Regional Water Quality NEWSLETTER

DATE: Report for May 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 below detection limits (2 ng/l) except for two samples that were near detection limits. Reservoir samples were below the threshold level of 10 ng/l except for the Bartlett Reservoir epilimnion sample near the dock. Samples for the upper Salt River reservoirs are being processed and will be reported in the next newsletter.

2. DOC values for Verde River water which remains as the primary water source were - 3.1-5.8 mg/l and the SUVA values remained relatively high. Salt River water had a DOC of 2-4.8 mg/l and the SUVA values were normal. Most canal samples ranged from 2-3.5 mg DOC/l and they also had relatively high SUVA values.

3. The primary source of surface water continues to be Verde River water with Salt River water comprising approximately 30% of reservoir releases.

4. Microbial concentrations for coliforms were consistent with the previous spring months. Increases in E. Coli were observed with several values increasing by an order of magnitude. Mycobacterium results from April also had significant increases and represent the highest numbers since monitoring for Mycobacterium was initiated.

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

Sample	E. coli	Coliform
Blank Average	**n/a**	**n/a**
AZ Canal at Highway 87 average	**7**	**952**
South Canal below CAP Cross- connect average	**26**	**896**
Cap Canal at Cross-connect average	**12**	**1344**
AZ Canal at 56th St. average	**7**	**968**
AZ Canal- Central Avenue average	**339**	**456**
Pima Average	**19**	**888**
AZ Canal above CAP Cross-connect average	**16**	**1480**
Waddell Canal average	**4**	**1392**
Verde River @ Beeline average	**10**	**1208**
AZ Canal below CAP Cross-connect average	**18**	**1072**
head of the Consolidated Canal average	**20**	**1136**
Middle of Consolidated Canal average	**58**	**TNTC**
Head of Tempe Canal average	**17**	**936**

Mycobacterium (April)	colonies
Blank	0
AZ Canal at Highway 87	57
South Canal below CAP Cross- connect	CONT
Cap Canal at Cross-connect	6
AZ Canal at 56th St.	29
AZ Canal- Central Avenue	92
AZ Canal at Pima	58
AZ Canal above CAP Cross-connect	36
Waddell Canal	0
Verde River @ Beeline	55
AZ Canal below CAP Cross-connect	29
head of the Consolidated Canal	61

Middle of Consolidated Canal	CONT
Head of Tempe Canal	31

CONT – Contaminated with other bacteria

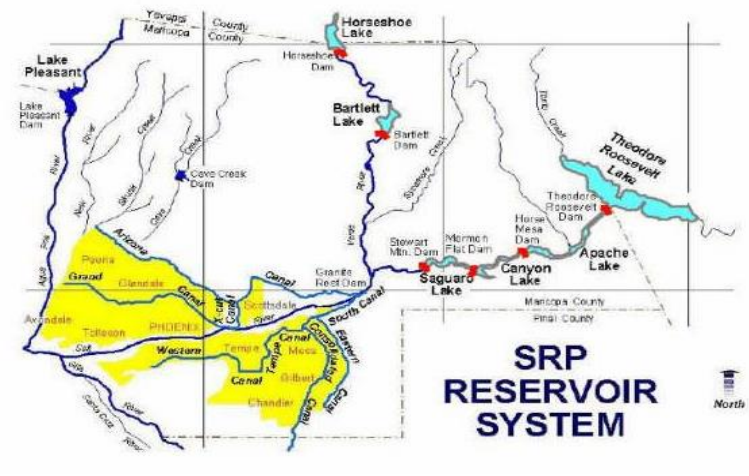
Quick Update of Water Supplies for May 2nd, 2017
(during day of canal/WTP sampling - May 2nd, 2017)

