

# **REGIONAL WATER QUALITY NEWSLETTER**

**DATE: Report for June 2017**

**A Tempe, Glendale, Peoria, Chandler, Phoenix, ADEQ, CAP, SRP, Epcor  
NSF Central Arizona-Phoenix Long-Term Ecological Research  
ASU Regional Water Quality Partnership**

<http://faculty.engineering.asu.edu/pwesterhoff/research/regional-water-quality-issues/>

## **SUMMARY**

1. Taste and Odor compounds for all canals and WTPs were near or below detection limits (2 ng/l). Reservoir samples were also below the threshold level of 10 ng/l except for the Bartlett Reservoir epilimnion sample near the dock which had 11 ng/l of geosmin.
2. DOC values for all water sources increased resulting in DOC concentrations ranging from 3.3-4.3 mg/l at the inlets of water treatment plants. The increase in Saguaro Lake during May or June has occurred for the last five years and is believed to be algal related.
3. The primary source of surface water was switched to Salt River Water. Significant quantities of CAP water, groundwater and Verde River water were also being used. Releases from Lake Pleasant have begun and contribute over 50% of the CAP water.
4. Microbial concentrations for coliforms were similar to the concentrations observed in May. In comparison to June 2016, total coliform concentrations are approximately 40% lower while E. Coli concentrations are approximately 50% higher. Mycobacterium concentrations in May were higher than the concentrations observed in April and all samples were elevated in comparison to 2016.

## *Topics Du Jour*

### **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 require one month to process and the samples are from November.

All Values are cfu per 100 ml

<u>Sample</u>	<u>E. coli</u>	<u>Coliform</u>
<b>Blank Average</b>	<b>0</b>	<b>0</b>
<b>AZ Canal at Highway 87 average</b>	<b>13</b>	<b>984</b>
<b>South Canal below CAP Cross- connect average</b>	<b>26</b>	<b>1096</b>
<b>Cap Canal at Cross-connect average</b>	<b>10</b>	<b>1400</b>
<b>AZ Canal at 56th St. average</b>	<b>8</b>	<b>904</b>
<b>AZ Canal- Central Avenue average</b>	<b>36</b>	<b>1232</b>
<b>Pima Average</b>	<b>1</b>	<b>1040</b>
<b>AZ Canal above CAP Cross-connect average</b>	<b>15</b>	<b>976</b>
<b>Waddell Canal average</b>	<b>1</b>	<b>696</b>
<b>Verde River @ Beeline average</b>	<b>64</b>	<b>856</b>
<b>AZ Canal below CAP Cross-connect average</b>	<b>13</b>	<b>736</b>
<b>head of the Consolidated Canal average</b>	<b>19</b>	<b>1440</b>
<b>Middle of Consolidated Canal average</b>	<b>22</b>	<b>1096</b>
<b>Head of Tempe Canal average</b>	<b>11</b>	<b>1048</b>

<u>Mycobacterium (May)</u>	<u>colonies</u>
Blank	0
AZ Canal at Highway 87	87
South Canal below CAP Cross- connect	43
Cap Canal at Cross-connect	0
AZ Canal at 56th St.	83
AZ Canal- Central Avenue	99
AZ Canal at Pima	33
AZ Canal above CAP Cross-connect	37
Waddell Canal	70
Verde River @ Beeline	70
AZ Canal below CAP Cross-connect	CONT
head of the Consolidated Canal	29

Middle of Consolidated Canal	60
Head of Tempe Canal	96

**CONT – Contaminated with other bacteria**

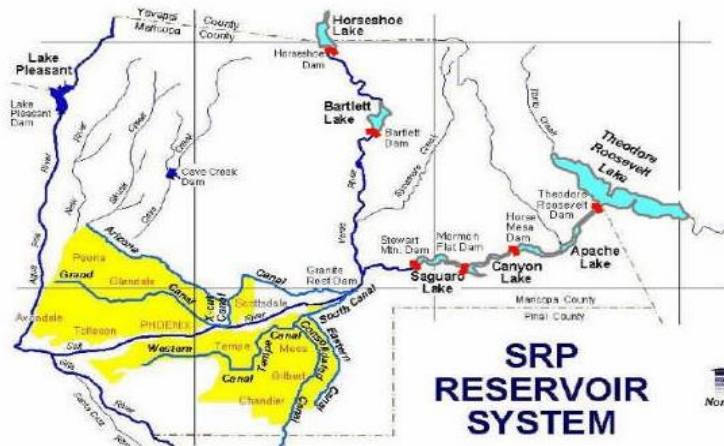
**Quick Update of Water Supplies for June 5th, 2017  
(during day of canal/WTP sampling – June 5th, 2017)**

