



2021 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.

“We never know the worth of water till the well is dry”.

- Thomas Fuller

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

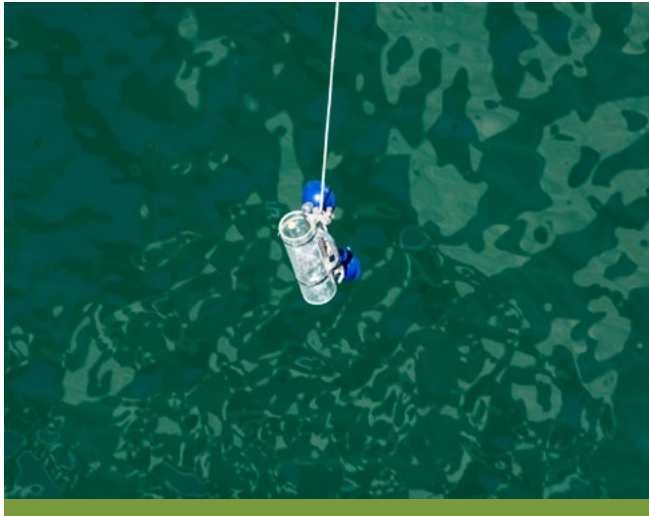
Colorado River, or a blend of water from the river and Lake Pleasant.

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 1996–2016 reports are available upon request.



CAP WATER QUALITY PROGRAM

The CAWCD water quality monitoring program is a service provided to CAP stakeholders, giving valuable information regarding source and canal water quality. Beginning in 2020, CAWCD put increased emphasis on its water quality program to provide stakeholders with additional data, respond to specific requests, improve communications, and incorporate elements of the System Use Agreement (which allows for wheeling of non-project water).

The expanded monitoring program consists of both continuous (real-time) measurements and monthly/quarterly grab samples. Sampled constituents align with the Non-Project Water Guidance Document:

[Water Quality Guidance Document](#)

In addition, the number of sampling sites has increased, additional continuous (real-time) turbidity meters are installed at strategic locations, targeted studies are underway (see Algae Studies section), and a new database management system and user interface are now 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 automatically uploaded from each water quality meter every 15 minutes and displayed on [AquaPortal - Current Conditions](#).

Real-time turbidity sensors are currently installed at two permanent locations (Mark Wilmer

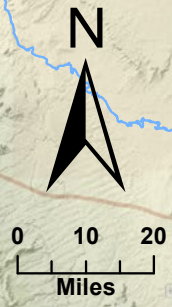
Pumping Plant and CAP Headquarters) and one temporary site (adjacent to Hieroglyphics Mountain Recharge Project). These sensors upload data every 15 minutes to [AquaPortal - Current Conditions](#). Three additional permanent turbidity monitoring stations will be installed in 2022.





GRAB SAMPLES

Monthly grab samples are collected at seven locations, including Lake Havasu (Mark Wilmer PP), Hassayampa Pumping Plant, Waddell Canal, Lake Pleasant Parkway, Roosevelt Water Conservation District Turnout, Brady Pumping Plant, and San Xavier Pumping Plant (see map 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). These samples include the 73 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.



Legend

-  CAP Canal
-  Water Quality Sample Sites

2021 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 46 priority constituents with Introduction and Delivery standards, and nearly 200 additional contaminants that should not be introduced (non-detect).

In 2021, priority constituents measured in the CAP system were similar to the average values measured over the past five years (see Table on pages 8-9). However, Aluminum (total), Chromium (total), Manganese (total), and turbidity were all more than 5% higher than recent historical averages. The higher average values directly correspond with the transition from Lake Pleasant to Colorado River water, which occurs each year in September. During this transition, sediments in the western portion of the canal are re-suspended and the resulting water quality reflects the metals that have bound to those sediments. In 2021, the transition was purposely more gradual, which helped downstream stakeholders to better manage moderate turbidity levels, but likely allowed for the metals to be detected for a longer period.

There were occasional spikes in various other priority constituents (Dissolved Aluminum, Barium, Radium 226/228, Total Organic Carbon, and Total Phosphorus), but each was relatively low level and likely related to the transition 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 2021. 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 “exotic” 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 2021, there were five natural substances (cyanotoxins, minerals, and nutrients) detected, and 14 synthetic, or exotic, 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 that are 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

Insect Repellents

- DEET

Medications

- Acetaminophen
- Erythromycin
- Ibuprofen
- Primidone
- Sulfamethoxazole

Steroids

- 4-androstene-3,17-dione
- Androstenedione

Stimulants

- 1,7-Dimethylxanthine
- Caffeine
- Theobromine

X-Ray Imaging

- Iohexol

SYSTEM-WIDE RANGES AND AVERAGES

2021 Summary of Priority Constituents

Constituent	Units	MRL	2021 Range	2021 Average	CAP 5-Yr Average (2016-2020)
Field Measurements					
Dissolved Oxygen	mg/L		4.84 - 11.09	9.09	9.20
pH	Units		7.14 - 8.6	8.21	8.06
Specific Conductance ¹	µS/cm		809 - 943	885.10	946.74
Temperature	°F		51.8 - 89.7	67.89	67.12

Laboratory Results					
Alkalinity	mg/L	2	89 - 140	126.89	122.50
Aluminum (Dissolved)	mg/L	20	ND - 120	12.13	NA
Aluminum (Total)	µg/L	20	ND - 800	84.02	47.27
Ammonia Nitrogen	mg/L	0.05	ND - 0.16	0.03	0.03
Antimony (Total)	µg/L	1	Non-Detect	Non-Detect	Non-Detect
Arsenic (Total)	µg/L	1	1.8 - 4.1	2.71	2.83
Barium (Total)	µg/L	2	99 - 250	116.66	118.12
Beryllium (Total)	µg/L	1	Non-Detect	Non-Detect	Non-Detect
Boron (Total)	mg/L	0.05	0.12 - 0.14	0.13	0.13
Bromide	µg/L	5	68 - 99	80.56	81.75
Cadmium (Total)	µg/L	0.5	Non-Detect	Non-Detect	Non-Detect
Calcium (Total)	mg/L	1	60 - 82	69.69	71.07
Chloride	mg/L	1	86 - 99	91.02	91.62
Chromium (Total)	µg/L	1	ND - 11	0.65	0.56
Cobalt (Total)	µg/L	2	Non-Detect	Non-Detect	1.13
Copper (Dissolved)	µg/L	2	ND - 5.3	1.05	1.17
Fluoride	mg/L	0.05	0.28 - 0.38	0.33	0.34
Gross Alpha	pCi/L	3	ND - 13	2.52	3.36
Gross Beta	pCi/L	3	2 - 7.5	5.31	5.31
Hexavalent Chromium	µg/L	0.02	ND - 0.053	0.03	0.07
Iron (Dissolved)	mg/L	0.02	ND - 0.01	0.01	0.01
Lead (Total)	µg/L	0.5	ND - 0.95	0.27	0.28
Manganese (Total)	µg/L	2	ND - 64	7.78	5.27

