

REGIONAL WATER QUALITY NEWSLETTER

DATE: Report for November 2017

A Tempe, Glendale, Peoria, Chandler, Phoenix, ADEQ, CAP, SRP, Epcor

NSF Central Arizona-Phoenix Long-Term Ecological Research

ASU Regional Water Quality Partnership



SUMMARY

1. Taste and Odor compounds were below or near detection limits (2 ng/l) in all canal and water treatment plant samples. Quarterly reservoir samples were all below threshold odor detection levels (10 ng/l). The reservoirs turned over last month and the impact of previous algal blooms has dissipated. The extremely high levels observed last month were primarily due to the algal bloom on Saguaro Lake combined with the operation of Stewart Mountain Dam. The turbines were under maintenance and the water was being released from the spillway. Therefore, the warm algal rich epilimnion water was directly flowing in the Salt River resulting in both high algal levels and warmer water in the river and subsequent canals. The central water quality laboratory at ASU will be getting a new triple quadropole mass spectrometer in January. This should allow us to return to consistent and timely taste and odor compound analysis.
2. DOC values for Saguaro Lake and Bartlett Lake ranged from 4.3 to 5.1 mg/l which was consistent with October and most quarterly reservoir samples were in this range. DOC concentrations ranged from 2.6-3.9 mg/l in canals and at the inlets of water treatment plants which was also consistent with October.
3. Reservoir releases were primarily from Bartlett at the time of sampling. CAP water and groundwater use remained at approximately 15% of the water supply. Lake Pleasant releases have stopped so the CAP water is river water.
4. Microbial concentrations for coliforms continued to decrease as compared to October and most values are now within historic norms. Mycobacterium concentrations remained low with the majority of samples being non-detects.

Microbial Water Quality Data

Over the years the regional water quality center has collected data on numerous different topics but very little data has been collected on basic microbial water quality. Therefore, we have initiated microbial sampling for E. Coli, total coliforms and mycobacterium in the canal system to determine potential impacts on both water quality and sources of possible contamination. Note that Mycobacterium samples require one month to process so they are from the previous month

All Values are cfu per 100 ml - November 6th-7th

<u>Sample</u>	<u>E. coli</u>	<u>Coliform</u>
Blank Average	0	0
AZ Canal at Highway 87 average	142	1272
South Canal below CAP Cross- connect average	195	896
Cap Canal at Cross-connect average	5	1120
AZ Canal at 56th St. average	34	1104
AZ Canal- Central Avenue average	43	1200
Pima Average	95	976
AZ Canal above CAP Cross-connect average	20	1736
Waddell Canal average	5	1480
Verde River @ Beeline average	88	1088
AZ Canal below CAP Cross-connect average	108	904
head of the Consolidated Canal average	129	1184
Middle of Consolidated Canal average	40	1072
Head of Tempe Canal average	158	1040
<u>Mycobacterium (October)</u>	<u>colonies</u>	
	0	
AZ Canal at Highway 87	0	
South Canal below CAP Cross- connect	17	
Cap Canal at Cross-connect	0	
AZ Canal at 56th St.	6	
AZ Canal- Central Avenue	3	
AZ Canal at Pima	0	
AZ Canal above CAP Cross-connect	0	
Waddell Canal	0	
Verde River @ Beeline	18	
AZ Canal below CAP Cross-connect	2	
head of the Consolidated Canal	1	
Middle of Consolidated Canal	1	
Head of Tempe Canal	1	

CONT – Contaminated with other bacteria

Quick Update of Water Supplies for November 6th, 2017
(during day of canal/WTP sampling – November 6th, 2017)