Source	Trend in supply	Discharge to water supply system	Flow into SRP Canal System	Dissolved organic carbon Concentration (mg/L) **
Salt River	Reservoirs at 74% full	778 cfs	678 cfs into <b>Arizona Canal</b>	4.5 mg/L
Verde River	Reservoirs At 68% full	193 cfs	680 cfs into <b>South Canal</b>	5.2 mg/L
			318 cfs of <b>CAP water</b> into Arizona Canal	
Colorado River	Lake Pleasant is 88.3% full (Lake Powell is 61.5% full)	Lake Pleasant is* releasing 950 cfs	<b>331 cfs Groundwater Pumping</b> into SRP Canals	3.3 mg/L
Groundwater	Pumping ***	331 cfs pumping by SRP		0.5 to 1 mg/L

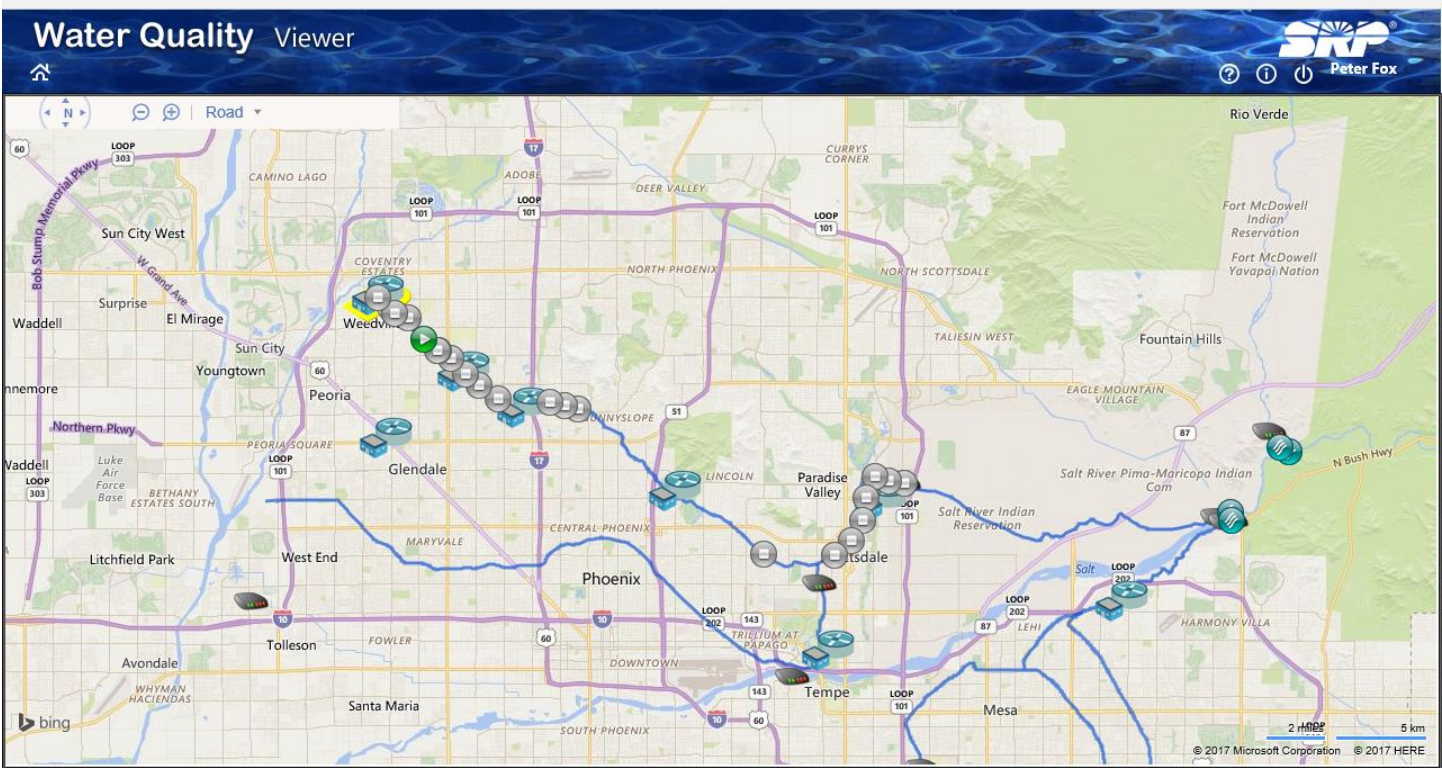
- \*CAP is not releasing from Lake Pleasant
- \*\*Concentration of DOC in the terminal reservoir
- \*\*\*CAP water is being delivered to the Arizona Canal.