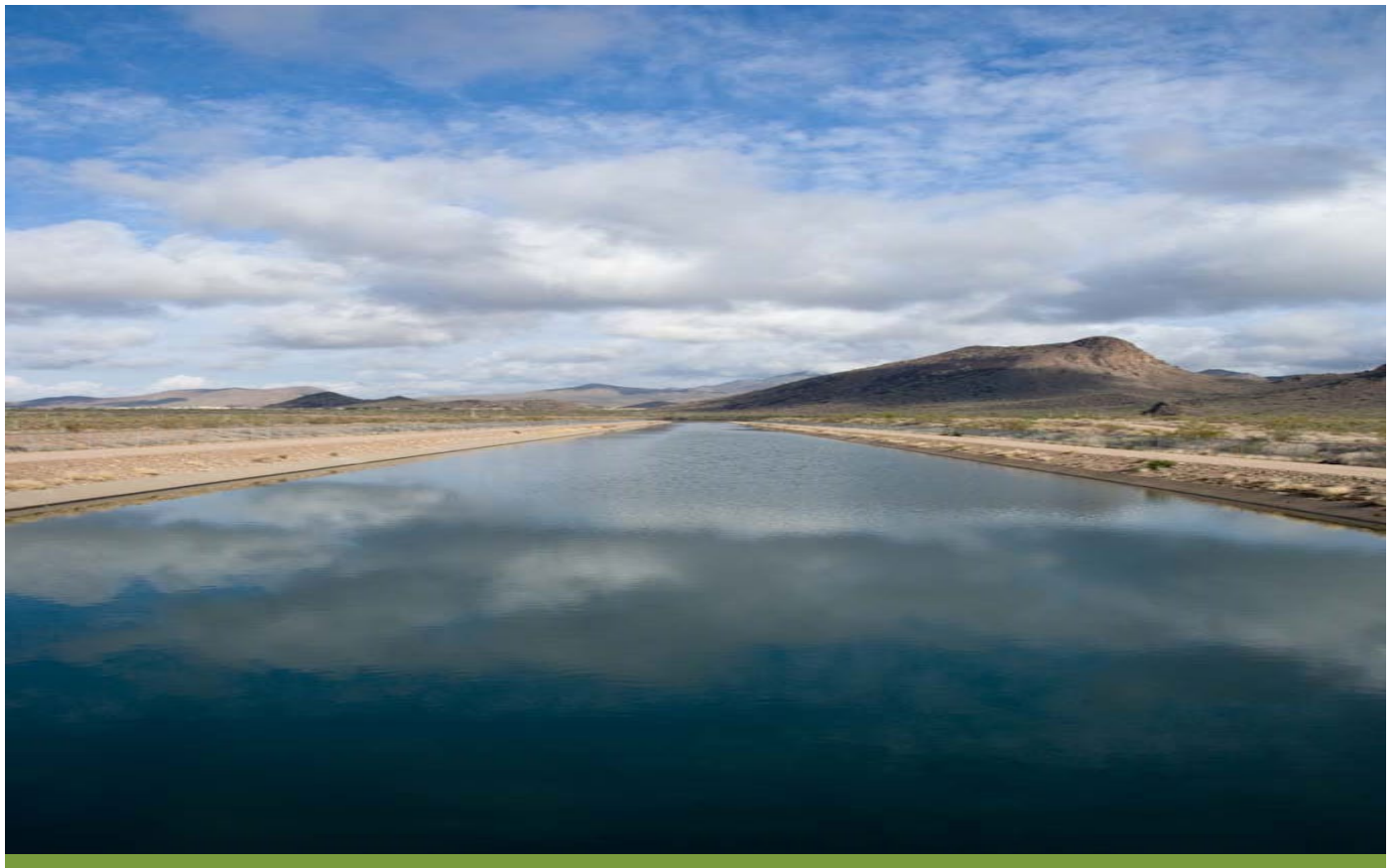
¹ Not included as part of the 10/26/20 DRAFT Guidance Document

RANGES AND AVERAGES (CONTINUED)

Constituent	Units	MRL	2021 Range	2021 Average	CAP 5-Yr Average (2016-2020)
Laboratory Results (cont.)					
Mercury	µg/L	0.2	Non-Detect	Non-Detect	Non-Detect
Molybdenum (Total)	ug/L	2	ND - 7.7	4.52	4.55
Nickel (Total)	µg/L	5	Non-Detect	Non-Detect	2.57
Nitrate	mg/L	0.05	ND - 0.37	0.09	0.10
Nitrite	mg/L	0.05	ND - 0.11	0.03	0.02
Perchlorate	µg/L	2	ND - 3.1	1.08	1.66
Potassium (Total)	mg/L	1	4.3 - 5.6	4.76	4.93
Radium 226/228	pCi/L	1	ND - 3.6	1.06	1.00
Selenium (Total)	µg/L	5	Non-Detect	Non-Detect	Non-Detect
Silver (Total)	µg/L	0.5	Non-Detect	Non-Detect	Non-Detect
Sodium (Total)	mg/L	1	80 - 95	87.06	90.74
Strontium (Total)	mg/L	0.01	0.92 - 1.1	1.01	1.07
Sulfate	mg/L	0.5	190 - 220	211.95	231.51
Thallium (Total)	µg/L	1	Non-Detect	Non-Detect	Non-Detect
Total Dissolved Solids	mg/L	10	510 - 640	582.07	615.98
Total Organic Carbon	mg/L	0.3	2.8 - 4.4	3.44	3.39
Total Phosphorus as P	mg/L	0.02	ND - 0.17	0.01	0.01
Turbidity	NTU	0.1	0.22 - 18	2.49	1.46
Uranium	µg/L	1	ND - 6.8	3.94	4.08
Vanadium (Total)	µg/L	3	ND - 4.2	1.90	2.05
Zinc (Total)	µg/L	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	Oct	0.35	µg/L	0.1	
Perfluorohexanoic acid (PFHxA)						Industrial processes
	San Xavier	Jul	0.0066	µg/L	0.002	
Quinoline (by LCMSMS)						Pollutant
	San Xavier	Apr	11	ng/L	0.02	
E. coli						Fecal transfer
	Lake Havasu	Jan	Present			
	Lake Pleasant Parkway	Apr	Present			
	San Xavier	Jul	Present			
	Lake Pleasant	Oct	Present			
	Lake Pleasant Parkway	Oct	Present			
	Lake Havasu	Oct	Present			
Total Coliform						Occurs naturally, Fecal transfer
	All Sites	All	Present			



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 2021. 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 2021, PFHxA was detected in a very small amount at San Xavier Pumping Plant in July.

QUINOLINE has few applications, but is mainly used in the production of other chemicals and the manufacturing of dyes. Quinoline is found at higher levels in cigarette smoke. However, its derivatives do have some anti-malarial characteristics. Quinoline breaks down quickly in water, so it is difficult to determine the source of this contamination.

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.

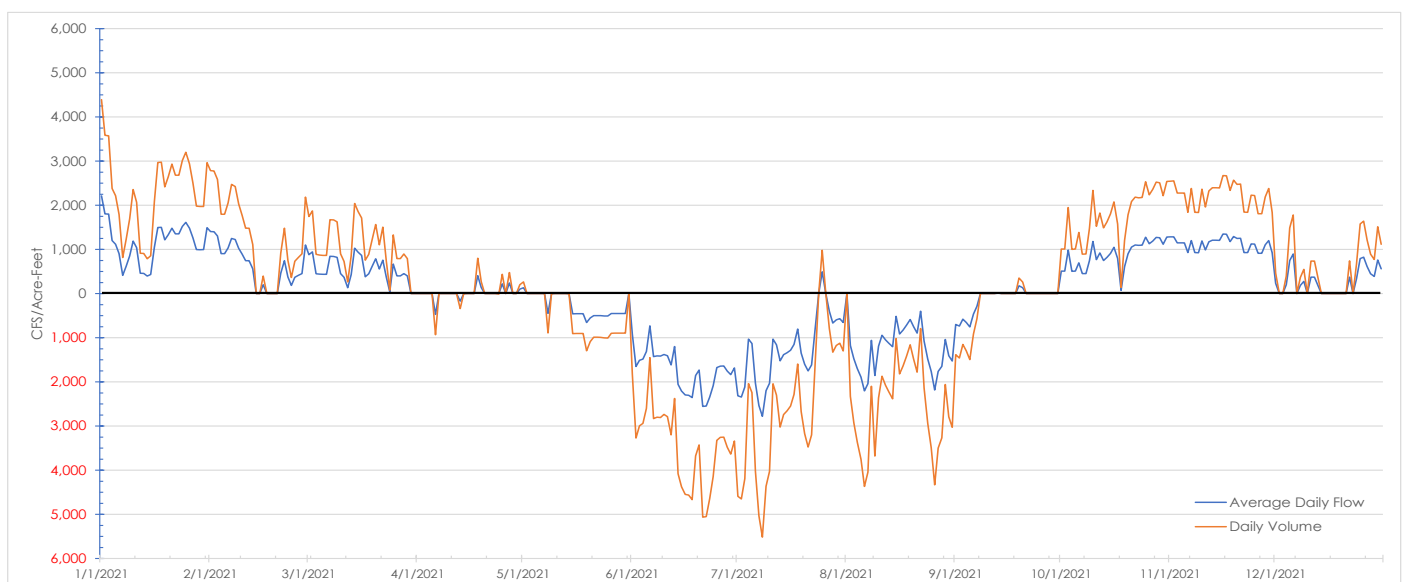
In 2021, pumping and releasing (generating) were typical of most years, although a more gradual transition from Lake Pleasant to Colorado River water was employed in early September. This was done at the request of stakeholders to minimize impacts caused by the re-suspension of sediments. Stakeholders have indicated that this approach was effective in reducing turbidity and total organic carbon levels.