Source	Trend in supply	Discharge to water supply system	Flow into SRP Canal System	Dissolved organic carbon Concentration (mg/L) **
Salt River	Reservoirs at 64% full	8 cfs	460 cfs into Arizona Canal	3.0 mg/L
Verde River	Reservoirs At 48% full	814 cfs	356 cfs into South Canal 108 cfs of CAP water into Arizona Canal	3.7 mg/L
Colorado River	Lake Pleasant is 64.7% full (Lake Powell is 59.3% full)	Lake Pleasant is* releasing 0 cfs	77 cfs Groundwater Pumping into SRP Canals	2.5 mg/L
Groundwater	Pumping ***	108 cfs pumping by SRP		0.5 to 1 mg/L

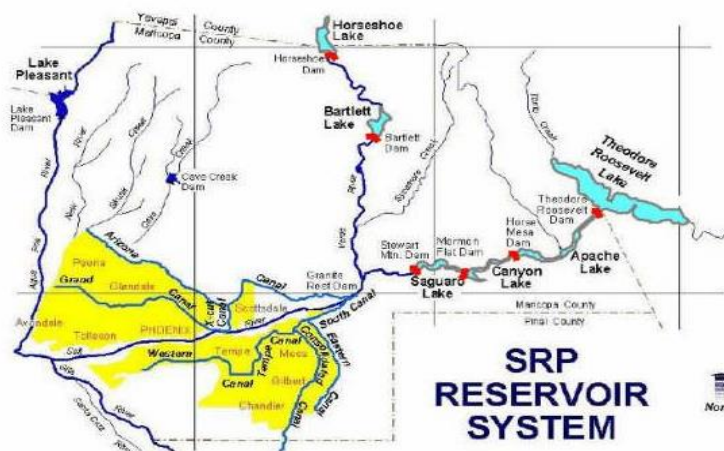
*CAP is not releasing from Lake Pleasant