Data from the following websites:

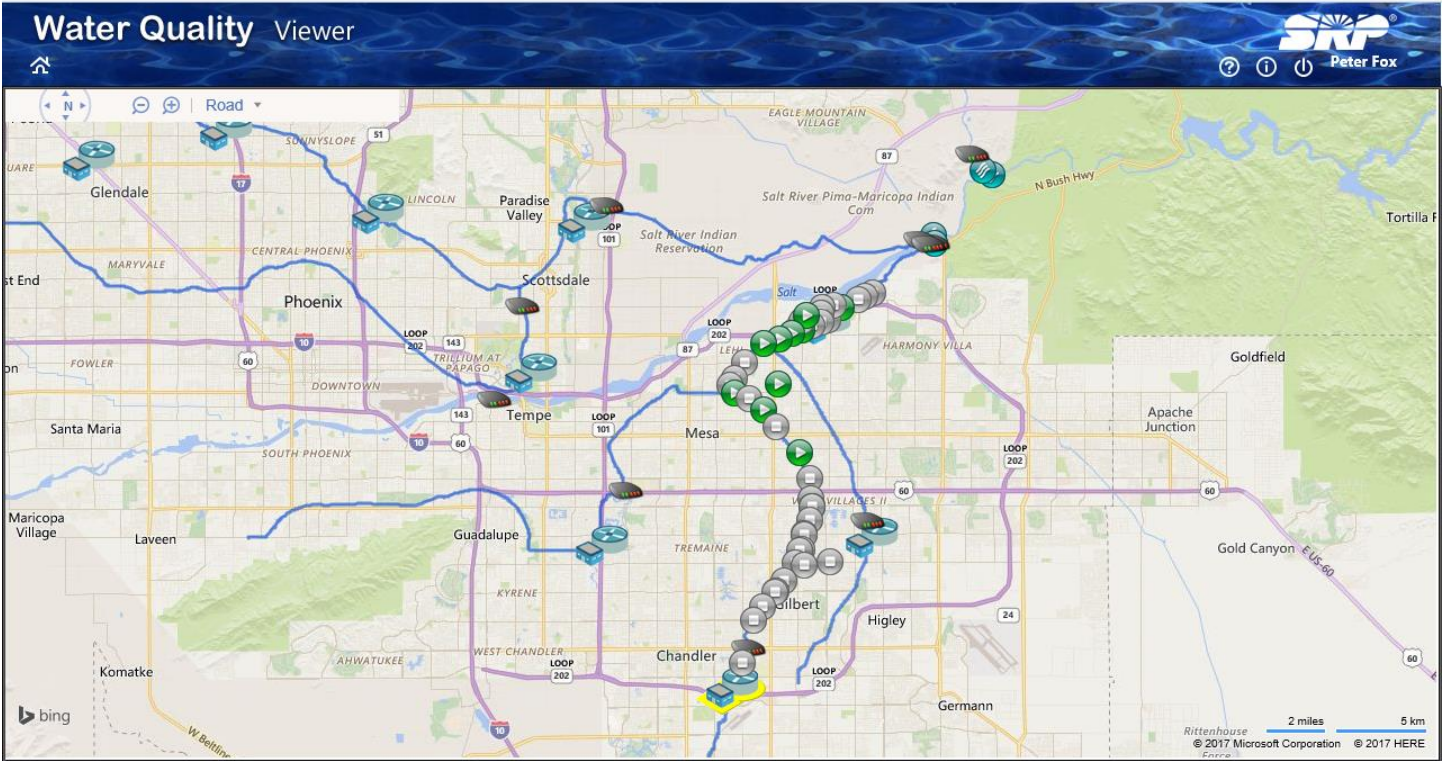
- <http://www.srpwater.com/dwr/>
- <http://www.cap-az.com/departments/water-operations/lake-pleasant>
- <http://lakepowell.water-data.com/>