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 measured at the Lake Pleasant Towers, 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) in September.

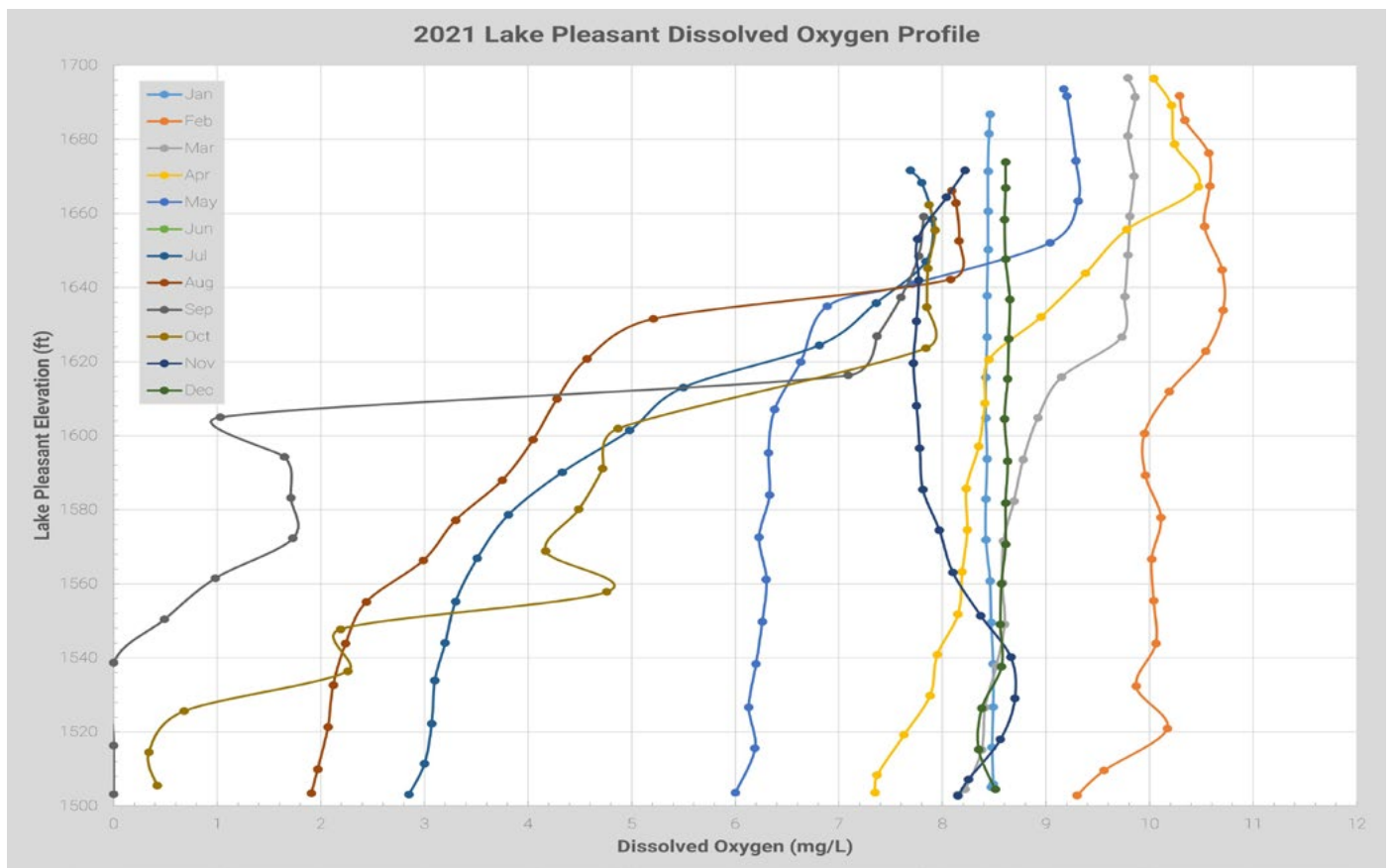
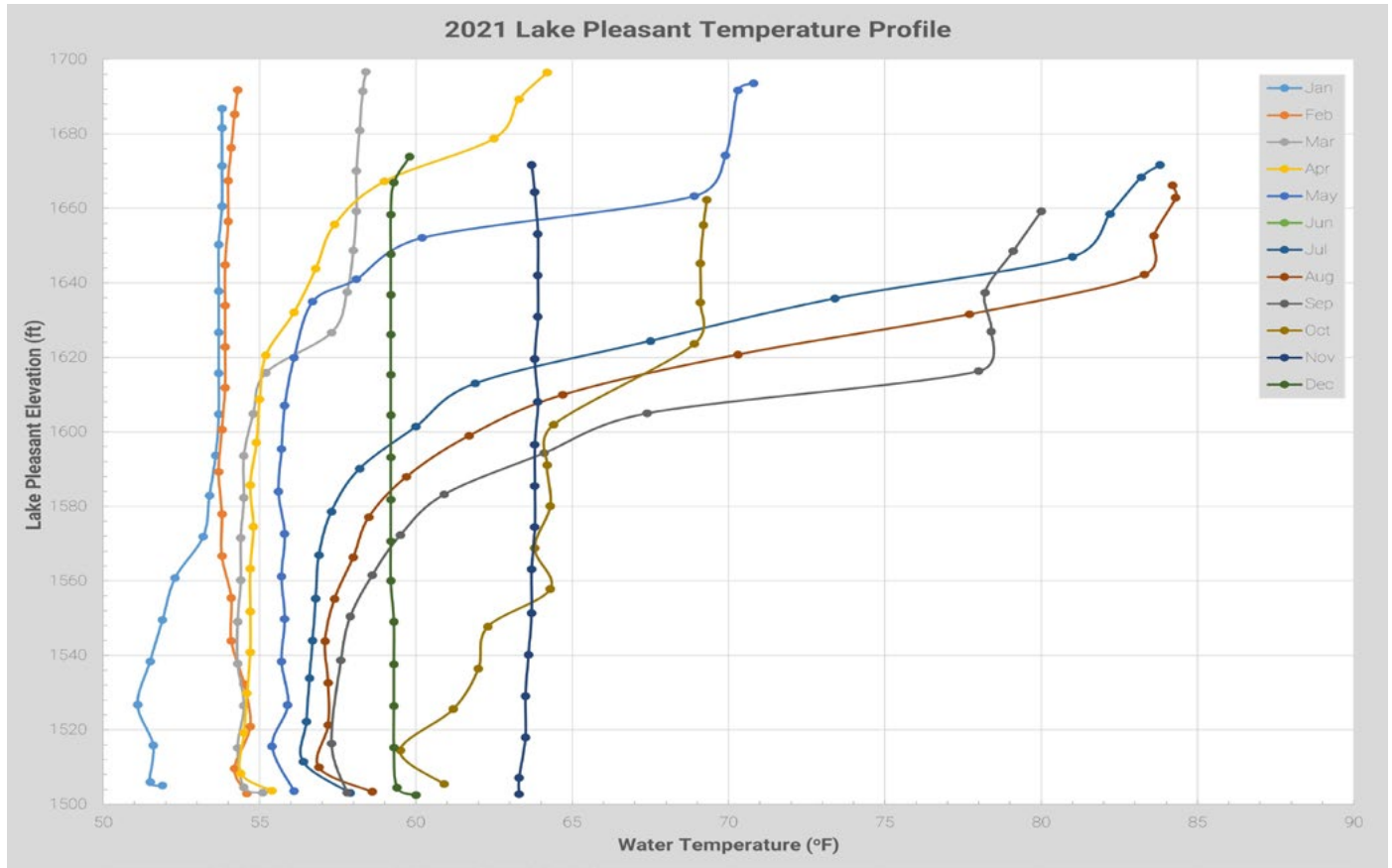
Although the intake portals at Waddell Dam are set at two different levels, CAP only utilizes the lower portals (elevation 1,515 feet) to best manage water quality and reduce taste and odor issues associated with anoxic water. This may seem counter-intuitive, as lower quality water is near the bottom of the reservoir (hypolimnion), but retaining the oxygen-rich epilimnetic water in the reservoir improves the overall quality of water to delivered to CAP stakeholders.