Source	Trend in supply	Discharge to water supply system	Flow into SRP Canal System	Dissolved organic carbon Concentration (mg/L) **
Salt River	Reservoirs at 75% full	401 cfs	571 cfs into **Arizona Canal** 485 cfs into **South Canal** 102 cfs of **CAP water** into Arizona Canal	3.0 mg/L
Verde River	Reservoirs At 79% full	700 cfs		3.7 mg/L
Colorado River	Lake Pleasant is 96.1% full (Lake Powell is 51.9% full)	Lake Pleasant is* releasing 0 cfs	138 cfs **Groundwater Pumping** into SRP Canals	2.0 mg/L
Groundwater	Pumping ***	138 cfs pumping by SRP		0.5 to 1 mg/L

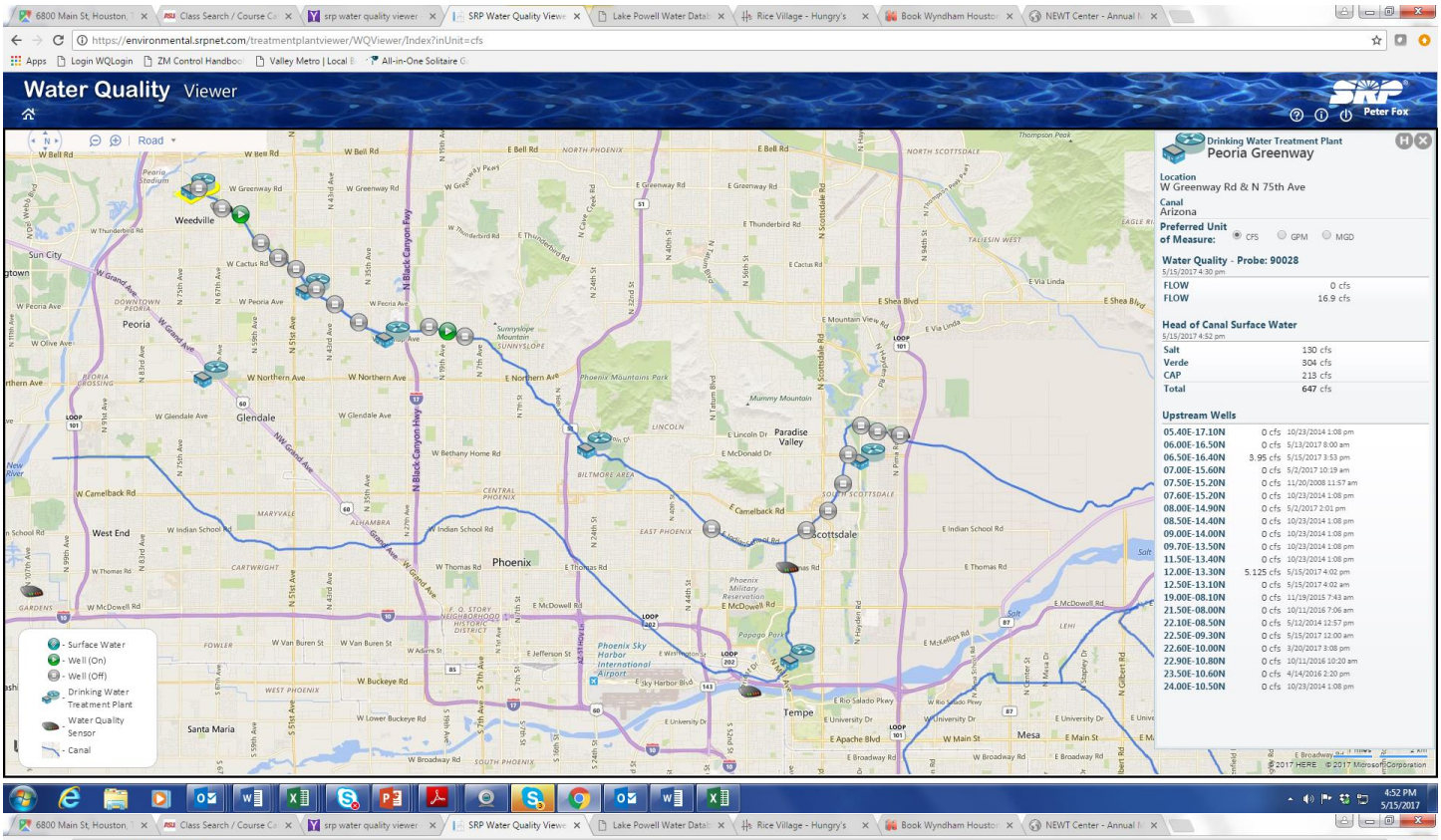
*CAP is not releasing from Lake Pleasant
**Concentration of DOC in the terminal reservoir
***CAP water is being delivered to the Arizona Canal.

