REGIONAL WATER QUALITY NEWSLETTER

DATE: Report for June 2016
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 were all below the threshold levels of 10 ng/l in the canals and water treatment plants. The Bartlett epilimnion and Lake Pleasant Hypolimnion were at or above the threshold level but neither water source is significant at this time.

2. The DOC concentrations in both Saguaro and Bartlett ranged from 4.4-7.2 mg/l which were lower values as compared to May. The DOC concentrations in Canals and WTPs ranged from 5.5-1.1 mg/l as attenuation and dilution with groundwater lowered the concentrations.

3. The primary source of surface water is the Salt River at the time of sampling. CAP diversions to the Arizona Canal and groundwater pumping continued at normal levels.

4. Microbial concentrations tended to increase, in particular to total coliforms, as the temperature increases.

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. The values in the tables below for sampling in May were similar to the values in April and are consistent with values previously observed as summer approaches.

All Values are cfu per 100 ml

Sample	E. coli	Coliform
Blank Average	**0**	**0**
AZ Canal at Highway 87 average	**5**	**2008**
South Canal below CAP Cross- connect average	**10**	**1936**
Cap Canal at Cross-connect average	**17**	**1300**
AZ Canal at 56th St. average	**15**	**1340**
AZ Canal- Central Avenue average	**91**	**1100**
Pima Average	**2**	**648**
AZ Canal above CAP Cross-connect average	**6**	**1704**
Waddell Canal average	**0**	**660**
Verde River @ Beeline average	**1**	**1312**
AZ Canal below CAP Cross-connect average	**17**	**1684**
head of the Consolidated Canal average	**8**	**1528**
Middle of Consolidated Canal average	**15**	**1748**
Head of Tempe Canal average	**10**	**1776**

Mycobacterium (May)	colonies
Blank	0
AZ Canal at Highway 87	6
South Canal below CAP Cross- connect	24
Cap Canal at Cross-connect	0
AZ Canal at 56th St.	4
AZ Canal- Central Avenue	1
AZ Canal at Pima	3
AZ Canal above CAP Cross-connect	10
Waddell Canal	0
Verde River @ Beeline	30
AZ Canal below CAP Cross-connect	7
head of the Consolidated Canal	2

Middle of Consolidated Canal	5
Head of Tempe Canal	2

CONT – Contaminated with other bacteria

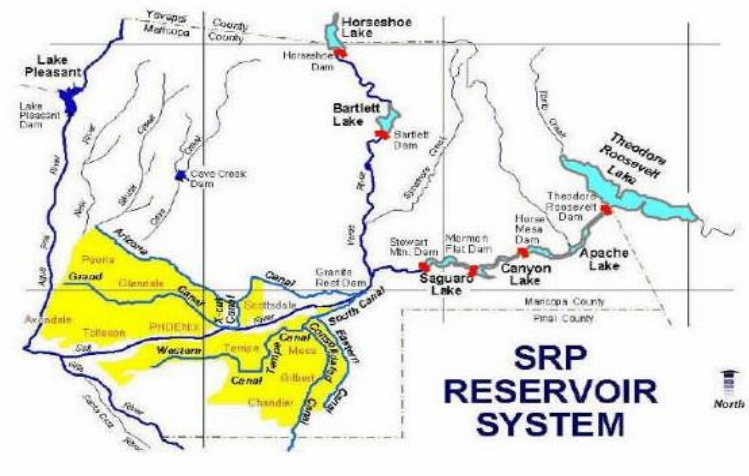
Quick Update of Water Supplies for June, 2016
(during day of canal/WTP June 6th, 2016)