2021 Lake Pleasant Operations	
Average Water Elevation	1,680.20 (ft)
Highest Water Elevation (3/30/21)	1,696.71 (ft)
Lowest Water Elevation (9/30/21)	1,659.68 (ft)
Change in Elevation:	37.03 (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



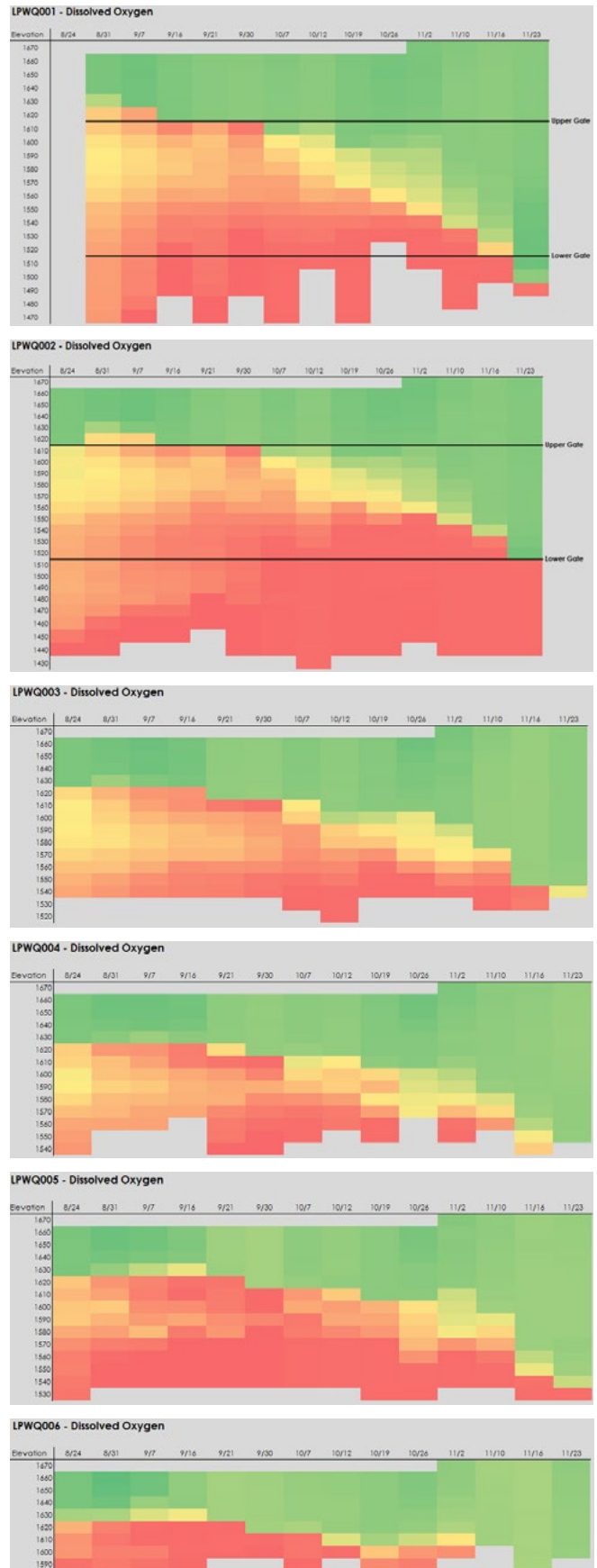
LAKE PLEASANT WEEKLY PROFILES

In 2021, CAP conducted weekly vertical profile sampling at six sites throughout the lake from late August through November. This was done to provide additional detail of the oxygen deficit in the lake and to determine influences of incoming canal water. Heat maps (right) show that anoxic conditions are present throughout the lake in late August, and persist into November. In late September, when the thermocline was strongest, anoxic conditions near the dam were present from an elevation of 1,610 feet all the way to the lake bottom (1,440 feet), leaving only about 50 feet of oxygen-rich water. Similar conditions, on a reduced scale, existed throughout the lake. The thermocline (and oxygen deficit) began to break down shortly after canal water was introduced into the lake (October 1st), but persisted through late-November.



Map of Lake Pleasant (above) with sample sites for weekly vertical profile sampling in 2021 from late-August through November.

Heat maps on the right show vertical profile oxygen gradients with green cells indicating dissolved oxygen levels above 7.0 mg/L and red cells indicating oxygen levels at (or near) 0.0 mg/L.



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.

Although maintenance activities continued at Alamo Dam, there were no scheduled or emergency releases in 2021 and there are none planned for 2022.

The United States Corps of Engineers, who operate and maintain 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. The Manual should be available for public comment in mid-2022 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.

To date, AzCATI researchers have determined that the species of diatom found in the canal (*Cymbella* spp) appears to be unique in the United States. A bulk of the AzCATI research has focused on the deployment of sensors (MiProbe) that are used to detect algal activity. Preliminary findings suggest that these sensors will be able to provide CAP and stakeholders with an alert when algal blooms are likely. This will allow for preparations to be made to effectively manage any problems that may arise as a result of the algal blooms.





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:

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APPENDIX A. WATER QUALITY TABLES

LAKE HAVASU 2021 (MARK WILMER PUMPING PLANT)

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements														
Dissolved Oxygen	mg/L	---	10.88	10.12	10.21	9.81	9.01			7.9	7.41	7.08	8.99	9.04
pH	Units	---	8.01	8.37	8.24	8.1	8.31	8.6	8.27	8.37	8.05	8.37	8.08	8.09
Conductivity	us/cm	---	899	876	908	914	880	920	901	837	832	889	927	911
Temperature	degF	---	53	56	57.2	64.5	73.1	80	89.7	82.6	81.9	74.5	66.9	58