**Concentration of DOC in the terminal reservoir

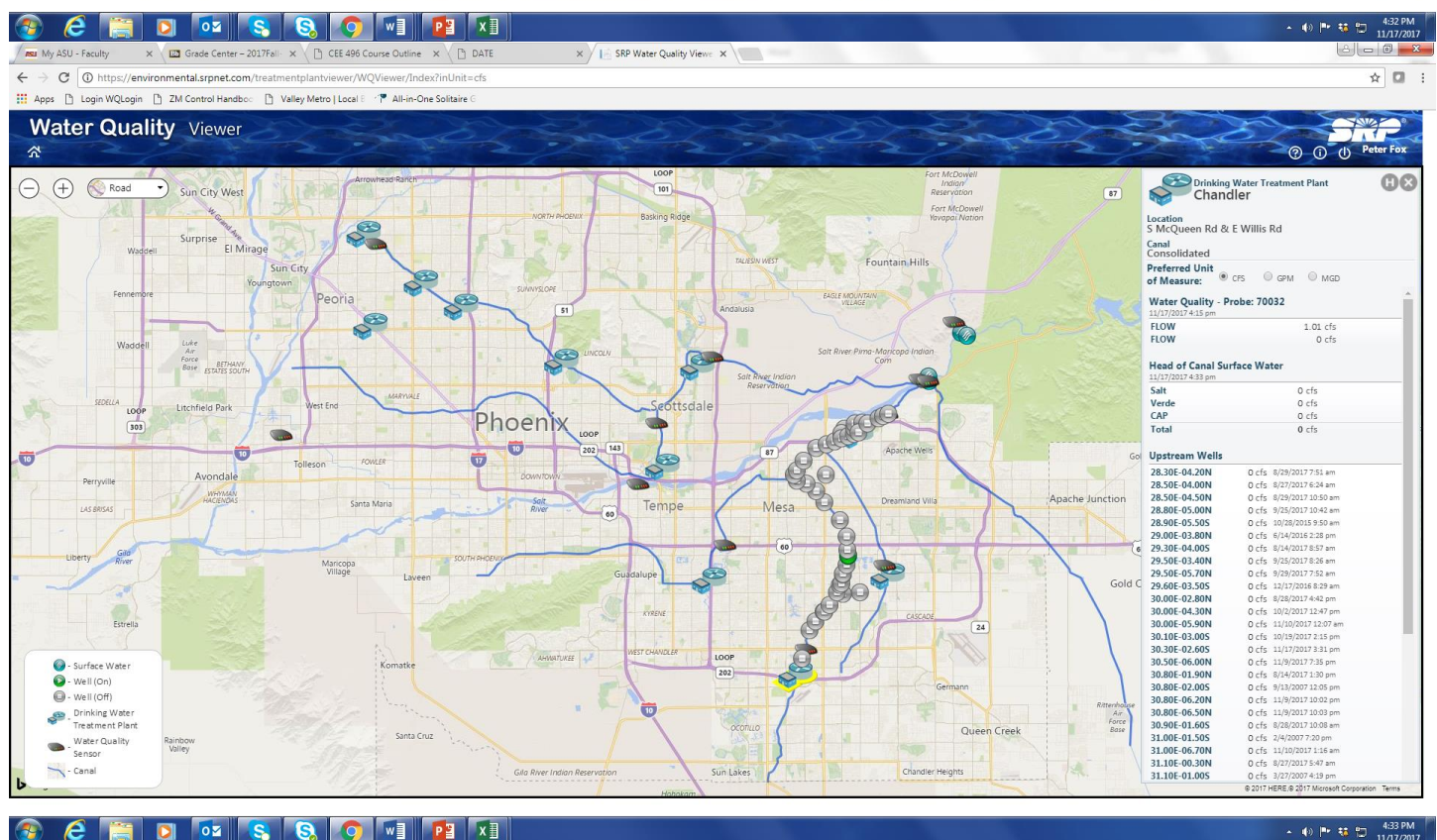
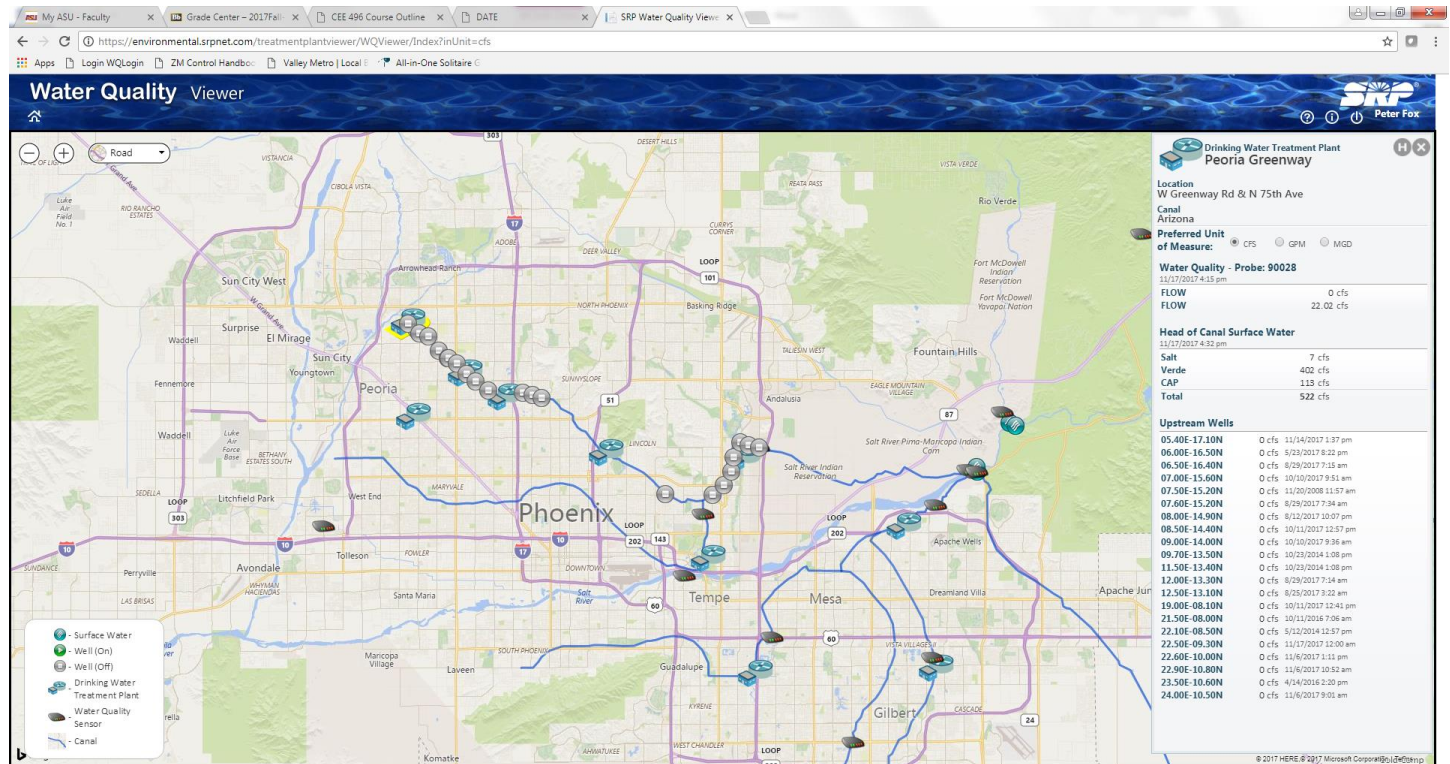
***CAP water is being delivered to the Arizona Canal.