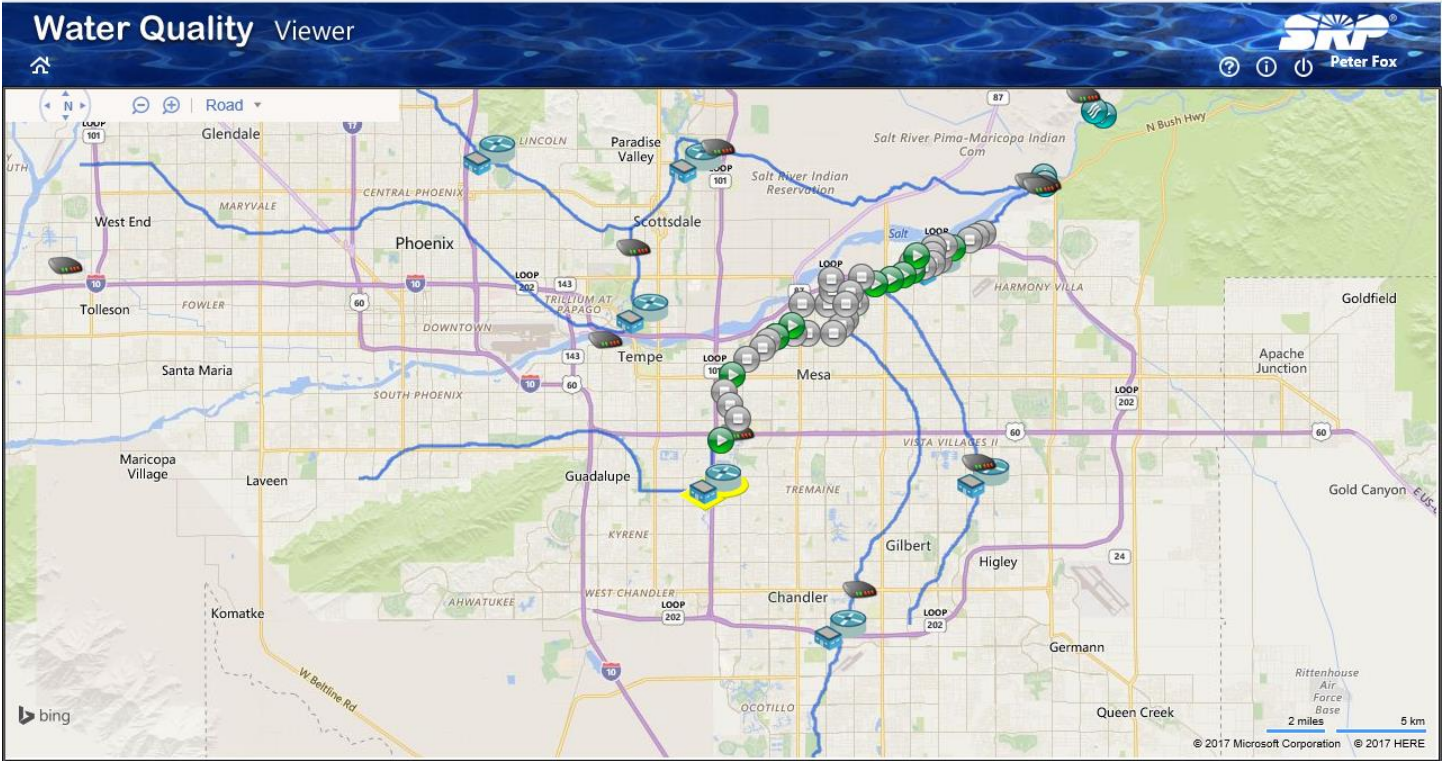


**The following views are from SRP website, and show which wells are operating along the various canals.**











## 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 - June 5th-6th, 2017

Sample Description	Location	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L)
Havasu (March)		2.8	0.046	1.7	0.574
Lake Pleasant (March)	Epilimnion	2.8	0.055	2.0	0.513
	Hypolimnion	4.1	0.062	1.5	0.413
Verde River	at Tangle	1.5	0.036	2.4	0.321
Verde River	at Beeline Highway	5.2	0.167	3.2	0.253
Bartlett Reservoir	Epilimnion	8.7	0.197	2.3	0.666
	Hypolimnion	N/A	N/A	#VALUE!	N/A
Saguaro Lake	Epilimnion	5.7	0.084	1.5	0.610
	Epi - Duplicate	N/A	N/A	#VALUE!	N/A
	Hypolimnion	N/A	N/A	#VALUE!	N/A
Salt River	at Blue Point Bridge	4.5	0.077	1.7	0.347
Salt River	above Roosevelt	N/A	N/A	#VALUE!	N/A
Roosevelt Reservoir Point 1	Epilimnion	N/A	N/A	#VALUE!	N/A
	Hypolimnion	N/A	N/A	#VALUE!	N/A
Roosevelt Reservoir Point 2	Epilimnion	N/A	N/A	#VALUE!	N/A
	Hypolimnion	N/A	N/A	#VALUE!	N/A
Apache Reservoir Point 1	Epilimnion	N/A	N/A	#VALUE!	N/A
	Hypolimnion	N/A	N/A	#VALUE!	N/A
Apache Reservoir Point 2	Epilimnion	N/A	N/A	#VALUE!	N/A
	Hypolimnion	N/A	N/A	#VALUE!	N/A
Canyon Reservoir Point 1	Epilimnion	N/A	N/A	#VALUE!	N/A
	Hypolimnion	N/A	N/A	#VALUE!	N/A
Canyon Reservoir Point 2	Epilimnion	N/A	N/A	#VALUE!	N/A
	Hypolimnion	N/A	N/A	#VALUE!	N/A

Water Treatment Plants- June 5th-6th,  
2017

Sample Description	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L)
Union Hills Inlet	3.3	0.046	1.4	0.452
Union Hills Treated	4.0	0.024	0.6	0.409
Tempe North Inlet	4.3	0.094	2.2	0.414
Tempe North Plant Treated	3.2	0.031	1.0	0.522
Tempe South Inlet	3.8	0.091	2.4	0.777