Primary Analytes														
Alkalinity	mg/L	2	130	130	130	130	130	130	130	130	130	130	130	130
Aluminum (Dissolved)	mg/L	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	20	76	64	77	86	28	ND	ND	32	200	290	180	87
Ammonia Nitrogen	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Antimony (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (Total)	ug/L	1	2.4	2	2.5	2.4	2.5	2.5	2.5	2.9	2	2.9	2.5	2.3
Barium (Total)	ug/L	2	120	110	120	120	110	110	110	110	250	110	120	110
Beryllium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron (Total)	mg/L	0.05	0.13	0.13	0.13	0.13	0.12	0.13	0.12	0.13	0.12	0.12	0.13	0.13
Bromide	ug/L	5	82	81	76	78	79	68	81	78	78	83	81	84
Cadmium (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium (Total)	mg/L	1	71	71	73	72	71	72	66	68	64	69	70	71
Chloride	mg/L	0.5	92	90	90	90	86	86	88	90	86	91	88	95
Chromium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	2.6	ND	ND	ND
Cobalt (Total)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper (Dissolved)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoride	mg/L	0.05	0.33	0.32	0.33	0.28	0.28	0.32	0.34	0.32	0.29	0.35	0.31	0.32
Gross Alpha	pCi/L	3	ND	ND	3.2	ND	ND	ND	4.5	ND	3.5	ND	ND	ND
Gross Beta	pCi/L	3	7.5	5.1	5.9	4.1	5.1	3.9	4.3	5.5	4.5	3.7	4.4	7.3
Hexavalent Chromium	ug/L	0.02	0.025	0.035	0.041	0.031	0.032	0.029	0.024	ND	0.025	0.02	ND	0.022
Iron (Dissolved)	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Manganese (Total)	ug/L	0.4	4.2	3.98	5	5	2.8	3.3	2.8	7.1	7.8	14	7.8	4.8
Mercury	ug/L	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum (Total)	ug/L	2	4.6	4.3	4.6	4.5	4.4	4.3	4.1	4.5	ND	4.2	4.9	4.2
Nickel (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate	mg/L	0.05	0.26	0.3	0.37	0.36	0.3	0.25	ND	ND	ND	ND	ND	ND

LAKE HAVASU 2021 (CONTINUED)

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Nitrite	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perchlorate	ug/L	4	#N/A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (Total)	mg/L	1	4.5	4.6	4.6	4.5	4.5	4.7	4.4	4.4	4.3	4.5	4.9	4.8
Radium 226/228 (calc)	pCi/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium (Total)	mg/L	1	87	86	87	84	83	88	83	83	80	84	89	89
Strontium (Total)	mg/L	0.01	1	1	1	1	0.98	1	0.95	0.97	0.92	0.98	1	1
Sulfate	mg/L	0.5	220	220	210	210	200	200	200	200	190	210	200	210
Thallium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Dissolved Solids	mg/L	10	600	580	600	600	590	560	560	570	640	560	570	590
Total Organic Carbon	mg/L	0.2	3.4	3.6	3	3.2	2.8	3.2	3.4	3.1	3.4	3.2	3.6	3.6
Total Phosphorus	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Turbidity	NTU	0.1	1.8	1.8	2.3	2.1	0.8	0.84	0.72	2	2.9	6	5.6	2.4
Uranium	ug/L	1	4	3.7	4.2	4.1	3.7	3.8	3.4	3.6	ND	3.9	4.1	3.7
Vanadium (Total)	ug/L	3	ND	ND	3	ND	ND	ND	ND	ND	ND	3.2	ND	ND
Zinc (Total)	ug/L	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

HASSAYAMPA PUMPING PLANT 2021

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements														
Dissolved Oxygen	mg/L	---	10.7	10.5	10.34	9.66	9.36			8.54	8.12	7.61	9.21	10.37
pH	Units	---	7.93	8.19	8.36	8.2	8.27	8.41	8.3	8.48	8.09	8.32	8.28	8.11
Conductivity	us/cm	---	913	921	867	917	878	899	898	893	836	833	920	914.4
Temperature	degF	---	51.9	54.7	58.2	68.4	71.1	78	87.4	86.2	81.4	74.9	67.8	57.1

Primary Analytes														
Alkalinity	mg/L	2	130	130	130	130	130	130	120	110	130	130	130	120
Aluminum (Dissolved)	mg/L	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	20	45	51	43	150	67	81	ND	ND	390	800	450	35
Ammonia Nitrogen	mg/L	0.05	ND	ND	ND	ND	ND	ND	0.058	ND	ND	ND	ND	ND
Antimony (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (Total)	ug/L	1	2.3	2.2	2.2	2.6	2.5	2.6	3	2.7	3.2	3.3	2.7	2.3
Barium (Total)	ug/L	2	120	110	110	110	120	110	110	100	130	120	120	110
Beryllium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron (Total)	mg/L	0.05	0.13	0.13	0.14	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.14
Bromide	ug/L	5	75	82	76	76	70	75	81	77	77	82	76	82
Cadmium (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium (Total)	mg/L	1	76	71	77	71	72	73	63	60	82	77	81	71
Chloride	mg/L	0.5	92	92	89	88	88	90	89	87	91	91	93	87
Chromium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.1	ND	ND
Cobalt (Total)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper (Dissolved)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoride	mg/L	0.05	0.32	0.34	0.34	0.3	0.34	0.29	0.32	0.29	0.32	0.31	0.32	0.32
Gross Alpha	pCi/L	3	4.1	6.5	5.2	3.5	ND	ND	ND	ND	ND	ND	4	ND
Gross Beta	pCi/L	3	5.2	6.1	3.5	5.6	5.3	4.8	3.8	5.4	4.7	6.4	4.5	5.7
Hexavalent Chromium	ug/L	0.02	0.033	0.034	0.036	0.04	0.034	0.026	0.026	0.029	ND	0.03	ND	0.023
Iron (Dissolved)	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	0.54	0.95	0.65	ND
Manganese (Total)	ug/L	0.4	2.5	2.3	2.6	9.5	4.8	14	5.8	3.3	25	31	15	4.1
Mercury	ug/L	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum (Total)	ug/L	2	4.5	4.5	4.3	4.3	4.5	3.9	4.4	4.5	4.4	4.3	4	4.4
Nickel (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate	mg/L	0.05	0.26	0.26	0.31	0.31	0.27	ND	ND	ND	ND	ND	ND	ND
Nitrite	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

HASSAYAMPA PUMPING PLANT 2021 (CONTINUED)

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (Total)	mg/L	1	4.9	4.8	4.7	4.4	4.6	4.7	4.5	4.5	4.6	4.8	4.8	4.8
Radium 226/228 (calc)	pCi/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium (Total)	mg/L	1	92	87	92	83	85	87	85	88	83	86	87	90
Strontium (Total)	mg/L	0.01	1.1	1	1.1	0.99	1	1	0.96	0.97	1	1	1.1	1
Sulfate	mg/L	0.5	220	220	210	210	210	210	200	200	200	200	210	200
Thallium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Dissolved Solids	mg/L	10	610	580	580	570	570	570	550	580	570	540	580	600
Total Organic Carbon	mg/L	0.2	3.4	3.7	3.4	3.3	3.4	3.8	3.8	3.5	3.4	3.8	4.4	2.9
Total Phosphorus	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.021	0.031	ND
Turbidity	NTU	0.1	1.2	1.5	1.4	4.1	3.1	4.5	1.1	0.8	12	18	10	0.68
Uranium	ug/L	1	4.2	4	4	4	4	3.8	3.9	3.7	3.9	3.9	3.8	4
Vanadium (Total)	ug/L	3	ND	ND	ND	ND	ND	ND	ND	ND	3.2	3.9	3.5	ND
Zinc (Total)	ug/L	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

WADDELL PUMPING PLANT 2021

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements														
Dissolved Oxygen	mg/L	---	10.83	10.72	10.41	8.63	6.5			4.84	9.8	7.88	9.31	10.1
pH	Units	---	8.33	8.32	8.35	7.45	7.7	7.78	8.01	7.86	8.21	8.26	8.25	7.14
Conductivity	us/cm	---	911	915	853	849	819	923	937	877	809	836	919	905
Temperature	degF	---	51.9	55.7	58.5	66	67.4	61.7	61.5	60.5	73.2	76.1	66.1	57