Source	Trend in supply	Discharge to water supply system	Flow into SRP Canal System	Dissolved organic carbon Concentration (mg/L) **
Salt River	Reservoirs at 56% full	966 cfs	495 cfs into **Arizona Canal** 311 cfs into **South Canal** 138 cfs of **CAP water** into Arizona Canal	2.9 mg/L
Verde River	Reservoirs At 42% full	113 cfs		3.0 mg/L
Colorado River	Lake Pleasant is 92% full (Lake Powell is 527% full)	Lake Pleasant is* releasing 0.0 cfs	421 cfs **Groundwater Pumping** into SRP Canals	3.8 mg/L
Groundwater	Pumping ***	421 cfs pumping by SRP		0.5 to 1 mg/L

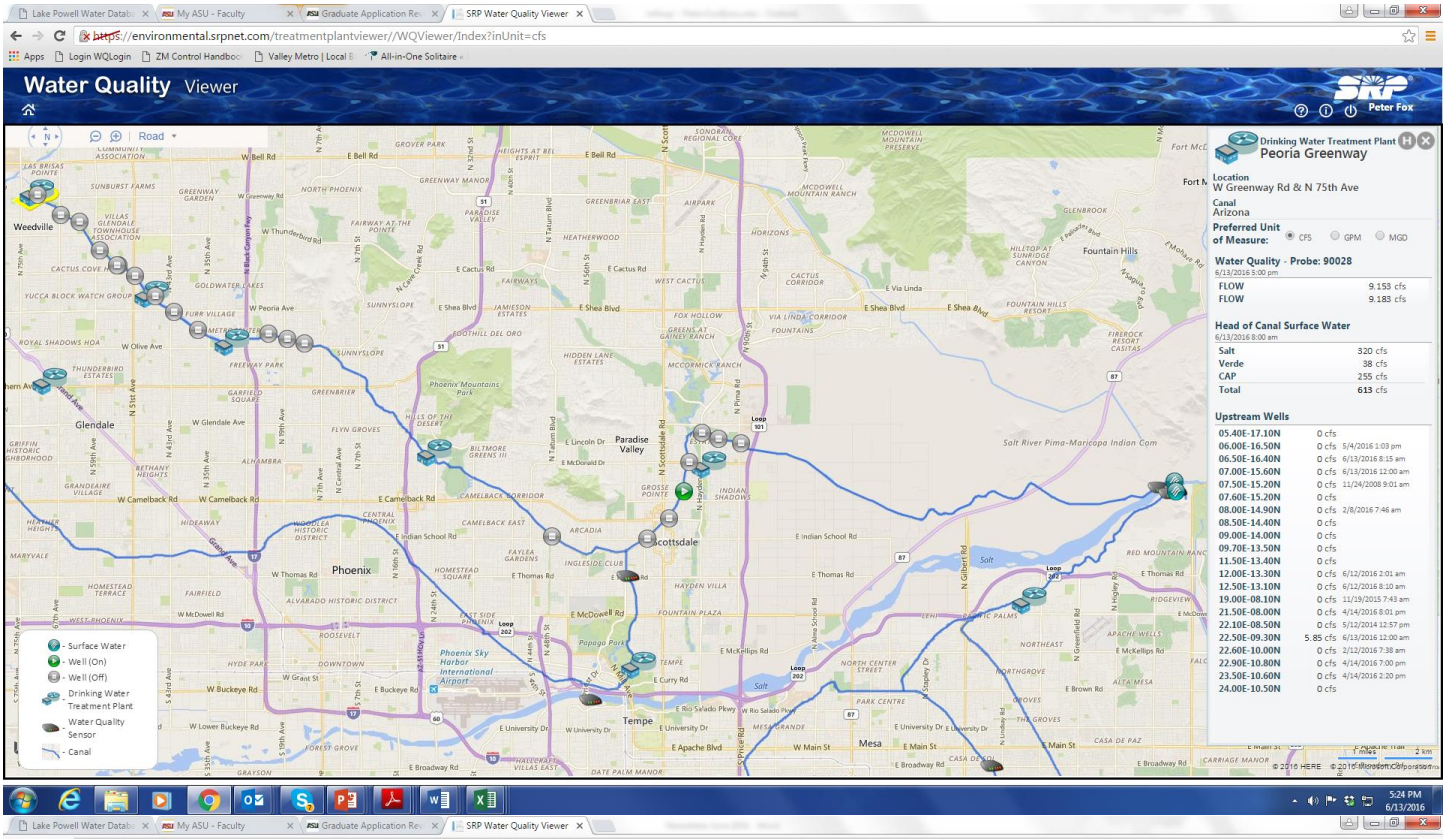
*CAP is releasing 0 cfs from Lake Pleasant which was 0% of the total flow
**Concentration of DOC in the terminal reservoir
***CAP water is being delivered to the Arizona Canal.