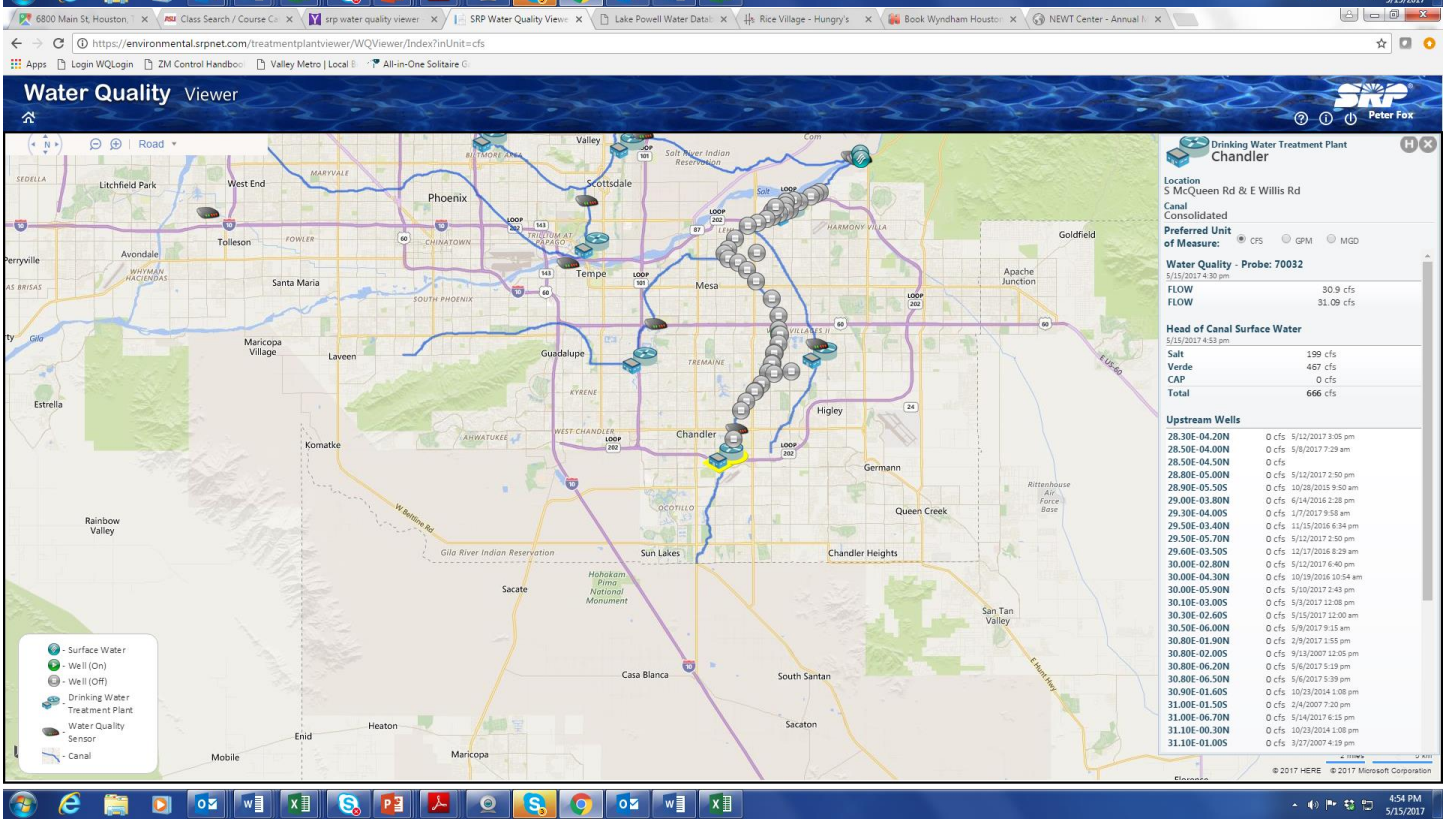
Data from the following websites:

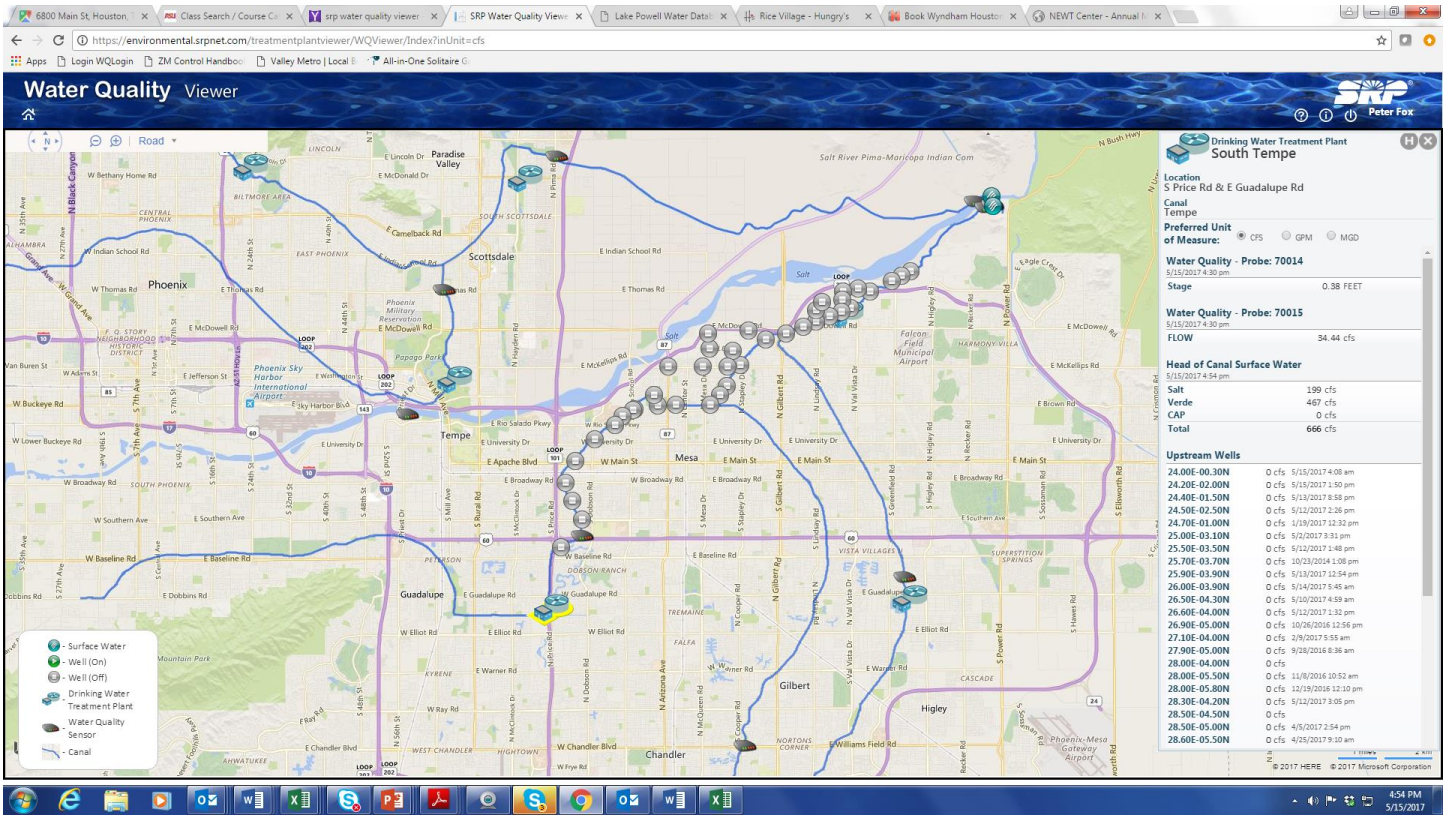
- http://www.srpwater.com/dwr/
- http://www.cap-az.com/departments/water-operations/lake-pleasant
- http://lakepowell.water-data.com/