Primary Analytes														
Alkalinity	mg/L	2	130	130	140	140	140	130	130	140	130	130	120	120
Aluminum (Dissolved)	mg/L	20	ND	ND	52	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	20	67	84	48	38	ND	23	51	29	ND	46	160	ND
Ammonia Nitrogen	mg/L	0.05	ND	ND	ND	0.16	ND	ND	ND	ND	ND	ND	ND	ND
Antimony (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (Total)	ug/L	1	2.3	2.3	2.4	3.4	3.6	3.8	3.8	3.2	3	2.6	2.5	2.3
Barium (Total)	ug/L	2	120	110	120	120	120	110	130	110	99	110	120	110
Beryllium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron (Total)	mg/L	0.05	0.13	0.13	0.13	0.13	0.14	0.13	0.13	0.13	0.13	0.12	0.13	0.13
Bromide	ug/L	5	75	80	85	92	93	91	93	92	91	82	80	81
Cadmium (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium (Total)	mg/L	1	76	74	72	66	70	70	70	70	68	67	72	70
Chloride	mg/L	0.5	91	92	93	91	91	91	90	89	93	91	93	96
Chromium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cobalt (Total)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper (Dissolved)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoride	mg/L	0.05	0.32	0.33	0.36	0.33	0.38	0.32	0.37	0.34	0.34	0.34	0.32	0.32
Gross Alpha	pCi/L	3	4.6	ND	ND	ND	ND	ND	4.8	ND	ND	ND	3.9	ND
Gross Beta	pCi/L	3	5.1	5.4	6.5	5.6	4.9	5.6	6.8	6.6	6.2	4.2	6.4	7.2
Hexavalent Chromium	ug/L	0.02	0.033	0.048	0.03	ND	0.03	ND	ND	ND	ND	0.026	ND	ND
Iron (Dissolved)	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Manganese (Total)	ug/L	0.4	2.7	2.3	1.3	16	9.2	12	25	17	11	5.7	6.4	0.99
Mercury	ug/L	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum (Total)	ug/L	2	4.2	4.2	4.6	4.8	5.1	4.9	5.2	4.8	4.2	4.2	4.4	4.5
Nickel (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate	mg/L	0.05	0.26	0.26	0.28	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrite	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

WADDELL PUMPING PLANT 2021 (CONTINUED)

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (Total)	mg/L	1	4.8	4.9	4.8	4.8	5.1	5.2	5.2	5.1	5	4.5	5	4.8
Radium 226/228 (calc)	pCi/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium (Total)	mg/L	1	91	89	86	84	89	90	90	90	88	84	89	90
Strontium (Total)	mg/L	0.01	1.1	1.1	1	0.98	1	1	1	1	1	0.98	1	1
Sulfate	mg/L	0.5	220	220	220	220	220	220	220	220	220	210	210	210
Thallium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Dissolved Solids	mg/L	10	590	590	600	620	600	610	590	610	620	550	560	590
Total Organic Carbon	mg/L	0.2	3.7	3.5	3.4	3.6	3.7	3.5	3.5	3.1	3.5	3.8	3.3	3
Total Phosphorus	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Turbidity	NTU	0.1	0.95	1.2	0.22	1.4	1.2	1.6	1.4	2	1.2	2.4	3.5	1.4
Uranium	ug/L	1	4	4	4.5	4.2	4.3	4.2	4.7	4.1	3.5	3.7	3.9	4
Vanadium (Total)	ug/L	3	ND	ND	ND	3	ND	3.4	3.1	ND	ND	ND	ND	ND
Zinc (Total)	ug/L	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

LAKE PLEASANT PARKWAY 2021

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements														
Dissolved Oxygen	mg/L	---	10.83	10.8	10.78	9.61	9.67			5.95	7.94	7.83	9.51	10.2
pH	Units	---	8.13	8.33	8.36	8.28	8.34	7.82	8.3	7.95	8.46	8.31	8.3	8.04
Conductivity	uS/cm	---	899	919	868	913	867	906	898	910	834	837	910	917
Temperature	degF	---	51.8	55.6	56.3	67.4	73.1	70.3	62.4	68.1	84.5	75.3	68.5	56.6

Primary Analytes														
Alkalinity	mg/L	2	130	130	130	130	130	130	130	120	120	130	130	120
Aluminum (Dissolved)	mg/L	20	ND	ND	30	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	20	ND	46	40	55	37	28	33	24	77	270	130	29
Ammonia Nitrogen	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Antimony (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (Total)	ug/L	1	2.4	2.3	2.4	2.5	2.5	3.2	3.5	3.2	2.6	3	2.3	2.3
Barium (Total)	ug/L	2	110	110	120	120	120	110	110	110	110	110	110	110
Beryllium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron (Total)	mg/L	0.05	0.13	0.14	0.13	0.12	0.12	0.13	0.14	0.13	0.12	0.13	0.13	0.13
Bromide	ug/L	5	79	84	80	73	73	82	93	85	76	80	78	82
Cadmium (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium (Total)	mg/L	1	71	73	72	68	71	70	72	65	69	71	71	71
Chloride	mg/L	0.5	90	92	94	89	88	91	88	88	93	89	93	97
Chromium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cobalt (Total)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper (Dissolved)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoride	mg/L	0.05	0.34	0.35	0.36	0.31	0.34	0.31	0.35	0.31	0.31	0.31	0.32	0.33
Gross Alpha	pCi/L	3	ND	3.6	ND	ND	3	ND	ND	3	ND	ND	3.6	ND
Gross Beta	pCi/L	3	4.8	4	3.5	ND	4.6	5	6.8	6.3	5.3	5	4.5	4.2
Hexavalent Chromium	ug/L	0.02	0.023	0.034	0.029	0.034	0.038	0.02	ND	0.024	ND	0.028	ND	0.023
Iron (Dissolved)	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Manganese (Total)	ug/L	0.4	ND	2.2	2.5	4.5	2.8	7.3	16	8.7	9.8	14	5.1	1.2
Mercury	ug/L	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum (Total)	ug/L	2	4.4	4.4	4.5	4.5	4.6	4.6	5.1	4.6	4	4.2	4.6	4.4
Nickel (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate	mg/L	0.05	ND	ND	0.28	0.31	ND	ND	ND	ND	ND	ND	ND	ND
Nitrite	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

LAKE PLEASANT PARKWAY 2021 (CONTINUED)

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L	4	#N/A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (Total)	mg/L	1	4.6	4.8	4.9	4.3	4.5	4.9	5.4	4.7	4.6	4.6	4.8	4.8
Radium 226/228 (calc)	pCi/L	2	ND	3.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium (Total)	mg/L	1	86	89	85	80	85	88	93	85	85	86	88	90
Strontium (Total)	mg/L	0.01	1	1	1	0.96	1	1	1.1	0.98	0.99	1	1	1
Sulfate	mg/L	0.5	220	220	220	210	210	210	210	210	210	200	210	210
Thallium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Dissolved Solids	mg/L	10	590	580	630	600	570	570	590	610	590	560	570	610
Total Organic Carbon	mg/L	0.2	3.2	3.7	3.4	3	3.5	3.5	3.3	3.7	3.2	3.4	4	2.9
Total Phosphorus	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	ND
Turbidity	NTU	0.1	0.82	1.6	0.88	1.5	1.6	1.4	1.6	1.1	3.3	3.1	3.5	0.89
Uranium	ug/L	1	3.9	4.1	4.4	3.9	4.2	3.9	3.9	3.9	3.6	3.7	3.8	3.9
Vanadium (Total)	ug/L	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.2	3.1	ND
Zinc (Total)	ug/L	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ROOSEVELT WCD 2021

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements														
Dissolved Oxygen	mg/L	---	10.74	10.79	11.09	10.06	9.56			9.02	7.72	8.61	9.54	10.01
pH	Units	---	8.38	8.33	8.31	8.38	8.51	8.32	8.25	8.37	8.12	8.48	7.96	8.09
Conductivity	uS/cm	---	905	924	864	915	881	910	921	905	836	838	922	912
Temperature	degF	---	54.3	54.8	61.8	65.6	72.9	76.2	72.6	73.7	84.9	68.4	67.1	58