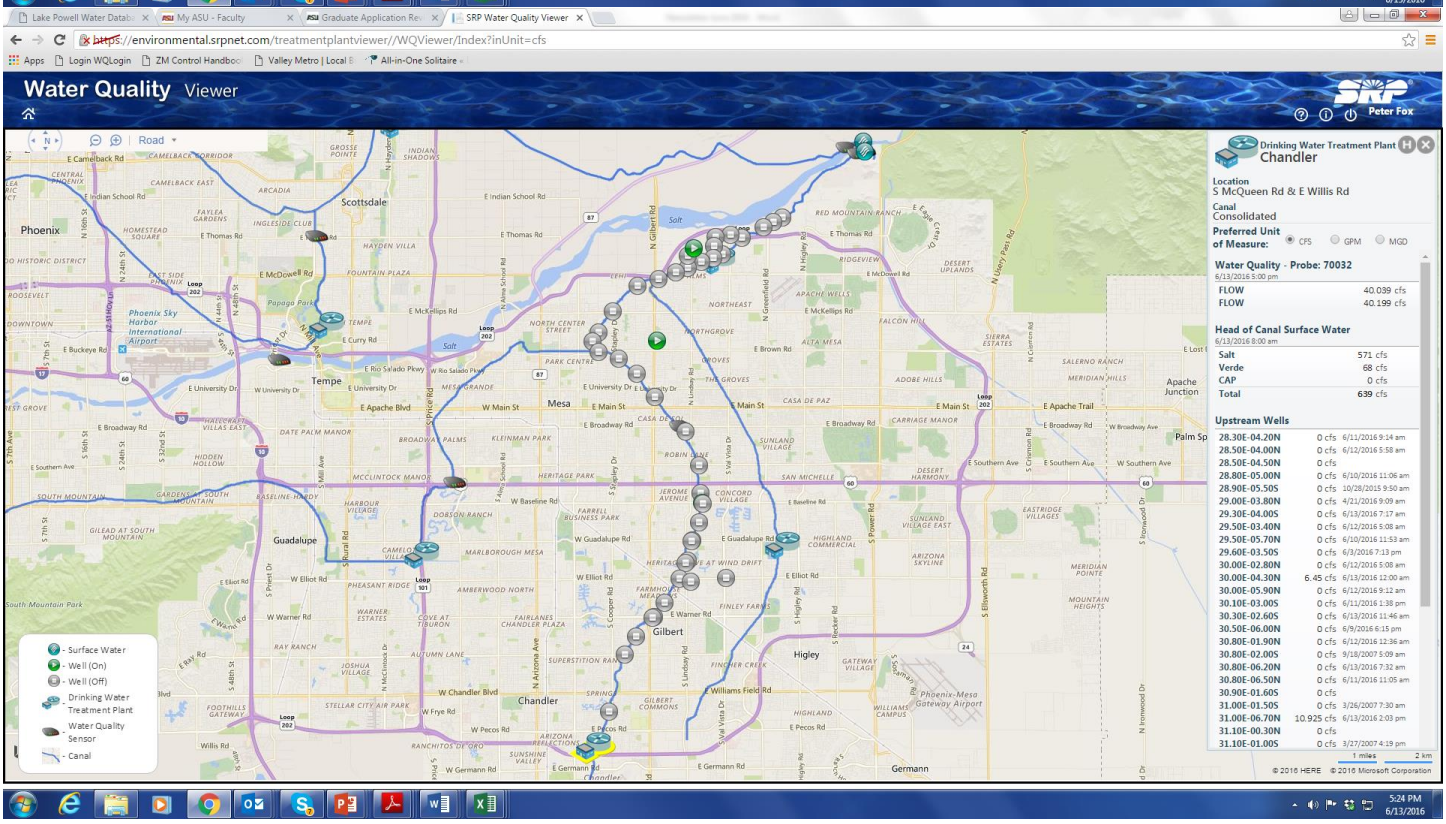
Data from the following websites:

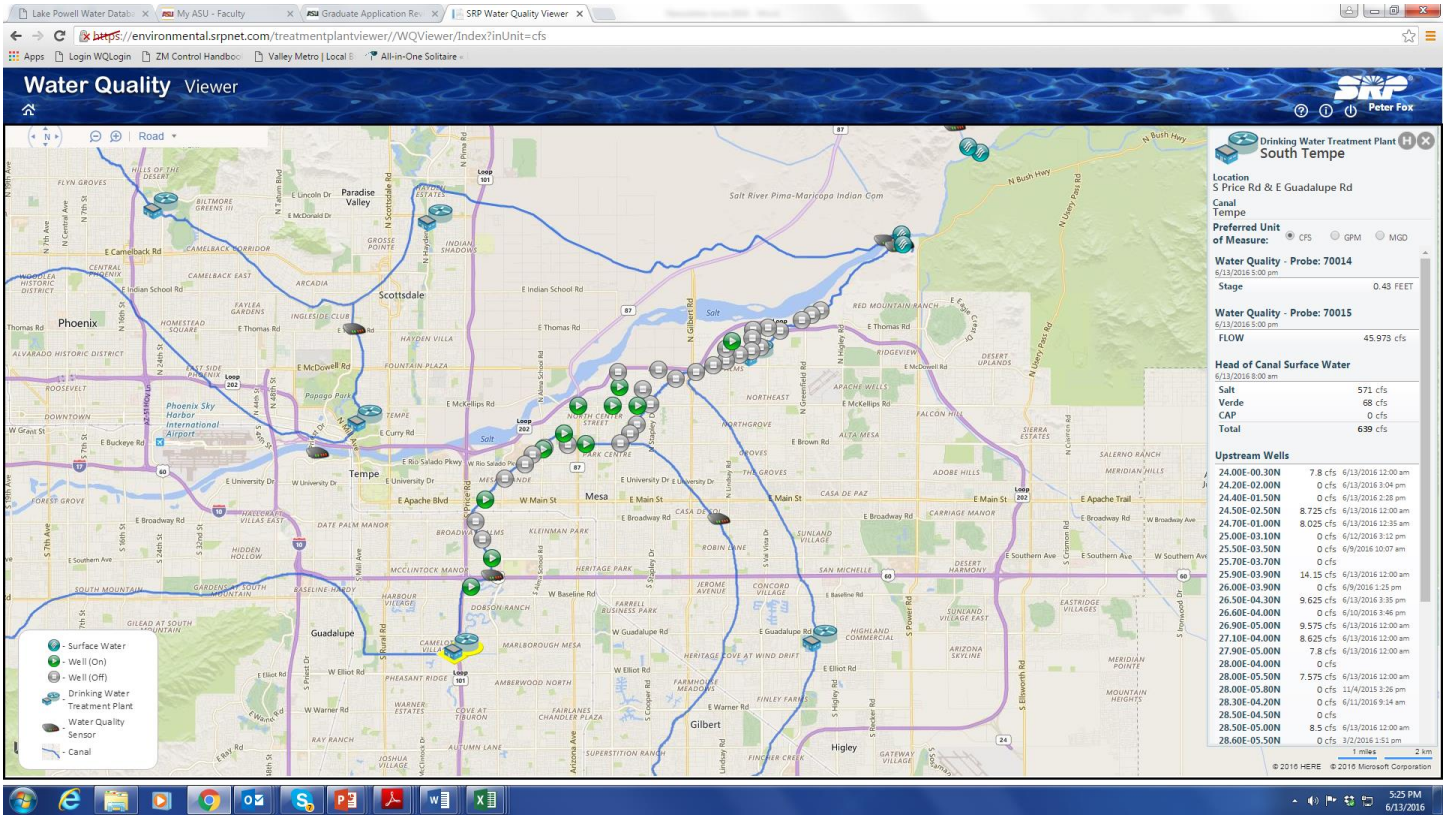
- http://www.srpwater.com/dwr/
- http://www.cap-az.com/departments/water-operations/lake-pleasant
- http://lakepowell.water-data.com/



