

REGIONAL WATER QUALITY NEWSLETTER

DATE: Report for May 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. Thanks to Marisa for working diligently to identify an instrument and get the taste and odor method working again.
2. The DOC concentrations in both Saguaro and Bartlett continued to increase with levels above 8 mg/l in Saguaro which is the terminal reservoir for the main water source. An increase was also observed in 2015 during the months of April and May. The DOC concentrations in Canals and WTPs ranged from 7.0-3.5 mg/l as attenuation and dilution with groundwater lowered the concentrations.
3. The primary source of surface water is Salt River the week prior to sampling. CAP diversions to the Arizona Canal decreased and groundwater pumping.
4. Microbial concentrations remained at levels similar to April. The levels are consistent with historical data for late spring.

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

<u>Sample</u>	<u>E. coli</u>	<u>Coliform</u>
Blank Average	0	0
AZ Canal at Highway 87 average	7	1868
South Canal below CAP Cross- connect average	6	792
Cap Canal at Cross-connect average	9	448
AZ Canal at 56th St. average	29	684
AZ Canal- Central Avenue average	44	508
Pima Average	6	852
AZ Canal above CAP Cross-connect average	6	784
Waddell Canal average	6	1360
Verde River @ Beeline average	840	308
AZ Canal below CAP Cross-connect average	6	636
head of the Consolidated Canal average	42	692
Middle of Consolidated Canal average	40	700
Head of Tempe Canal average	27	576

<u>Mycobacterium (March)</u>	<u>colonies</u>
Blank	0
AZ Canal at Highway 87	41
South Canal below CAP Cross- connect	CONT
Cap Canal at Cross-connect	12
AZ Canal at 56th St.	6
AZ Canal- Central Avenue	5
AZ Canal at Pima	4
AZ Canal above CAP Cross-connect	5
Waddell Canal	4
Verde River @ Beeline	CONT
AZ Canal below CAP Cross-connect	14
head of the Consolidated Canal	29

Middle of Consolidated Canal	4
Head of Tempe Canal	24

CONT – Contaminated with other bacteria

Quick Update of Water Supplies for May, 2016 (during day of canal/WTP May 2nd, 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 59% full	739 cfs	495 cfs into Arizona Canal	5.1 mg/L
Verde River	Reservoirs At 44% full	109 cfs	311 cfs into South Canal	4.3 mg/L
			9 cfs of CAP water into Arizona Canal	
Colorado River	Lake Pleasant is 93% full (Lake Powell is 45.6% full)	Lake Pleasant is* releasing 0.8 cfs	450 cfs Groundwater Pumping into SRP Canals	4.8 mg/L
Groundwater	Pumping ***	450 cfs pumping by SRP		0.5 to 1 mg/L

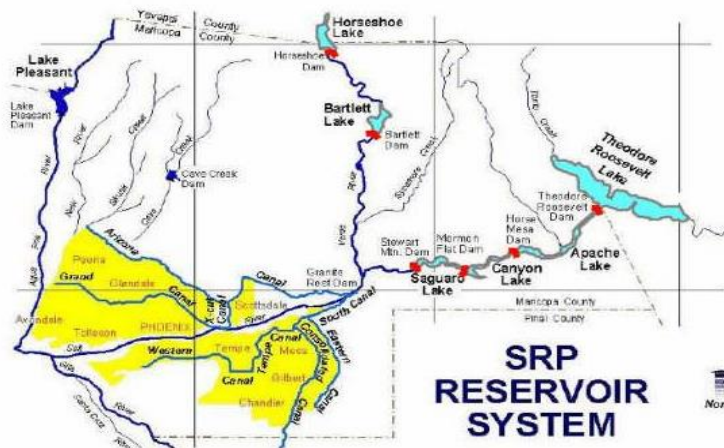
*CAP is releasing 0 cfs from Lake Pleasant which was 0% of the total flow