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






Water Quality Viewer
Peter Fox
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
5/15/2017 4:30 pm
Stage 0.38 FEET
Water Quality - Probe: 70015
5/15/2017 4:30 pm
FLOW 34.44 cfs
Head of Canal Surface Water
5/15/2017 4:54 pm
Salt 199 cfs
Verde 467 cfs
CAP 0 cfs
Total 666 cfs
Upstream Wells
24.00E-00.30N 0 cfs 5/15/2017 4:08 am
24.20E-02.00N 0 cfs 5/15/2017 1:50 pm
24.40E-01.50N 0 cfs 5/13/2017 8:58 pm
24.50E-02.50N 0 cfs 5/12/2017 2:26 pm
24.70E-01.00N 0 cfs 1/19/2017 12:32 pm
25.00E-03.10N 0 cfs 5/2/2017 3:31 pm
25.50E-03.50N 0 cfs 5/12/2017 1:48 pm
25.70E-03.70N 0 cfs 10/23/2014 1:08 pm
25.90E-03.90N 0 cfs 5/13/2017 12:54 pm
26.00E-03.90N 0 cfs 5/14/2017 5:45 am
26.50E-04.30N 0 cfs 5/10/2017 4:59 am
26.60E-04.00N 0 cfs 5/12/2017 1:32 pm
26.90E-05.00N 0 cfs 10/26/2016 12:56 pm
27.10E-04.00N 0 cfs 2/9/2017 5:55 am
27.90E-05.00N 0 cfs 9/28/2016 8:36 am
28.00E-04.00N 0 cfs
28.00E-05.50N 0 cfs 11/8/2016 10:52 am
28.00E-05.80N 0 cfs 12/19/2016 12:10 pm
28.30E-04.20N 0 cfs 5/12/2017 3:05 pm
28.50E-04.50N 0 cfs
28.50E-05.00N 0 cfs 4/5/2017 2:54 pm
28.60E-05.50N 0 cfs 4/25/2017 9:10 am
Surface Water
Well (On)
Well (Off)
Drinking Water Treatment Plant
Water Quality Sensor
Canal
Scottsdale
Phoenix
Tempe
Mesa
Guadalupe
Gilbert
Higley
Chandler
Paradise Valley
Salt River Pima-Maricopa Indian Com
4:54 PM
5/15/2017

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 - May 1st-2nd& 8th-9th, 2017

Sample Description	Location	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L
Havasu (March)		1.7	0.049	2.8	0.540
Lake Pleasant (March)	Epilimnion	2.3	0.060	2.6	0.429
	Hypolimnion	2.5	0.070	2.8	0.375
Verde River	at Tangle	1.4	0.058	4.2	0.298
Verde River	at Beeline Highway	3.7	0.185	5.0	0.367
Bartlett Reservoir	Epilmnion	5.5	0.166	3.0	0.452
	Hypolimnion	5.8	0.202	3.5	0.485
Saguaro Lake	Epilimnion	4.8	0.078	1.6	0.671
	Epi - Duplicate	4.8	0.078	1.6	0.598
	Hypolimnion	3.9	0.068	1.8	0.536
Salt River	at Blue Point Bridge	2.0	0.057	2.8	0.361
Salt River	above Roosevelt	N/A	N/A	#VALUE!	N/A
Roosevelt Reservoir Point 1	Epilmnion	4.4	0.116	N/A	0.5062
	Hypolimnion	4.6	0.114	N/A	0.6729
Roosevelt Reservoir Point 2	Epilmnion	4.6	0.125	N/A	0.4367
	Hypolimnion	4.3	0.107	N/A	0.6457
Apache Reservoir Point 1	Epilmnion	4.1	0.067	N/A	0.3506
	Hypolimnion	N/A	N/A	N/A	N/A
Apache Reservoir Point 2	Epilmnion	N/A	N/A	N/A	N/A
	Hypolimnion	N/A	N/A	N/A	N/A
Canyon Reservoir Point 1	Epilmnion	5.2	0.100	1.9	0.6294
	Hypolimnion	4.6	0.090	N/A	0.5407
Canyon Reservoir Point 2	Epilmnion	4.8	0.095	N/A	0.4368
	Hypolimnion	4.6	0.090	N/A	0.4454