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






Water Quality Viewer
Peter Fox
https://environmental.srpnet.com/treatmentplantviewer//WQViewer/Index?inUnit=cfs
Drinking Water Treatment Plant
South Tempe
Location
S Price Rd & E Guadalupe Rd
Canal
Tempe
Preferred Unit of Measure:
CFS
GPM
MGD
Water Quality - Probe: 70014
6/13/2016 5:00 pm
Stage 0.43 FEET
Water Quality - Probe: 70015
6/13/2016 5:00 pm
FLOW 45.973 cfs
Head of Canal Surface Water
6/13/2016 8:00 am
Salt 571 cfs
Verde 68 cfs
CAP 0 cfs
Total 639 cfs
Upstream Wells
24.00E-00.30N 7.8 cfs 6/13/2016 12:00 am
24.20E-02.00N 0 cfs 6/13/2016 3:04 pm
24.40E-01.50N 0 cfs 6/13/2016 2:28 pm
24.50E-02.50N 8.725 cfs 6/13/2016 12:00 am
24.70E-01.00N 8.025 cfs 6/13/2016 12:35 am
25.00E-03.10N 0 cfs 6/12/2016 3:12 pm
25.50E-03.50N 0 cfs 6/9/2016 10:07 am
25.70E-03.70N 0 cfs
25.90E-03.90N 14.15 cfs 6/13/2016 12:00 am
26.00E-03.90N 0 cfs 6/9/2016 1:25 pm
26.50E-04.30N 9.625 cfs 6/13/2016 3:35 pm
26.60E-04.00N 0 cfs 6/10/2016 3:46 pm
26.90E-05.00N 9.575 cfs 6/13/2016 12:00 am
27.10E-04.00N 8.625 cfs 6/13/2016 12:00 am
27.90E-05.00N 7.8 cfs 6/13/2016 12:00 am
28.00E-04.00N 0 cfs
28.00E-05.50N 7.575 cfs 6/13/2016 12:00 am
28.00E-05.80N 0 cfs 11/4/2015 3:26 pm
28.30E-04.20N 0 cfs 6/11/2016 9:14 am
28.50E-04.50N 0 cfs
28.50E-05.00N 8.5 cfs 6/13/2016 12:00 am
28.60E-05.50N 0 cfs 3/2/2016 1:51 pm
Surface Water
Well (On)
Well (Off)
Drinking Water Treatment Plant
Water Quality Sensor
Canal
Phoenix
Scottsdale
Tempe
Mesa
Gilbert
Guadalupe
Higley
Paradise Valley
Salt River Pima-Maricopa Indian Com
5:25 PM
6/13/2016

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)