**Concentration of DOC in the terminal reservoir

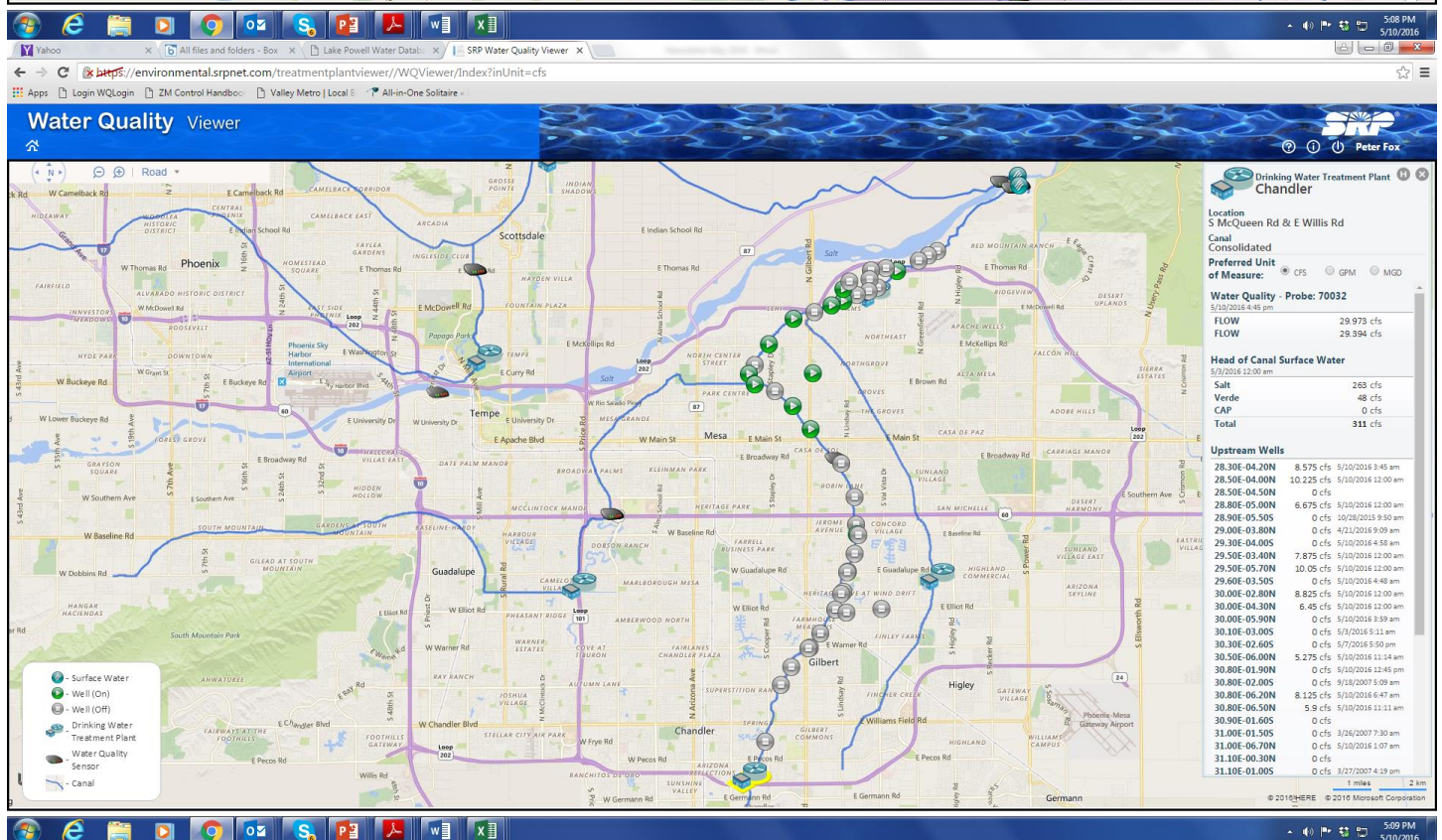