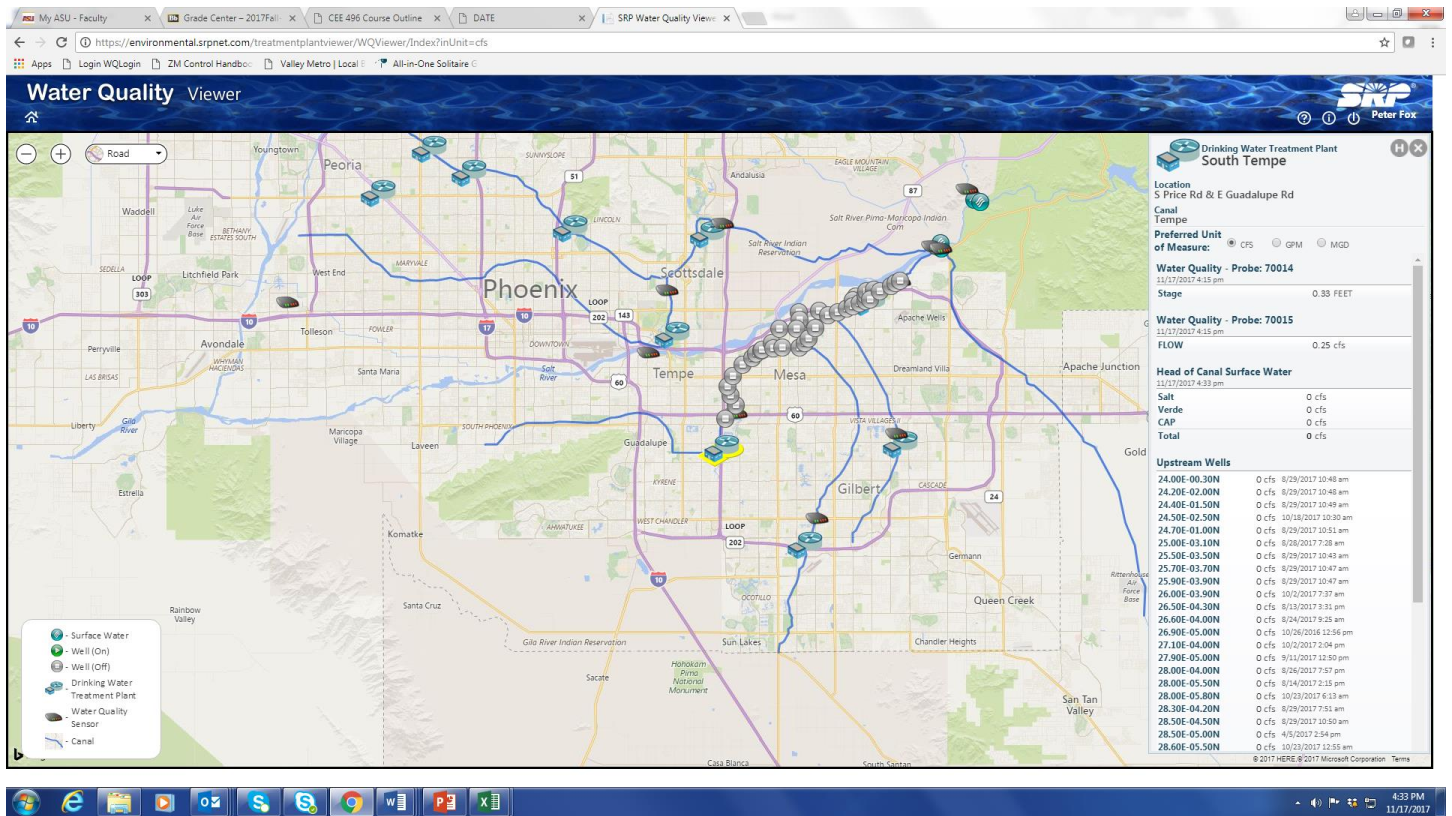
Data from the following websites:

- <http://www.srpwater.com/dwr/>
- <http://www.cap-az.com/departments/water-operations/lake-pleasant>
- <http://lakepowell.water-data.com/>



The following views are from SRP website, and show which wells are operating along the various canals.





Dissolved Organic Carbon in Reservoirs and Treatment Plants

DOC = Dissolved organic carbon

UV254 = ultraviolet absorbance at 254 nm (an indicator of aromatic carbon content)

SUVA = UV254/DOC

TDN = Total dissolved nitrogen (mostly nitrate from groundwater)

Reservoir Samples - November 6th-7th, 2017

Sample Description	Location	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L)
Havasu (October)		2.1	0.046	2.2	0.466
Lake Pleasant (October)	Epilimnion	2.8	0.060	2.1	0.453
	Hypolimnion	3.6	0.060	1.6	0.339
Verde River	at Tangle	N/A	N/A	#VALUE!	N/A
Verde River	at Beeline Highway	3.7	0.102	2.8	0.536
Bartlett Reservoir	Epilimnion	4.4	0.102	2.3	0.543
	Hypolimnion	5.1	0.107	2.1	0.727
Saguaro Lake	Epilimnion	4.4	0.087	2.0	0.585
	Epi - Duplicate	4.3	0.088	2.0	0.549
	Hypolimnion	4.7	0.087	1.8	0.709
Salt River	at Blue Point Bridge	3.0	0.067	2.2	0.355
Salt River	above Roosevelt	N/A	N/A	#VALUE!	N/A
Roosevelt Reservoir Point 1	Epilimnion	4.8	0.112	N/A	0.616
	Hypolimnion	4.7	0.113	N/A	0.559
Roosevelt Reservoir Point 2	Epilimnion	4.6	0.104	N/A	0.507
	Hypolimnion	4.2	0.122	N/A	0.523
Apache Reservoir Point 1	Epilimnion	4.045	0.091	N/A	0.519
	Hypolimnion	4.364	0.099	N/A	0.765
Apache Reservoir Point 2	Epilimnion	4.59	0.091	N/A	0.583
	Hypolimnion	3.815	0.09	N/A	0.511
Canyon Reservoir Point 1	Epilimnion	N/A	N/A	N/A	N/A
	Hypolimnion	N/A	N/A	N/A	N/A
Canyon Reservoir Point 2	Epilimnion	N/A	N/A	N/A	N/A
	Hypolimnion	N/A	N/A	N/A	N/A