June 2016 Data

Reservoir Samples - June 6th-7th, 2016

Sample Description	Location	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L
Havasu (March)		3.9	0.059	1.5	N/A
Lake Pleasant (March)	Epilimnion	4.5	0.047	1.0	N/A
	Hypolimnion	3.2	0.051	1.6	N/A
Verde River	at Tangle	2.9	0.056	2.0	N/A
Verde River	at Beeline Highway	2.3	0.094	4.0	N/A
Bartlett Reservoir	Epilmnion	4.4	0.071	1.6	N/A
	Hypolimnion	7.2	0.080	1.1	N/A
Saguaro Lake	Epilimnion	4.4	0.063	1.4	N/A
	Epi - Duplicate	6.0	0.075	1.2	N/A
	Hypolimnion	5.0	0.069	1.4	N/A
Salt River	at Blue Point Bridge	3.0	0.062	2.1	N/A
Salt River	above Roosevelt	2.9	0.056	2.0	N/A
Roosevelt Reservoir Point 1	Epilmnion	2.7	0.068	2.5	N/A
	Hypolimnion	4.2	0.067	1.6	N/A
Roosevelt Reservoir Point 2	Epilmnion	2.9	0.068	2.4	N/A
	Hypolimnion	4.3	0.066	1.5	N/A
Apache Reservoir Point 1	Epilmnion	5.1	0.061	1.2	N/A
	Hypolimnion	3.3	0.061	1.8	N/A
Apache Reservoir Point 2	Epilmnion	3.1	0.059	1.9	N/A
	Hypolimnion	4.3	0.060	1.4	N/A
Canyon Reservoir Point 1	Epilmnion	N/A	N/A	N/A	N/A
	Hypolimnion	N/A	N/A	N/A	N/A
Canyon Reservoir Point 2	Epilmnion	N/A	N/A	N/A	N/A
	Hypolimnion	N/A	N/A	N/A	N/A

Organic Matter in Canal & Water Treatment Plants

Water Treatment Plants- June 6th-7th, 2016

Sample Description	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L
Union Hills Inlet	2.3	0.048	2.0	N/A
Union Hills Treated	2.6	0.031	1.2	N/A
Tempe North Inlet	1.2	0.069	5.6	N/A
Tempe North Plant Treated	N/A	0.038	0.5	N/A
Tempe South Inlet	5.5	0.036	0.7	N/A
Tempe South Plant Treated	4.0	0.023	0.6	N/A
Greenway WTP Inlet	1.1	0.028	2.4	N/A
Greenway WTP Treated	1.1	0.028	2.4	N/A
Glendale WTP Inlet	2.7	0.065	2.4	N/A
Glendale WTP Treated	1.1	0.028	2.4	N/A
Anthem WTP Inlet	2.5	0.043	1.7	N/A
Anthem WTP Treated	2.7	0.039	1.5	N/A
24th Street WTP Inlet	2.6	0.067	2.5	N/A
24th Street WTP Treated	2.6	0.067	2.5	N/A
Chandler WTP Inlet	5.1	0.044	0.9	N/A
Chandler WTP Treated	3.4	0.030	0.9	N/A

Rivers and Canals- June 6th-7th, 2016

Sample Description	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L
Waddell Canal	2.1	0.045	2.1	N/A
Anthem WTP Inlet	2.5	0.043	1.7	N/A
Union Hills Inlet	2.3	0.048	2.0	N/A
CAP Salt-Gila Pumping Station (June)	4.0	0.055	1.4	N/A
CAP Mesa Turnout (June)	3.4	0.053	1.6	N/A
CAP Canal at Cross-connect	2.1	0.047	2.2	N/A
Salt River @ Blue pt. Bridge	3.0	0.062	2.1	N/A
Verde River @ Beeline	2.3	0.094	4.0	N/A
AZ Canal above CAP Cross-connect	2.3	0.045	2.0	N/A
AZ Canal below CAP Cross-connect	2.9	0.056	2.0	N/A
AZ Canal at Highway 87	3.8	0.060	1.6	N/A
AZ Canal at Pima Rd.	1.0	0.070	6.8	N/A
AZ Canal at 56th St.	4.5	0.065	1.4	N/A
AZ Canal - Central Avenue	3.7	0.069	1.8	N/A
AZ Canal - Inlet to Glendale WTP	2.7	0.065	2.4	N/A
AZ Canal - Inlet to Greenway WTP	1.1	0.028	2.4	N/A

