.9	0.5
Uranium	ug/L	3.7	4.2	4.2	4.2	4.1	4.2	4.2		4.1	4	4.3	3.9
Vanadium (Total)	ug/L	ND	ND	ND	ND	3	ND	ND		2.6	ND	2.4	2.5
Zinc (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND

LAKE PLEASANT PARKWAY 2022

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements													
Dissolved Oxygen	mg/L	10.94	10.11	10.11	9.86	9.34	7.64	8.39	6.13	5.24	8.03	9.78	9.79
pH	Units	7.99	7.56	8.03	8.13	8.39	7.97	8	7.65	7.7	8.16	8.13	8.3
Conductivity	us/cm	923	903	962	963	919	900	911	911	941	991	967	970
Temperature	degF	53.4	53	60.8	67.4	69.5	69.6	61.6	63.4	65.2	77.2	59.8	59.3

Primary Analytes													
Alkalinity	mg/L	130	130	130	130	130	120	130	130	130	110	130	130
Aluminum (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	33	41	390	96	71		69			59	73	13
Ammonia Nitrogen	mg/L	ND	ND	ND	ND	0.015	0.015	0.055	0.015		ND	ND	ND
Antimony (Total)	ug/L	ND	ND	ND	ND	ND		ND			ND	ND	ND
Arsenic (Total)	ug/L	2.3	2.4	2.6	2.6	2.3		3.1			2.7	2.7	2.3
Barium (Total)	ug/L	120	120	120	110	110		110			120	120	120
Beryllium (Total)	ug/L	ND	ND	ND	ND	ND		ND			ND	ND	ND
Boron (Total)	mg/L	0.13	0.13	0.14	0.14	0.13	0.14	0.14	0.14	0.14	0.14	0.13	0.12
Bromide	ug/L	84	84	83	82	82	91	98	95	98	92	73	80
Cadmium (Total)	ug/L	ND	ND	ND	ND	0.25		0.25			ND	ND	ND
Calcium (Total)	mg/L	71	72	76	77	74	71	67	68	69	72	70	73
Chloride	mg/L	93	96	91	96	95	99	110	100	100	99	95	100
Chromium (Total)	ug/L	ND	ND	ND	ND	ND		ND			ND	ND	0.93
Cobalt (Total)	ug/L	ND	ND	ND	ND	ND		ND			ND	ND	ND
Copper (Dissolved)	ug/L	ND	ND	ND	ND		ND	ND		ND	ND	ND	1.5
Fluoride	mg/L	0.33	0.35	0.33	0.31	0.32	0.33	0.35	0.34	0.33	0.34	0.36	0.33
Gross Alpha	pCi/L	ND	6.6	2.4	ND	3.2	ND	4.6	2.9	3.3	2.8	4.1	
Gross Beta	pCi/L	3.8	4.3	ND	8.3	ND	4.3	5.3	ND	7.3	4.8	7.6	
Hexavalent Chromium	ug/L	0.026	0.022	0.028	0.026	0.029	0.15	0.02		0.024	0.026	0.029	ND
Iron (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	ND	ND	0.5	ND	ND		ND			ND	ND	ND
Manganese (Total)	ug/L	1.2	4.2	13	6.4	4.6		7.7			2.8	2.8	ND
Mercury	ug/L	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND
Molybdenum (Total)	ug/L	4.5	4.8	4.6	4.6	4.3		5.1			4.4		4.7
Nickel (Total)	ug/L	ND	ND	ND	ND	ND		ND			ND	1.5	1.4
Nitrate	mg/L	ND	0.26	0.32	0.31	0.25	ND	ND	ND	ND	ND	0.14	0.2
Nitrite	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

LAKE PLEASANT PARKWAY 2022 (CONTINUED)