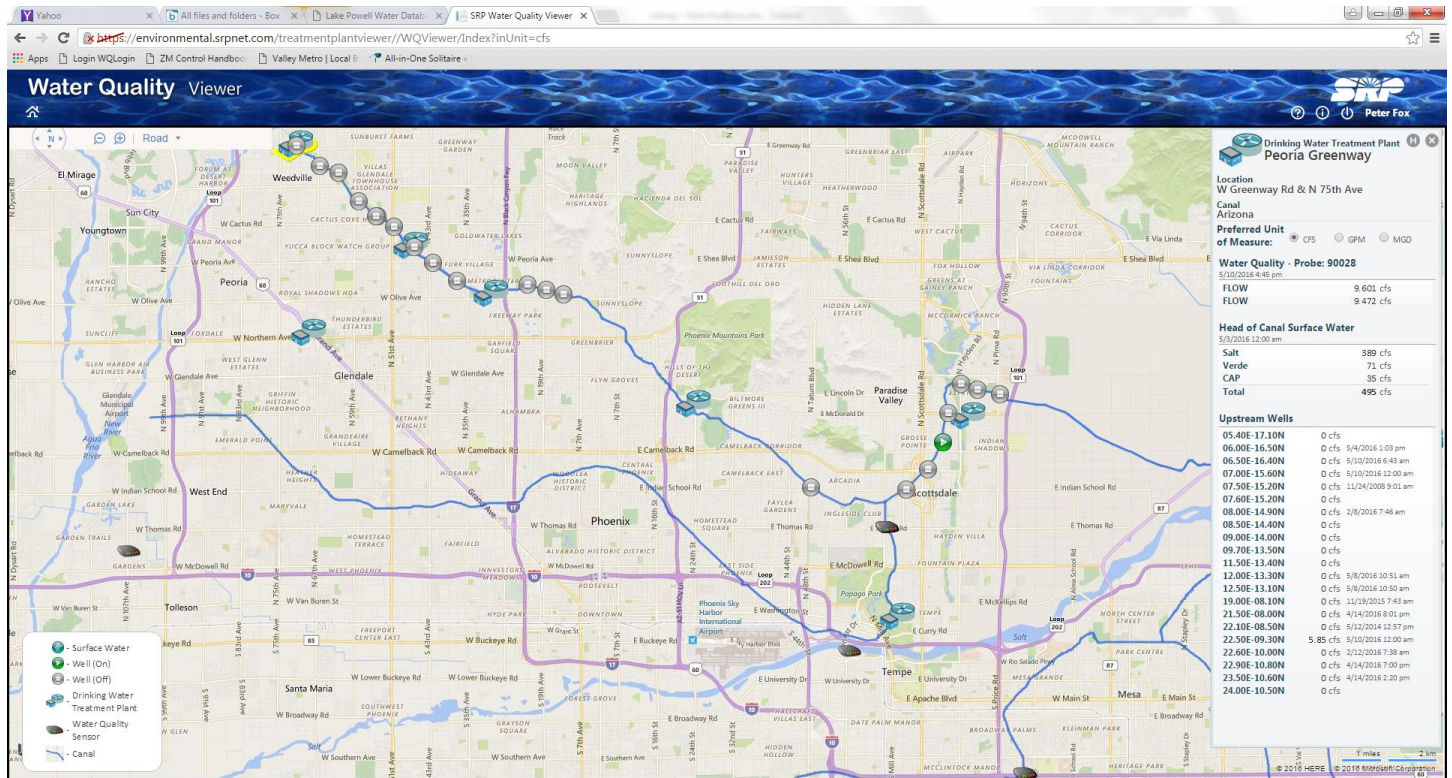
***CAP water is being delivered to the Arizona Canal.