Water Treatment Plants- November 6th-7th, 2017

Sample Description	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L)
Union Hills Inlet	3.5	0.045	1.3	0.502
Union Hills Treated	2.1	0.025	1.2	0.442
Tempe North Inlet	3.3	0.097	2.9	0.579
Tempe North Plant Treated	2.3	0.036	1.6	1.276
Tempe South Inlet	N/A	N/A	#VALUE!	N/A
Tempe South Plant Treated	N/A	N/A	#VALUE!	N/A
Greenway WTP Inlet	3.5	0.109	3.1	0.702
Greenway WTP Treated	2.5	0.038	1.5	0.673
Glendale WTP Inlet	3.3	0.092	2.8	0.723
Glendale WTP Treated	1.7	0.031	1.8	0.634
Anthem WTP Inlet	2.6	0.040	1.5	0.487
Anthem WTP Treated	2.3	0.039	1.7	0.474
24th Street WTP Inlet	3.3	0.092	2.7	0.561
24th Street WTP Treated	N/A	N/A	#VALUE!	N/A
Chandler WTP Inlet	3.4	0.104	3.0	0.525
Chandler WTP Treated	2.8	0.045	1.6	0.461

Rivers and Canals- November 6th-7th, 2017

Sample Description	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L)
Waddell Canal	2.5	0.042	1.7	0.484
Anthem WTP Inlet	2.6	0.040	1.5	0.487
Union Hills Inlet	3.5	0.045	1.3	0.502
CAP Salt-Gila Pumping Station (October)	2.3	0.044	1.9	0.445
CAP Mesa Turnout (October)	2.6	0.045	1.7	0.417
CAP Canal at Cross-connect	2.6	0.046	1.7	0.434
Salt River @ Blue pt. Bridge	3.0	0.067	2.2	0.355
Verde River @ Beeline	3.7	0.102	2.8	0.536
AZ Canal above CAP Cross-connect	2.6	0.048	1.8	0.388
AZ Canal below CAP Cross-connect	3.0	0.072	2.4	0.442
AZ Canal at Highway 87	3.6	0.092	2.6	0.500
AZ Canal at Pima Rd.	3.3	0.092	2.8	0.561
AZ Canal at 56th St.	3.5	0.091	2.6	0.549
AZ Canal - Central Avenue	3.2	0.091	2.8	0.596
AZ Canal - Inlet to Glendale WTP	3.3	0.092	2.8	0.723
AZ Canal - Inlet to Greenway WTP	3.5	0.109	3.1	0.702
South Canal below CAP Cross-connect	3.9	0.106	2.7	0.533
Head of Tempe Canal	3.6	0.104	2.9	0.554

Tempe Canal - Inlet to Tempe's South Plant	N/A	N/A	#VALUE!	N/A
Head of the Consolidated Canal	3.5	0.105	3.0	0.560
Middle of Consolidated Canal	3.8	0.105	2.8	0.509
Chandler WTP - Inlet	3.4	0.104	3.0	0.525

Taste and Odor

MIB, Geosmin and Cyclocitral are compounds naturally produced by algae in our reservoirs and canals, usually when the water is warmer and algae are growing/decaying more rapidly. They are non toxic, but detectable to consumers of water because of their earthy-musty-moldy odor. The human nose can detect these in drinking water because the compounds are semi-volatile. Since compounds are more volatile from warmer water, these tend to be more noticable in the summer and fall. The human nose can detect roughly 10 ng/L of these compounds. Our team collects samples from the water sources and raw/treated WTP samples.