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L	ND	ND	ND	ND	1	1	1		1	ND	0.9	0.8
Potassium (Total)	mg/L	4.9	4.7	5.2	5.2	4.8	5.5	5.2	5.2	5.2	5	5.2	5.5
Radium 226/228	pCi/L	ND	ND	ND		ND	ND	ND	ND	ND	ND		
Selenium (Total)	ug/L	ND	ND	ND	ND	ND		ND			ND	ND	ND
Silver (Total)	ug/L	ND	ND	ND	ND	ND		ND			ND	ND	ND
Sodium (Total)	mg/L	90	90	92	94	91	95	91	93	93	94	89	91
Strontium (Total)	mg/L	1	1	1.1	1.1	1	1.1	1	1.1	1.1	1.1	1	1.1
Sulfate	mg/L	210	220	200	220	210	220	240	240	220	220	210	230
Thallium (Total)	ug/L	ND	ND	ND	ND	ND		ND			ND		ND
Total Dissolved Solids	mg/L	590	580	590	610	600	560	610	610	600	600	640	650
Total Organic Carbon	mg/L	3.1	3.2	2.8	3.4	2.86	3.01	3.79	3.6	3.3		2.3	2.2
Total Phosphorus	mg/L	ND	ND	ND	ND	ND	ND	0.07	ND	ND	ND	ND	ND
Turbidity	NTU	1	0.46	4.7	1.9	1.5	1.6	1.1	0.5	0.4	0.8	2.3	0.5
Uranium	ug/L	4.1	4.2	4.4	4.2	3.8		4.3			4		4
Vanadium (Total)	ug/L	ND	ND	3.3	ND	ND		3.2			ND		2.6
Zinc (Total)	ug/L	ND	ND	ND	ND	ND		ND			ND		ND

ROOSEVELT WCD 2022

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements													
Dissolved Oxygen	mg/L	10.39	9.78	10.24	9.59	9.89	8.98	8.7	8.33	7.28	8.95	10.43	12.5
pH	Units	8.02	8.21	8.36	8.14	8.28	8.15	7.93	8.03	7.83	8.2	8.14	8.31
Conductivity	uS/cm	910	924	947	967	917	914	918	917	946	978	963	965
Temperature	degF	56.2	56.3	60	68.5	71.6	70	63.8	70.3	72	74.4	59.5	58

Primary Analytes													
Alkalinity	mg/L	130	130	130	130	130	120	130	120	130	120	120	130
Aluminum (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	ND	69	170	100	52	52	92				9.2	11
Ammonia Nitrogen	mg/L	ND	ND	ND	ND	ND	ND	0.015	0.015	0.12	0.038	ND	ND
Antimony (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND				ND	ND
Arsenic (Total)	ug/L	1.9	2.2	2.5	2.6	2.4	2.9	2.9				2.7	2.3
Barium (Total)	ug/L	120	110	110	110	110	110	120				130	120
Beryllium (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND				ND	ND
Boron (Total)	mg/L	0.13	0.13	0.13	0.13	0.13	0.15	0.15	0.14	0.15	0.14	0.13	0.14
Bromide	ug/L	77	80	84	86	83	90	93	95	98	90	78	78
Cadmium (Total)	ug/L	ND	ND	ND	ND	ND	ND	0.25				ND	ND
Calcium (Total)	mg/L	71	73	71	73	74	75	72	68	71	70	72	72
Chloride	mg/L	90	92	97	98	94	100	98	100	96	120	98	100
Chromium (Total)	ug/L	1.3	ND	ND	ND	ND	ND	ND				ND	1.2
Cobalt (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND				ND	ND
Copper (Dissolved)	ug/L	ND	ND	ND	ND		2.1	ND		ND	ND	1.6	1.5
Fluoride	mg/L	0.33	0.33	0.34	0.33	0.32	0.34	0.35	0.33	0.34	0.38	0.36	0.33
Gross Alpha	pCi/L	ND	10	4	3.9	3.9	3.6	3.5	3.4	4	4.2		3.1
Gross Beta	pCi/L	4.6	5.8	ND	7.3	ND	5.2	5.2	6.1		5.9		
Hexavalent Chromium	ug/L	0.024	0.024	0.03	0.025	0.025	0.026	ND	0.03	0.027	0.03	0.027	0.025
Iron (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND				ND	ND
Manganese (Total)	ug/L	1.3	3	7	6.5		5.5	9.6				2.3	2.1
Mercury	ug/L	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND
Molybdenum (Total)	ug/L	4.6	4.5	4.6	4.5	4.3	4.7	5					4.7
Nickel (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND				1.2	1.3
Nitrate	mg/L	ND	0.26	0.3	0.29	ND	ND	ND	ND	0.25	ND	0.12	0.18
Nitrite	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ROOSEVELT WCD 2022 (CONTINUED)