South Canal below CAP Cross-connect	3.8	0.064	1.7	N/A
Head of Tempe Canal	3.3	0.063	1.9	N/A
Tempe Canal - Inlet to Tempe's South Plant	5.5	0.036	0.7	N/A
Head of the Consolidated Canal	4.0	0.063	1.6	N/A
Middle of Consolidated Canal	3.0	0.046	1.5	N/A
Chandler WTP - Inlet	5.1	0.044	0.9	N/A

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 – June 6, 2016

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	**<2.0**	**<2.0**
Tempe North Plant Treated	**<2.0**	**<2.0**
Tempe South WTP	**<2.0**	**<2.0**
Tempe South Plant Treated	**<2.0**	**<2.0**
Anthem Inlet	**2.0**	**<2.0**
Anthem Treated	**2.1**	**<2.0**
Chandler Inlet	**3.7**	**2.1**
Chandler Treated	**2.9**	**<2.0**
Greenway WTP Inlet	**ns**	**ns**
Greenway WTP Treated	**ns**	**ns**
Glendale WTP Inlet	**<2.0**	**<2.0**
Glendale WTP Treated	**<2.0**	**<2.0**
24th St. WTP Inlet	**2.4**	**<2.0**
24th St. WTP Outlet	**2.9**	**<2.0**

Table 2 - Canal Sampling – June 6, 2016

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)
CAP	Waddell Canal	**4.5**	**<2.0**
	Union Hills Inlet	**<2.0**	**<2.0**
	CAP Canal at Cross-connect	**3.2**	**<2.0**
AZ Canal	Salt River @ Blue Pt Bridge	**<2.0**	**<2.0**
	Verde River @ Beeline	**10.0**	**3.8**
	AZ Canal above CAP Cross-connect	**3.0**	**<2.0**
	AZ Canal below CAP Cross-connect	**2.4**	**<2.0**
	AZ Canal at Highway 87	**<2.0**	**<2.0**
	AZ Canal at Pima Rd.	**2.3**	**<2.0**
	AZ Canal at 56th St.	**<2.0**	**<2.0**
	AZ Canal - Central Avenue	**<2.0**	**<2.0**
	AZ Canal - Inlet to Glendale WTP	**<2.0**	**<2.0**
	Head of the Consolidated Canal	**<2.0**	**<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	**<2.0**	**<2.0**
	Tempe Canal - Inlet to Tempe's South Plant	**<2.0**	**<2.0**
	Salt-Gila (May)	**<2.0**	**<2.0**
	Mesa Turnout (May)	**<2.0**	**<2.0**

Table 3 - Reservoir Samples – June 7, 2016

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)
Lake Pleasant (May)	Eplimnion	**2.7**	**<2.0**
Lake Pleasant (May)	Hypolimnion	**13.4**	**2.1**
Verde River @ Beeline		**10.0**	**3.8**
Bartlett Reservoir	Epilimnion	**10.0**	**5.2**
Bartlett Reservoir	Epi-near dock	**7.7**	**3.6**
Bartlett Reservoir	Hypolimnion	**<2.0**	**<2.0**
Salt River @ BluePt Bridge			
Saguaro Lake	Epilimnion	**4.1**	**<2.0**
Saguaro Lake	Epi - Duplicate	**4.2**	**<2.0**
Saguaro Lake	Epi-near dock	**4.2**	**<2.0**
Saguaro Lake	Hypolimnion	**<2.0**	**<2.0**
Lake Havasu (May)		**<2.0**	**<2.0**
Verde River at Tangle Creek (May)		**<2.0**	**<2.0**
Verde River at Tangle Creek (June)		**2.1**	**7.7**
Roosevelt at Salt River Inlet (Dec15)		**<2.0**	**<2.0**