Primary Analytes														
Alkalinity	mg/L	2	130	130	130	130	130	130	130	120	120	130	120	120
Aluminum (Dissolved)	mg/L	20	ND	ND	120	23	ND	ND	ND	ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	20	ND	ND	35	120	100	32	68	75	89	85	ND	48
Ammonia Nitrogen	mg/L	0.05	ND	ND	ND	ND	ND	ND	0.062	ND	ND	ND	ND	ND
Antimony (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (Total)	ug/L	1	2.2	2.8	2.4	2.6	2.6	2.9	3.1	3	2.6	2.6	2	3.7
Barium (Total)	ug/L	2	120	120	110	120	120	110	110	110	120	110	110	200
Beryllium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron (Total)	mg/L	0.05	0.13	0.12	0.13	0.13	0.12	0.13	0.13	0.13	0.12	0.13	0.13	0.13
Bromide	ug/L	5	83	75	74	75	75	80	85	84	77	79	78	80
Cadmium (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium (Total)	mg/L	1	73	70	72	73	73	71	67	64	68	70	68	70
Chloride	mg/L	0.5	94	90	92	93	86	89	91	93	93	90	93	98
Chromium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cobalt (Total)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper (Dissolved)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoride	mg/L	0.05	0.35	0.31	0.31	0.32	0.31	0.3	0.35	0.31	0.3	0.31	0.3	0.32
Gross Alpha	pCi/L	3	ND	ND	ND	5.6	ND	5.4	5.4	ND	3.2	ND	13	ND
Gross Beta	pCi/L	3	4.4	4.7	5.4	4.2	4.4	6.2	5.1	5.6	3.5	4.9	5	5.4
Hexavalent Chromium	ug/L	0.02	0.03	0.03	0.038	0.038	0.033	0.02	ND	0.029	0.022	0.034	ND	ND
Iron (Dissolved)	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Manganese (Total)	ug/L	0.4	ND	1.7	2.3	6.7	5	5.3	ND	9.2	12	5.2	1.8	1.7
Mercury	ug/L	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum (Total)	ug/L	2	4.4	4.7	4.3	4.6	4.5	4.8	4.5	4.8	4.4	4.6	4.4	7.7
Nickel (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate	mg/L	0.05	ND	0.26	0.28	0.31	ND	ND	0.12	ND	ND	0.29	ND	ND
Nitrite	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ROOSEVELT WCD 2021 (CONTINUED)

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L	4	ND	ND	ND	3.1	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (Total)	mg/L	1	4.6	4.7	4.5	4.6	4.6	5	4.9	4.8	4.6	4.9	4.8	4.8
Radium 226/228 (calc)	pCi/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium (Total)	mg/L	1	90	85	88	85	86	89	86	85	84	89	88	90
Strontium (Total)	mg/L	0.01	1.1	1	1	1	1	1	0.99	0.99	0.98	1	1	1
Sulfate	mg/L	0.5	220	220	220	220	200	210	220	220	210	210	210	210
Thallium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Dissolved Solids	mg/L	10	590	580	550	580	550	570	600	590	510	590	600	600
Total Organic Carbon	mg/L	0.2	3.6	3.8	3.5	3.4	3	3.5	3.7	3.3	3.6	3.5	2.9	2.8
Total Phosphorus	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Turbidity	NTU	0.1	0.71	1.1	0.81	4.6	1.5	2.2	2.2	2.4	5.3	2.4	0.76	1.1
Uranium	ug/L	1	4	4.4	4.2	4.1	4	4.3	4	3.9	3.9	3.9	3.9	6.8
Vanadium (Total)	ug/L	3	ND	ND	ND	ND	ND	3	ND	3.1	ND	ND	ND	4.2
Zinc (Total)	ug/L	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

BRADY PUMPING PLANT 2021

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements														
Dissolved Oxygen	mg/L	---	9.52	9.43	9.93	9.11	8.94			9.22	9.14	9.11	7.94	9.8
pH	Units	---	8.15	8.48	8.33	8.02	8.32	8.23	8.22	8.16	8.17	8.57	7.95	8.23
Conductivity	uS/cm	---	848	811	868	891	864	823	930	829	845	846	926	877
Temperature	degF	---	61.2	64.1	62.6	72.8	76.8	88	78.9	80.3	80.5	68.4	68.3	57.9

Primary Analytes														
Alkalinity	mg/L	2	130	130	130	130	130	120	130	120	120	89	120	120
Aluminum (Dissolved)	mg/L	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	20	ND	61	ND	78	140	ND	ND	130	ND	ND	59	ND
Ammonia Nitrogen	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Antimony (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (Total)	ug/L	1	2.6	2.3	2.3	2.5	2.8	3	3.2	3.2	2.8	2.4	3	2.4
Barium (Total)	ug/L	2	110	110	120	110	110	110	110	120	120	110	110	100
Beryllium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron (Total)	mg/L	0.05	0.13	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.12	0.12	0.13	0.13
Bromide	ug/L	5	78	75	74	75	76	79	99	83	78	78	84	81
Cadmium (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium (Total)	mg/L	1	73	69	72	72	74	73	67	64	62	65	65	67
Chloride	mg/L	0.5	92	92	90	91	88	90	89	89	93	91	97	93
Chromium (Total)	ug/L	1	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cobalt (Total)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper (Dissolved)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoride	mg/L	0.05	0.36	0.33	0.34	0.3	0.29	0.34	0.36	0.33	0.31	0.32	0.32	0.32
Gross Alpha	pCi/L	3	ND	ND	5.1	ND	3.3	ND	ND	3.4	ND	4	3.6	ND
Gross Beta	pCi/L	3	5.6	5.9	6.2	6.4	5.5	6.5	4.1	6.4	5.6	6	5.4	5.5
Hexavalent Chromium	ug/L	0.02	0.043	0.038	0.044	0.039	0.026	0.021	0.02	0.031	0.03	0.05	ND	0.042
Iron (Dissolved)	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Manganese (Total)	ug/L	0.4	1	1.3	1.9	7.7	14	5.8	7.9	11	8.3	3.8	26	1.4
Mercury	ug/L	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum (Total)	ug/L	2	4.2	4.5	4.7	4.5	4.3	4.5	4.8	4.8	4.5	4.5	4.5	4.7
Nickel (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate	mg/L	0.05	ND	ND	0.26	0.28	ND	ND	ND	ND	ND	ND	ND	ND
Nitrite	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

BRADY PUMPING PLANT 2021 (CONTINUED)

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (Total)	mg/L	1	4.6	4.7	4.7	4.9	4.7	5	5	4.8	4.7	4.5	4.9	4.7
Radium 226/228 (calc)	pCi/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium (Total)	mg/L	1	91	86	88	86	88	92	87	86	82	84	89	88
Strontium (Total)	mg/L	0.01	1.1	1	1	1	1	1.1	1	0.99	0.94	0.97	1	1
Sulfate	mg/L	0.5	220	220	210	210	210	210	210	210	210	210	210	210
Thallium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Dissolved Solids	mg/L	10	580	570	570	590	590	570	580	560	550	590	570	580
Total Organic Carbon	mg/L	0.2	3.3	3.9	3.3	3.1	3.6	3.8	3.8	3.4	3.2	3.2	4.4	3.2
Total Phosphorus	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Turbidity	NTU	0.1	0.66	0.69	2.4	5.6	5.1	2.4	1.8	2.3	1.5	1.1	3.4	0.54
Uranium	ug/L	1	3.8	4.2	4.1	4.2	4	ND	4.1	3.9	3.8	3.4	3.9	3.8
Vanadium (Total)	ug/L	3	ND	ND	ND	ND	ND	ND	ND	3.4	ND	ND	ND	ND
Zinc (Total)	ug/L	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