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L	ND	ND	ND	ND	ND	ND	1		1	ND	0.87	0.97
Potassium (Total)	mg/L	4.9	4.9	4.9	5	5	5.5	5.5	5.3	5.6	4.8	5.4	5.5
Radium 226/228	pCi/L	ND	ND			ND	ND	ND	ND	ND	ND		
Selenium (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND				ND	ND
Silver (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND				ND	ND
Sodium (Total)	mg/L	89	90	88	90	92	100	96	95	97	93	98	97
Strontium (Total)	mg/L	1	1	1	1.1	1.1	1.2	1.1	1.1	1.1	1.1	1.1	1.1
Sulfate	mg/L	210	200	220	220	210	220	230	230	210	240	220	220
Thallium (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND				ND	ND
Total Dissolved Solids	mg/L	570	600	590	580	590	590	620	600	580	600	640	630
Total Organic Carbon	mg/L	3.3	3.3	2.9	2.9	2.92	3.13	3.94	3.8		2.6	2.3	2.5
Total Phosphorus	mg/L	ND	ND	ND	ND	ND	ND	ND	0.47	ND	ND	ND	ND
Turbidity	NTU	0.48	1.1	3.8	1.5	1.4	1	0.6	0.75	0.6	0.45	0.25	0.4
Uranium	ug/L	3.8	4.1	4.2	4.2	3.9	4	4.2				4.3	4.1
Vanadium (Total)	ug/L	ND	ND	ND	ND	ND	ND	3				2.5	2.6
Zinc (Total)	ug/L	ND	ND	ND	ND	ND	ND	ND				ND	ND

BRADY PUMPING PLANT 2022

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements													
Dissolved Oxygen	mg/L	10.09	9.26	9.43	8.91	9.21	9.58	9.85	8.7	7.36	6.92	9.66	10.07
pH	Units	7.88	8.17	8.33	8.34	8.27	8.26	8.24	8.04	7.99	8	8.18	8.05
Conductivity	us/cm	839	887	961	892	924	913	919	910	969	970	933	924
Temperature	degF	57.9	58.1	63.6	72.9	75.7	77.2	78.7	77.7	82.2	77.4	58.7	57