**Table 1 - Water Treatment Plants –
November 6, 2017**

Sample Description	MIB (ng/L)	Geosmin (ng/L)
Union Hills Inlet	<2.0	<2.0
Union Hills Treated	<2.0	<2.0
Tempe North Inlet	2.4	<2.0
Tempe North Plant Treated	2.1	<2.0
Tempe South WTP	ns	ns
Tempe South Plant Treated	ns	ns
Anthem Inlet	<2.0	<2.0
Anthem Treated	<2.0	<2.0
Chandler Inlet	<2.0	<2.0
Chandler Treated	<2.0	<2.0
Greenway WTP Inlet	<2.0	<2.0
Greenway WTP Treated	<2.0	<2.0
Glendale WTP Inlet	<2.0	<2.0
Glendale WTP Treated	<2.0	<2.0
24th St. WTP Inlet	2.3	<2.0

24th St. WTP Outlet	ns	ns
---------------------	----	----

Table 2 - Canal Sampling – November 6, 2017

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)
CAP	Waddell Canal	<2.0	2.7
	Union Hills Inlet	<2.0	<2.0
	CAP Canal at Cross-connect	<2.0	<2.0
AZ Canal	Salt River @ Blue Pt Bridge	2.6	<2.0
	Verde River @ Beeline	2.4	<2.0
	AZ Canal above CAP Cross-connect	<2.0	<2.0
	AZ Canal below CAP Cross-connect	<2.0	<2.0
	AZ Canal at Highway 87	<2.0	<2.0
	AZ Canal at Pima Rd.	3.3	2.0
	AZ Canal at 56th St.	<2.0	<2.0
	AZ Canal - Central Avenue	2.6	<2.0
	AZ Canal - Inlet to Glendale WTP	<2.0	<2.0
	Head of the Consolidated Canal	2.4	<2.0
	Middle of the Consolidated Canal	<2.0	<2.0
South Tempe Canals	South Canal below CAP Cross-connect	<2.0	<2.0
	Head of the Tempe Canal	2.4	<2.0
	Tempe Canal - Inlet to Tempe's South Plant	ns	ns
	Salt-Gila (Oct)	<2.0	<2.0
	Mesa Turnout (Oct)	<2.0	<2.0

Table 3 - Reservoir Samples – November 7, 2017

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)
Lake Pleasant (Oct)	Epilimnion	<2.0	<2.0
Lake Pleasant (Oct)	Hypolimnion	7.0	<2.0

Verde River @ Beeline		2.4	<2.0
Bartlett Reservoir	Epilimnion	4.5	<2.0
Bartlett Reservoir	Epi-near dock	4.1	<2.0
Bartlett Reservoir	Hypolimnion	4.2	<2.0
Salt River @ BluePt Bridge		2.6	<2.0
Saguaro Lake	Epilimnion	3.7	<2.0
Saguaro Lake	Epi - Duplicate	3.6	<2.0
Saguaro Lake	Epi-near dock	3.6	2.4
Saguaro Lake	Hypolimnion	4.4	<2.0
Lake Havasu		<2.0	2.0
Verde River at Tangle Creek		ns	ns
Roosevelt at Salt River Inlet		ns	ns

**Table 4 -
Quarterly Lake
Sampling -
November 7-8,
2017**

Sample Description	Site	Location	MIB (ng/L)	Geosmin (ng/L)
Roosevelt Lake	Site 1A	Epilimnion	4.9	<2.0
Roosevelt Lake	Site 1B	Hypolimnion	4.3	<2.0
Roosevelt Lake	Site 2A	Epilimnion	5.4	<2.0
Roosevelt Lake	Site 2B	Hypolimnion	<2.0	<2.0
Apache Lake	Site 1A	Epilimnion	6.2	9.7
Apache Lake	Site 1B	Hypolimnion	7.5	2.0
Apache Lake	Site 2A	Epilimnion	7.8	8.3
Apache Lake	Site 2B	Hypolimnion	5.6	2.9
Canyon Lake	Site 1A	Epilimnion	3.8	<2.0
Canyon Lake	Site 1B	Hypolimnion	4.1	<2.0
Canyon Lake	Site 2A	Epilimnion	4.0	<2.0
Canyon Lake	Site 2B	Hypolimnion	<2.0	<2.0