SAN XAVIER PUMPING PLANT 2021

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements														
Dissolved Oxygen	mg/L	---	9.14	10.36	8.71	8.71	8.4			7.4	8.64	7.67	8.99	9.43
pH	Units	---	8.19	8.53	8.32	8.19	8.36	8.05	8.46	8.17	8.34	8.46	8.35	8.22
Conductivity	uS/cm	---	859	851	872	886	877	919	927	827	843	835	920	881
Temperature	degF	---	57	59.1	60.8	70.6	74	80.6	84.5	81.6	79.2	65.9	64.8	57.9

Primary Analytes														
Alkalinity	mg/L	2	130	130	130	130	120	120	120	120	120	120	110	120
Aluminum (Dissolved)	mg/L	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aluminum (Total)	ug/L	20	ND	31	52	ND	27	48	180	230	120	230	400	82
Ammonia Nitrogen	mg/L	0.05	0.05	ND	ND	ND	ND	ND	ND	0.055	0.055	0.055	0.097	0.051
Antimony (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (Total)	ug/L	1	1.8	2.2	2.4	2.4	2.6	3	3.4	2.8	3	2.5	2.4	2.2
Barium (Total)	ug/L	2	120	120	120	120	110	120	110	120	120	110	130	110
Beryllium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron (Total)	mg/L	0.05	0.13	0.12	0.13	0.12	0.12	0.13	0.13	0.13	0.12	0.12	0.13	0.13
Bromide	ug/L	5	76	76	75	74	70	80	86	84	80	80	82	82
Cadmium (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium (Total)	mg/L	1	72	69	70	69	68	68	64	62	62	65	65	66
Chloride	mg/L	0.5	93	93	92	92	88	92	90	89	95	92	99	94
Chromium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cobalt (Total)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper (Dissolved)	ug/L	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoride	mg/L	0.05	0.35	0.32	0.33	0.3	0.31	0.34	0.36	0.33	0.32	0.33	0.31	0.32
Gross Alpha	pCi/L	3	3	3.3	ND	ND	3.4	ND	ND	3.6	ND	ND	3.7	ND
Gross Beta	pCi/L	3	5.6	6.3	4.9	5.2	5.4	5	4.7	3.3	4.4	5.5	5.5	4.6
Hexavalent Chromium	ug/L	0.02	0.053	0.037	0.034	0.03	0.026	ND	ND	0.031	ND	0.028	ND	0.027
Iron (Dissolved)	mg/L	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Manganese (Total)	ug/L	0.4	1.7	2	2.7	2.4	3.1	3.5	17	18	16	7	16	3.8
Mercury	ug/L	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Molybdenum (Total)	ug/L	2	4.3	4.6	4.7	4.8	4.6	4.7	4.8	4.8	4.7	4.3	4.6	4.7
Nickel (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrate	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrite	mg/L	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

SAN XAVIER PUMPING PLANT 2021 (CONTINUED)

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (Total)	mg/L	1	4.6	4.7	4.7	4.8	4.6	5	5	4.8	4.7	4.5	5.1	4.7
Radium 226/228 (calc)	pCi/L	2	ND	3.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (Total)	ug/L	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (Total)	ug/L	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium (Total)	mg/L	1	91	86	86	86	87	90	85	86	85	85	91	86
Strontium (Total)	mg/L	0.01	1.1	1	1	1	1	1	0.98	0.96	0.97	0.97	1	0.99
Sulfate	mg/L	0.5	220	220	220	220	210	210	210	210	210	210	220	210
Thallium (Total)	ug/L	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Dissolved Solids	mg/L	10	590	580	580	580	590	570	570	570	550	610	570	560
Total Organic Carbon	mg/L	0.2	3.3	3.3	3.4	3.2	3.4	3.6	3.9	3.3	3.4	3	4	3.2
Total Phosphorus	mg/L	0.02	ND	ND	ND	0.098	0.17	ND	ND	ND	ND	ND	0.026	ND
Turbidity	NTU	0.1	1.1	0.25	3.2	1.3	1.8	1.8	4	3.8	3.1	4.1	5.4	1.8
Uranium	ug/L	1	4	4.2	4.3	4.1	4	4.2	4.1	3.9	3.9	3.9	4.1	4.1
Vanadium (Total)	ug/L	3	ND	ND	ND	ND	ND	3	ND	3.2	3.5	ND	3.6	ND
Zinc (Total)	ug/L	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

LAKE PLEASANT TOWERS 2021

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field Measurements														
Dissolved Oxygen	mg/L	---	9.62			---			5.5			4.87		
pH	Units	---	8.48			---			7.71			7.96		
Conductivity	uS/cm	---	923			---			935			943		
Temperature	degF	---	53.7			---			61.9			64.4		

Primary Analytes														
Alkalinity	mg/L	2	130			---			130			130		
Aluminum (Dissolved)	mg/L	20	ND			---			ND			ND		
Aluminum (Total)	ug/L	20	23			---			ND			ND		
Ammonia Nitrogen	mg/L	0.05	ND			---			ND			ND		
Antimony (Total)	ug/L	1	ND			---			ND			ND		
Arsenic (Total)	ug/L	1	3.6			---			4.1			3.9		
Barium (Total)	ug/L	2	120			---			120			100		
Beryllium (Total)	ug/L	1	ND			---			ND			ND		
Boron (Total)	mg/L	0.05	0.13			---			0.13			0.14		
Bromide	ug/L	5	93			---			94			94		
Cadmium (Total)	ug/L	0.5	ND			---			ND			ND		
Calcium (Total)	mg/L	1	68			---			66			66		
Chloride	mg/L	0.5	90			---			89			92		
Chromium (Total)	ug/L	1	ND			---			ND			ND		
Cobalt (Total)	ug/L	2	ND			---			ND			ND		
Copper (Dissolved)	ug/L	2	5.3			---			ND			ND		
Fluoride	mg/L	0.05	0.37			---			0.35			0.36		
Gross Alpha	pCi/L	3	ND			---			ND			5.4		
Gross Beta	pCi/L	3	5.4			---			5.9			5.5		
Hexavalent Chromium	ug/L	0.02	0.029			---			0.044			0.043		
Iron (Dissolved)	mg/L	0.02	ND			---			ND			ND		
Lead (Total)	ug/L	0.5	ND			---			ND			ND		
Manganese (Total)	ug/L	0.4	4			---			2			64		
Mercury	ug/L	0.2	ND			---			ND			ND		
Molybdenum (Total)	ug/L	2	5			---			4.7			5.1		
Nickel (Total)	ug/L	5	ND			---			ND			ND		
Nitrate	mg/L	0.05	ND			---			ND			ND		
Nitrite	mg/L	0.05	ND			---			ND			ND		

LAKE PLEASANT TOWERS 2021 (CONTINUED)

Constituent	Units	MRL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perchlorate	ug/L	4				---			ND			ND		
Potassium (Total)	mg/L	1	5			---			5.2			5.6		
Radium 226/228 (calc)	pCi/L	2	ND			---			ND			ND		
Selenium (Total)	ug/L	5	ND			---			ND			ND		
Silver (Total)	ug/L	0.5	ND			---			ND			ND		
Sodium (Total)	mg/L	1	88			---			87			95		
Strontium (Total)	mg/L	0.01	1			---			1			1.1		
Sulfate	mg/L	0.5	220			---			210			220		
Thallium (Total)	ug/L	1	ND			---			ND			ND		
Total Dissolved Solids	mg/L	10	580			---			610			600		
Total Organic Carbon	mg/L	0.2	3.8			---			3.5			3.9		
Total Phosphorus	mg/L	0.02	ND			---			ND			ND		
Turbidity	NTU	0.1	3.1			---			1			0.75		
Uranium	ug/L	1	4.1			---			4			4.2		
Vanadium (Total)	ug/L	3	ND			---			ND			3.7		
Zinc (Total)	ug/L	20	ND			---			ND			ND		