Primary Analytes													
Alkalinity	mg/L	120	130	130	120	120	120	120	130	120	120	120	130
Aluminum (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	ND	ND	39	240	ND	57		48		250	20	35
Ammonia Nitrogen	mg/L	0.06	ND	ND	ND	ND	0.015	0.072	0.015	0.32	0.32	0.1	ND
Antimony (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Arsenic (Total)	ug/L	2.2	2.1	2.6	2.5	2.4	2.9		2.9		3.6	2.4	2.3
Barium (Total)	ug/L	110	110	120	120	110	110		110		140	120	120
Beryllium (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Boron (Total)	mg/L	0.13	0.13	0.13	0.14	0.13	0.14	0.14	0.15	0.16	0.14	0.14	0.15
Bromide	ug/L	73	79	85	81	85	90	94	95	110	96	74	99
Cadmium (Total)	ug/L	ND	ND	ND	ND	ND	0.25		0.25		ND	ND	ND
Calcium (Total)	mg/L	68	70	71	76	70	68	65	71	69	66	70	70
Chloride	mg/L	95	94	94	100	100	100	100	99	110	98	100	100
Chromium (Total)	ug/L	ND	1.8	ND	ND	ND	ND		ND		ND	1.1	ND
Cobalt (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Copper (Dissolved)	ug/L	ND	ND	ND	ND		ND			ND	ND	1.7	1.4
Fluoride	mg/L	0.32	0.33	0.32	0.32	0.31	0.34	0.34	0.34	0.35	0.36	0.32	0.34
Gross Alpha	pCi/L	3.3	3.6	3.1	2.8	3.5	4	4.7	2.4	4	2.6	3.9	3.1
Gross Beta	pCi/L	6.2	6.4	7.2	6.1	ND	ND	ND	7.8	6.7	6.4		
Hexavalent Chromium	ug/L	0.042	0.038	0.033	0.027	0.029	0.033	0.026	0.032	0.036	0.034	0.066	0.054
Iron (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Manganese (Total)	ug/L	2.6	1.7	2.8	16	2.3	4.5		5.4		31	6.3	3.8
Mercury	ug/L	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND
Molybdenum (Total)	ug/L	4.6	4.5	4.7	4.5	4.5	4.3		4.8		4.2		4.7
Nickel (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	1.2	1.6
Nitrate	mg/L	0.17	0.24	0.29	0.28	ND	ND	ND	ND	ND	ND	ND	0.13
Nitrite	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.026	ND

BRADY PUMPING PLANT 2022 (CONTINUED)

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L	ND	ND	ND	ND	ND	1	1	1	1	ND	0.9	0.87
Potassium (Total)	mg/L	4.8	4.8	5	5	4.9	5.2	5.1	5.5	5.8	5.2	5.5	5.4
Radium 226/228	pCi/L	ND	ND			ND	ND	ND	ND	ND	ND		
Selenium (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Silver (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Sodium (Total)	mg/L	88	89	91	93	90	94	91	97	98	93	90	93
Strontium (Total)	mg/L	1	1	1	1.1	1	1.1	1	1.1	1.1	1.1	1.1	1.1
Sulfate	mg/L	210	220	260	230	220	230	230	230	220	220	220	230
Thallium (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND
Total Dissolved Solids	mg/L	600	600	590	600	580	620	620	600	610	620	630	640
Total Organic Carbon	mg/L	3.6	3	3	3	2.84	3.19	2.6	2.8	4.1	3.4	2.3	2.3
Total Phosphorus	mg/L	ND	ND	ND	0.8	ND	ND	ND	ND	ND	0.035	ND	ND
Turbidity	NTU	0.27	0.4	0.95	7.2	0.4	0.9	0.55	0.55	1.3	4.6	1	1.5
Uranium	ug/L	4	4.1	4.3	4.1	3.9	4.1		4.1		3.9	4.2	4.5
Vanadium (Total)	ug/L	ND	ND	ND	3.2	ND	ND		3		4.7	2.5	2.6
Zinc (Total)	ug/L	ND	ND	ND	ND	ND	ND		ND		ND	ND	ND

SAN XAVIER PUMPING PLANT 2022

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements													
Dissolved Oxygen	mg/L	9.8	8.76	8.73	8.09	8.08	8.43	8.05	7.54	7.85	8.19	9.98	9.39
pH	Units	7.5	8.11	8.08	8.27	8.19	8.38	8.37	8.15	8.32	8.24	8.46	7.83
Conductivity	uS/cm	866	929	970	905	913	925	935	937	962	995	939	884
Temperature	degF	59.7	56.1	61.5	69.6	76.1	79	83.3	81.4	80.7	73	56.8	57.7