Tempe South Plant Treated	3.1	0.042	1.3	0.765
Greenway WTP Inlet	4.2	0.093	2.2	0.243
Greenway WTP Treated	2.9	0.032	1.1	0.660
Glendale WTP Inlet	4.2	0.092	2.2	0.386
Glendale WTP Treated	2.3	0.027	1.2	0.354
Anthem WTP Inlet	3.3	0.052	1.6	0.427
Anthem WTP Treated	3.2	0.051	1.6	0.243
24th Street WTP Inlet	4.3	0.091	2.1	0.380
24th Street WTP Treated	2.5	0.030	1.2	0.348
Chandler WTP Inlet	3.9	0.098	2.5	0.726
Chandler WTP Treated	3.2	0.041	1.3	0.613

Rivers and Canals- June 5th-6th, 2017

Sample Description	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L)
Waddell Canal	4.0	0.057	1.4	0.516
Anthem WTP Inlet	3.3	0.052	1.6	0.427
Union Hills Inlet	3.3	0.046	1.4	0.452
CAP Salt-Gila Pumping Station (June)	2.7	0.042	1.6	0.527
CAP Mesa Turnout (June)	2.8	0.044	1.6	0.535
CAP Canal at Cross-connect	3.2	0.048	1.5	0.422
Salt River @ Blue pt. Bridge	4.5	0.077	1.7	0.347
Verde River @ Beeline	5.2	0.167	3.2	0.253
AZ Canal above CAP Cross-connect	3.3	0.049	1.5	0.455
AZ Canal below CAP Cross-connect	3.8	0.079	2.1	0.410
AZ Canal at Highway 87	4.2	0.092	2.2	0.408
AZ Canal at Pima Rd.	4.1	0.093	2.3	0.277
AZ Canal at 56th St.	4.1	0.090	2.2	0.249
AZ Canal - Central Avenue	4.1	0.087	2.1	0.373
AZ Canal - Inlet to Glendale WTP	4.2	0.092	2.2	0.386
AZ Canal - Inlet to Greenway WTP	4.2	0.093	2.2	0.243
South Canal below CAP Cross-connect	4.6	0.123	2.7	0.244
Head of Tempe Canal	4.3	0.111	2.6	0.251

Tempe Canal - Inlet to Tempe's South Plant	3.8	0.091	2.4	0.777
Head of the Consolidated Canal	4.2	0.112	2.7	0.259
Middle of Consolidated Canal	4.1	0.101	2.5	0.246
Chandler WTP - Inlet	3.9	0.098	2.5	0.726

## 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 noticeable 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.