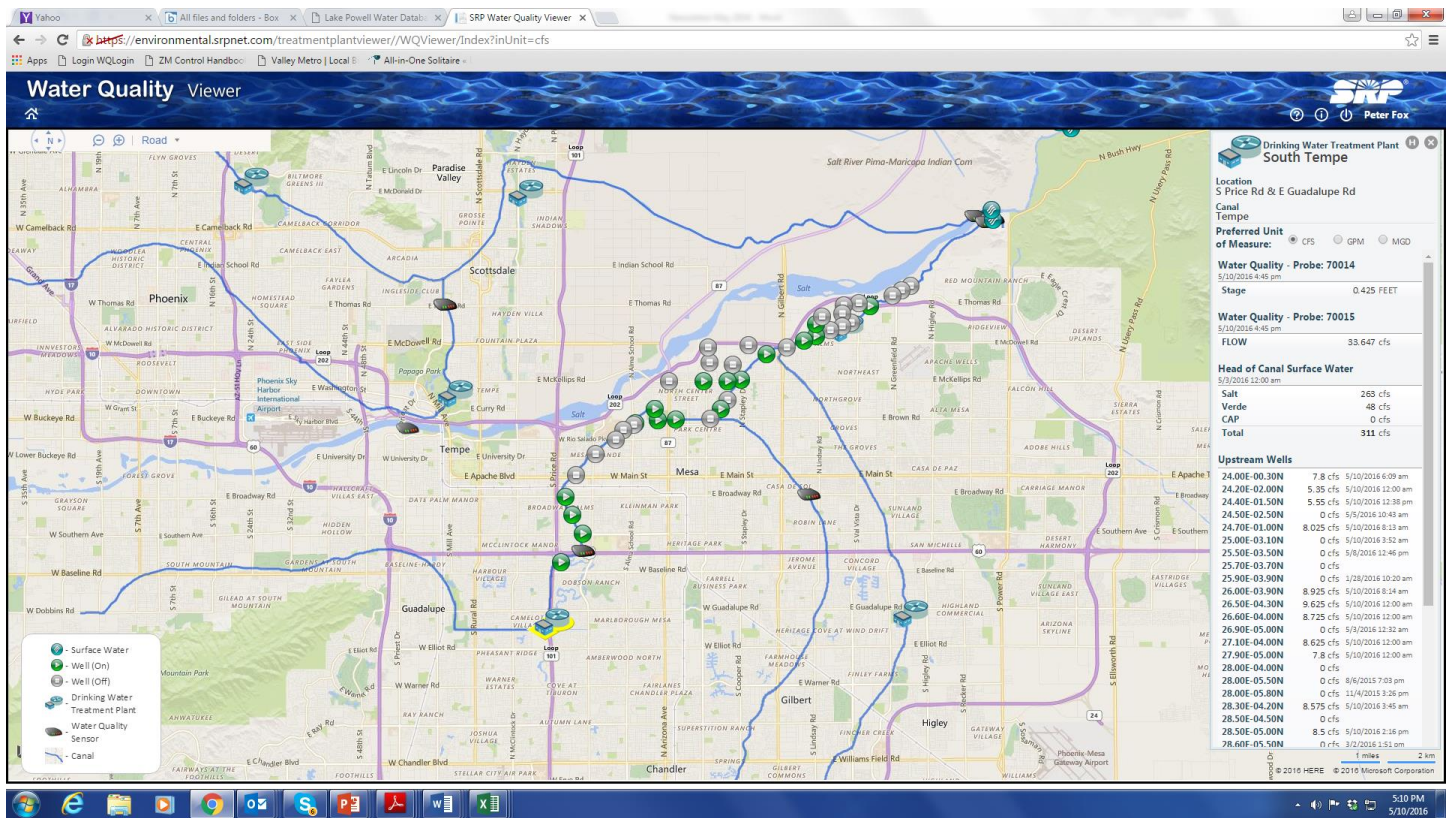
Data from the following websites:

- <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.





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)

May 2016 Data

Reservoir Samples - May 2nd-3rd, 2016

Sample Description	Location	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L)
Havasu (March)		6.6	0.044	0.7	
Lake Pleasant (March)	Epilimnion	6.6	0.040	0.6	
	Hypolimnion	5.9	0.039	0.7	
Verde River	at Tangle	4.7	0.026	0.6	
Verde River	at Beeline Highway	4.3	0.074	1.7	
Bartlett Reservoir	Epilimnion	4.4	0.072	1.6	
	Hypolimnion	N/A	N/A	#VALUE!	
Saguaro Lake	Epilimnion	8.7	0.064	0.7	
	Epi - Duplicate	8.7	0.066	0.8	
	Hypolimnion	8.4	0.069	0.8	
Salt River	at Blue Point Bridge	5.0	0.066	1.3	
Salt River	above Roosevelt	5.2	0.042	0.8	
Roosevelt Reservoir Point 1	Epilimnion	N/A	N/A	N/A	N/A
	Hypolimnion	N/A	N/A	N/A	N/A
Roosevelt Reservoir Point 2	Epilimnion	N/A	N/A	N/A	N/A
	Hypolimnion	N/A	N/A	N/A	N/A
Apache Reservoir Point 1	Epilimnion	N/A	N/A	N/A	N/A
	Hypolimnion	N/A	N/A	N/A	N/A
Apache Reservoir Point 2	Epilimnion	N/A	N/A	N/A	N/A
	Hypolimnion	N/A	N/A	N/A	N/A
Canyon Reservoir Point 1	Epilimnion	6.9	N/A	0.1	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

Organic Matter in Canal & Water Treatment Plants

Water Treatment Plants- May 2nd, 2016

Sample Description	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L)
Union Hills Inlet	5.2	0.042	0.8	
Union Hills Treated	5.0	0.021	0.4	
Tempe North Inlet	5.6	0.066	1.2	
Tempe North Plant Treated	4.3	0.028	0.7	
Tempe South Inlet	3.3	0.013	0.4	
Tempe South Plant Treated	3.1	0.008	0.3	
Greenway WTP Inlet	3.5	0.021	0.6	
Greenway WTP Treated	3.8	0.022	0.6	
Glendale WTP Inlet	5.0	0.062	1.2	
Glendale WTP Treated	2.6	0.013	0.5	
Anthem WTP Inlet	4.8	0.037	0.8	
Anthem WTP Treated	6.1	0.033	0.5	
24th Street WTP Inlet	7.0	0.064	0.9	
24th Street WTP Treated	4.6	0.023	0.5	
Chandler WTP Inlet	4.4	0.020	0.5	
Chandler WTP Treated	3.6	0.010	0.3	

Rivers and Canals- May 2nd, 2016

Sample Description	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L)
Waddell Canal	6.4	0.042	0.7	
Anthem WTP Inlet	4.8	0.037	0.8	
Union Hills Inlet	5.2	0.042	0.8	
CAP Salt-Gila Pumping Station (June)	5.2	0.042	0.8	
CAP Mesa Turnout (June)	5.1	0.040	0.8	
CAP Canal at Cross-connect	4.0	0.046	1.1	
Salt River @ Blue pt. Bridge	5.0	0.066	1.3	
Verde River @ Beeline	4.3	0.074	1.7	
AZ Canal above CAP Cross-connect	5.1	0.068	1.3	
AZ Canal below CAP Cross-connect	4.9	0.063	1.3	
AZ Canal at Highway 87	4.8	0.065	1.4	
AZ Canal at Pima Rd.	7.9	0.066	0.8	
AZ Canal at 56th St.	7.0	0.064	0.9	
AZ Canal - Central Avenue	6.8	0.064	0.9	

AZ Canal - Inlet to Glendale WTP	5.0	0.062	1.2	
AZ Canal - Inlet to Greenway WTP	3.5	0.021	0.6	
South Canal below CAP Cross-connect	5.0	0.068	1.4	
Head of Tempe Canal	4.3	0.017	0.4	
Tempe Canal - Inlet to Tempe's South Plant	3.3	0.013	0.4	
Head of the Consolidated Canal	3.5	0.019	0.5	
Middle of Consolidated Canal	3.5	0.016	0.5	
Chandler WTP - Inlet	4.4	0.020	0.5	

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.