Primary Analytes													
Alkalinity	mg/L	120	130	120	130	120	120	120	120	110	110	98	98
Aluminum (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND		ND	ND	ND	2.2	ND
Aluminum (Total)	ug/L	51	120	91	820	330	150				140	73	57
Ammonia Nitrogen	mg/L	0.05	ND	0.07	ND	0.051	0.045	0.032	0.039	0.049	0.1	ND	0.14
Antimony (Total)	ug/L	ND	ND	ND	ND	ND	ND				ND	ND	ND
Arsenic (Total)	ug/L	2	2.2	2.2	2.7	2.5	2.8				3.4	2.5	1.7
Barium (Total)	ug/L	110	110	110	130	120	110				120	120	110
Beryllium (Total)	ug/L	ND	ND	ND	ND	ND	ND				ND	ND	ND
Boron (Total)	mg/L	0.13	0.13	0.14	0.14	0.13	0.14	0.14	0.15	0.15	0.16	0.16	0.17
Bromide	ug/L	80	82	84	82	86	90	96	96	100	110	98	97
Cadmium (Total)	ug/L	ND	ND	ND	ND	0.25	0.25				ND	ND	ND
Calcium (Total)	mg/L	66	71	71	77	73	68	66	68	63	64	58	57
Chloride	mg/L	95	95	97	100	97	110	100	100	110	100	110	110
Chromium (Total)	ug/L	ND	3.1	ND	ND	ND	ND				ND	ND	ND
Cobalt (Total)	ug/L	ND	ND	ND	ND	ND	ND				ND	ND	ND
Copper (Dissolved)	ug/L	ND	ND	ND	ND		ND			ND	ND	1.8	1.7
Fluoride	mg/L	0.33	0.34	0.32	0.32	0.31	0.34	0.34	0.34	0.36	0.37	0.35	0.34
Gross Alpha	pCi/L	ND	7.6	2.9	2.1	5.1	2.6	3.8	2.9	5	1.4	5.1	3.4
Gross Beta	pCi/L	6.2	4.9	5.6	7.2	ND	ND	ND	7.3	6	5.8		
Hexavalent Chromium	ug/L	0.048	0.036	0.026	0.025		0.028	0.027	0.031	0.036	0.038	0.026	0.024
Iron (Dissolved)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	ND	ND	ND	0.56	ND	ND				ND	ND	ND
Manganese (Total)	ug/L	5.9	4.5	11	24	11	7.7				11	5.6	4.8
Mercury	ug/L	ND	ND	ND	ND	ND	ND			ND	ND	ND	ND
Molybdenum (Total)	ug/L	4.6	4.5	4.5	4.5	4.4	4.5				4.6		4.8
Nickel (Total)	ug/L	ND	ND	ND	ND	ND	ND				ND	1.5	1.3
Nitrate	mg/L	0.12	ND	0.19	0.26	ND	ND	ND	ND	ND	ND	ND	ND
Nitrite	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

SAN XAVIER PUMPING PLANT 2022 (CONTINUED)

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L	ND	ND	ND	4.1	1	1	1		1	ND	ND	0.19
Potassium (Total)	mg/L	4.8	4.9	5.4	5.2	5	5.4	5.4	5.4	5.6	5.8	6.6	5.9
Radium 226/228	pCi/L	ND	ND			ND	0.9	ND	ND	ND			
Selenium (Total)	ug/L	ND	ND	ND	ND	ND	ND				ND	ND	ND
Silver (Total)	ug/L	ND	ND	ND	ND	ND	ND				ND	ND	ND
Sodium (Total)	mg/L	91	92	94	92	91	97	95	98	97	99	110	100
Strontium (Total)	mg/L	1	1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Sulfate	mg/L	210	210	220	230	220	240	230	230	240	230	230	230
Thallium (Total)	ug/L	ND	ND	ND	ND	ND	ND				ND	ND	ND
Total Dissolved Solids	mg/L	610	590	590	600	590	600	600	560	610	640	660	620
Total Organic Carbon	mg/L	3.6	3	3.9	2.9	2.76	3.3	3.39	3.8	4.1	4.3	3.6	3.7
Total Phosphorus	mg/L	ND	ND	ND	0.031	ND	ND	ND	ND	ND	ND	ND	ND
Turbidity	NTU	0.21	1.6	2.5	20	6	3.2	1.8	1.8	4	2.9	1.3	1.4
Uranium	ug/L	4.1	4.1	4.3	4.3	4.1	4.1				4.1	4.7	4.3
Vanadium (Total)	ug/L	ND	ND	ND	4.1	3.1	3.2				3.6	2.5	ND
Zinc (Total)	ug/L	ND	ND	ND	ND	ND	ND				ND	ND	ND