<b>Sample Description</b>	<b>MIB (ng/L)</b>	<b>Geosmin (ng/L)</b>
Union Hills Inlet	<2.0	<2.0
Union Hills Treated	2.3	<2.0
Tempe North Inlet	<2.0	2.2
Tempe North Plant Treated	2.0	<2.0
Tempe South WTP	<2.0	2.2
Tempe South Plant Treated	<2.0	2.4
Anthem Inlet	<2.0	<2.0
Anthem Treated	<2.0	<2.0
Chandler Inlet	4.0	2.1
Chandler Treated	2.2	2.2
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	<2.0	2.1
24th St. WTP Outlet	<2.0	<2.0

<b>Table 2 - Canal Sampling – June 5, 2017</b>			
<b>System</b>	<b>Sample Description</b>	<b>MIB (ng/L)</b>	<b>Geosmin (ng/L)</b>
<b>CAP</b>	<b>Waddell Canal</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>
	<b>Union Hills Inlet</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>
	<b>CAP Canal at Cross-connect</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>
	<b>Salt River @ Blue Pt Bridge</b>	<b>2.3</b>	<b>2.4</b>
	<b>Verde River @ Beeline</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>
<b>AZ</b>	<b>AZ Canal above CAP Cross-connect</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>
<b>Canal</b>	<b>AZ Canal below CAP Cross-connect</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>
	<b>AZ Canal at Highway 87</b>	<b>&lt;2.0</b>	<b>2.0</b>
	<b>AZ Canal at Pima Rd.</b>	<b>&lt;2.0</b>	<b>2.1</b>
	<b>AZ Canal at 56th St.</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>
	<b>AZ Canal - Central Avenue</b>	<b>&lt;2.0</b>	<b>2.1</b>
	<b>AZ Canal - Inlet to Glendale WTP</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>
	<b>Head of the Consolidated Canal</b>	<b>&lt;2.0</b>	<b>2.1</b>
	<b>Middle of the Consolidated Canal</b>	<b>&lt;2.0</b>	<b>2.0</b>
<b>South</b>	<b>South Canal below CAP Cross-connect</b>	<b>&lt;2.0</b>	<b>2.2</b>
<b>Tempe</b>	<b>Head of the Tempe Canal</b>	<b>&lt;2.0</b>	<b>2.1</b>

<b>Canals</b>	<b>Tempe Canal - Inlet to Tempe's South Plant</b>	<b>&lt;2.0</b>	<b>2.2</b>
	<b>Salt-Gila (May)</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>
	<b>Mesa Turnout (May)</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>



<b>Table 3 - Reservoir Samples – June 5, 2017</b>			
<b>Sample Description</b>	<b>Location</b>	<b>MIB (ng/L)</b>	<b>Geosmin (ng/L)</b>
<b>Lake Pleasant (May)</b>	<b>Eplimnion</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>
<b>Lake Pleasant (May)</b>	<b>Hypolimnion</b>	<b>3.9</b>	<b>&lt;2.0</b>
<b>Verde River @ Beeline</b>		<b>&lt;2.0</b>	<b>&lt;2.0</b>
<b>Bartlett Reservoir</b>	<b>Epilimnion</b>		
<b>Bartlett Reservoir</b>	<b>Epi-near dock</b>	<b>3.9</b>	<b>11.0</b>
<b>Bartlett Reservoir</b>	<b>Hypolimnion</b>		
<b>Salt River @ BluePt Bridge</b>		<b>2.3</b>	<b>2.4</b>
<b>Saguaro Lake</b>	<b>Epilimnion</b>		
<b>Saguaro Lake</b>	<b>Epi - Duplicate</b>		
<b>Saguaro Lake</b>	<b>Epi-near dock</b>	<b>3.0</b>	<b>2.5</b>
<b>Saguaro Lake</b>	<b>Hypolimnion</b>		
<b>Lake Havasu (May)</b>		<b>&lt;2.0</b>	<b>2.4</b>