Many thanks to Marisa for her diligence in finding an instrument on campus to complete the analyses for taste and odor compounds! This is no small accomplishment since this was a new method for the GC-MS.

Table 1 - Water Treatment Plants – May 2, 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	3.8	<2.0
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	3.3
Glendale WTP Treated	<2.0	<2.0
24th St. WTP Inlet	<2.0	<2.0
24th St. WTP Outlet	<2.0	<2.0

Table 2 - Canal Sampling – May 2, 2016			
System	Sample Description	MIB (ng/L)	Geosmin (ng/L)
CAP	Waddell Canal	<2.0	2.3
	Union Hills Inlet	<2.0	<2.0
	CAP Canal at Cross-connect	<2.0	<2.0
	Salt River @ Blue Pt Bridge	<2.0	<2.0
	Verde River @ Beeline	6.0	2.7
AZ	AZ Canal above CAP Cross-connect	<2.0	<2.0
Canal	AZ Canal below CAP Cross-connect	<2.0	<2.0
	AZ Canal at Highway 87	<2.0	<2.0
	AZ Canal at Pima Rd.	<2.0	<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	3.3
	Head of the Consolidated Canal	<2.0	<2.0
	Middle of the Consolidated Canal	<2.0	<2.0
South	South Canal below CAP Cross-connect	3.2	4.8
Tempe	Head of the Tempe Canal	<2.0	<2.0
Canals	Tempe Canal - Inlet to Tempe's South Plant	<2.0	<2.0
	Salt-Gila (April)	<2.0	5.1
	Mesa Turnout (April)	<2.0	7.9

Table 3 - Reservoir Samples – May 3, 2016			
Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)
Lake Pleasant (April)	Eplimnion	4.1	<2.0
Lake Pleasant (April)	Hypolimnion	5.7	<2.0
Verde River @ Beeline		6.0	2.7
Bartlett Reservoir	Epilimnion	ns	ns
Bartlett Reservoir	Epi-near dock	3.1	7.4
Bartlett Reservoir	Hypolimnion	ns	ns
Salt River @ BluePt Bridge		<2.0	<2.0
Saguaro Lake	Epilimnion	<2.0	<2.0
Saguaro Lake	Epi - Duplicate	<2.0	<2.0
Saguaro Lake	Epi-near dock	<2.0	<2.0
Saguaro Lake	Hypolimnion	<2.0	<2.0
Lake Havasu (April)		<2.0	2.0
Verde River at Tangle Creek (April)		<2.0	<2.0
Roosevelt at Salt River Inlet		ns	ns

High Winds prevented Lake Sampling – Sampling is Rescheduled for week of May 16th

Table 4 - Quarterly Lake Sampling - May 3, 2016				
Sample Description	Site	Location	MIB (ng/L)	Geosmin (ng/L)
Roosevelt Lake	Site 1A	Epilimnion		
Roosevelt Lake	Site 1B	Hypolimnion		
Roosevelt Lake	Site 2A	Epilimnion		
Roosevelt Lake	Site 2B	Hypolimnion		

Apache Lake	Site 1A	Eplimnion		
Apache Lake	Site 1B	Hypolimnion		
Apache Lake	Site 2A	Eplimnion		
Apache Lake	Site 2B	Hypolimnion		
Canyon Lake	Site 1A	Eplimnion	<2.0	<2.0
Canyon Lake	Site 1B	Hypolimnion	ns	ns
Canyon Lake	Site 2A	Eplimnion	ns	ns
Canyon Lake	Site 2B	Hypolimnion	ns	ns