LAKE PLEASANT TOWERS 2022

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements													
Dissolved Oxygen	mg/L		9.55			9.15			7.56			7.47	
pH	Units		8.18			8.28			8.24			7.92	
Conductivity	uS/cm		925.5			949			1012			994	
Temperature	degF		53.5			63.6			80.1			63.8	

Primary Analytes													
Alkalinity	mg/L		130			130			120			130	
Aluminum (Dissolved)	mg/L		ND			ND			ND			ND	
Aluminum (Total)	ug/L		ND			ND			ND			21	
Ammonia Nitrogen	mg/L		ND			ND			0.015			ND	
Antimony (Total)	ug/L		ND			ND			ND			ND	
Arsenic (Total)	ug/L		3.5			3.2			3.6			4.2	
Barium (Total)	ug/L		110			110			110			120	
Beryllium (Total)	ug/L		ND			ND			ND			ND	
Boron (Total)	mg/L		0.14			0.14			0.15				
Bromide	ug/L		96			100			110			95	
Cadmium (Total)	ug/L		ND			ND			0.25			ND	
Calcium (Total)	mg/L		68			68			66			69	
Chloride	mg/L		99			95			100			98	
Chromium (Total)	ug/L		ND			ND			ND			ND	
Cobalt (Total)	ug/L		ND			ND			ND			ND	
Copper (Dissolved)	ug/L		ND						2			ND	
Fluoride	mg/L		0.4			0.36			0.37			0.38	
Gross Alpha	pCi/L		ND			2.9			3			3.4	
Gross Beta	pCi/L		7.7			5.5			20.9			10.4	
Hexavalent Chromium	ug/L		0.02			ND			#N/A			0.043	
Iron (Dissolved)	mg/L		0.018			ND			ND			ND	
Lead (Total)	ug/L		ND			ND			ND			ND	
Manganese (Total)	ug/L		2.6			ND			2.5			11	
Mercury	ug/L		ND			ND			ND			ND	
Molybdenum (Total)	ug/L		5			5			5.5			5.3	
Nickel (Total)	ug/L		ND			ND			ND			1.2	
Nitrate	mg/L		ND			ND			ND			ND	
Nitrite	mg/L		ND			ND			ND			ND	

LAKE PLEASANT TOWERS 2022 (CONTINUED)

Constituent	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L		ND			ND			1			0.34	
Potassium (Total)	mg/L		5.3			5.3			5.9			6.2	
Radium 226/228	pCi/L		ND			ND			ND				
Selenium (Total)	ug/L		ND			ND			ND			ND	
Silver (Total)	ug/L		ND			ND			ND			ND	
Sodium (Total)	mg/L		92			94			99			100	
Strontium (Total)	mg/L		1			1.1			1.1				
Sulfate	mg/L		220			220			250			230	
Thallium (Total)	ug/L		ND			ND			ND			ND	
Total Dissolved Solids	mg/L		630			650			650			650	
Total Organic Carbon	mg/L		3.3			3.3			3.1			2.7	
Total Phosphorus	mg/L		ND			ND			ND			ND	
Turbidity	NTU		0.45			0.3			0.55			0.85	
Uranium	ug/L		4			4.3			4.6			4.1	
Vanadium (Total)	ug/L		3			ND			3.9			3.2	
Zinc (Total)	ug/L		ND			ND			ND			ND	