Water Treatment Plants- May 1st-2nd, 2017

Sample Description	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L
Union Hills Inlet	1.9	0.047	2.5	0.492
Union Hills Treated	1.6	0.029	1.8	0.453
Tempe North Inlet	3.7	0.173	4.7	0.422
Tempe North Plant Treated	2.6	0.052	2.0	0.353
Tempe South Inlet	3.7	0.189	5.0	0.377
Tempe South Plant Treated	2.9	0.085	3.0	0.488
Greenway WTP Inlet	3.3	0.146	4.4	0.700
Greenway WTP Treated	2.6	0.067	2.6	0.350
Glendale WTP Inlet	3.3	0.153	4.7	0.839
Glendale WTP Treated	1.7	0.038	2.3	0.534
Anthem WTP Inlet	1.9	0.048	2.5	0.479
Anthem WTP Treated	1.9	0.041	2.2	0.486
24th Street WTP Inlet	3.6	0.168	4.7	0.391
24th Street WTP Treated	1.9	0.046	2.4	0.327
Chandler WTP Inlet	3.7	0.192	5.2	0.381
Chandler WTP Treated	2.4	0.056	2.3	0.443

Rivers and Canals- May 1st-2nd, 2017

Sample Description	DOC (mg/L)	UV254 (l/cm)	SUVA (L/mg-m)	TDN (mg/L
Waddell Canal	2.0	0.049	2.5	0.462
Anthem WTP Inlet	1.9	0.048	2.5	0.479
Union Hills Inlet	1.9	0.047	2.5	0.492
CAP Salt-Gila Pumping Station (June)	2.1	0.048	2.3	0.495
CAP Mesa Turnout (June)	1.9	0.048	2.5	0.512
CAP Canal at Cross-connect	2.1	0.048	2.3	0.451
Salt River @ Blue pt. Bridge	2.0	0.057	2.8	0.361
Verde River @ Beeline	3.7	0.185	5.0	0.367
AZ Canal above CAP Cross-connect	2.0	0.056	2.8	0.453
AZ Canal below CAP Cross-connect	2.9	0.131	4.5	0.416
AZ Canal at Highway 87	3.4	0.171	5.0	0.361
AZ Canal at Pima Rd.	3.4	0.168	4.9	0.367
AZ Canal at 56th St.	3.6	0.167	4.6	0.376
AZ Canal - Central Avenue	3.5	0.165	4.8	0.389
AZ Canal - Inlet to Glendale WTP	3.3	0.153	4.7	0.839
AZ Canal - Inlet to Greenway WTP	3.3	0.146	4.4	0.700
South Canal below CAP Cross-connect	3.5	0.188	5.4	0.370

Head of Tempe Canal	2.4	0.117	4.8	0.746
Tempe Canal - Inlet to Tempe's South Plant	3.7	0.189	5.0	0.377
Head of the Consolidated Canal	2.4	0.118	4.9	0.779
Middle of Consolidated Canal	3.5	0.191	5.4	0.375
Chandler WTP - Inlet	3.7	0.192	5.2	0.381

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 – May 1, 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	**<2.0**	**<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	**<2.0**	**<2.0**
Chandler Inlet	**<2.0**	**<2.0**
Chandler Treated	**<2.0**	**<2.0**
Greenway WTP Inlet	**<2.0**	**2.2**
Greenway WTP Treated	**<2.0**	**2.5**
Glendale WTP Inlet	**<2.0**	**<2.0**
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 1, 2017

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)
CAP	Waddell Canal	**<2.0**	**<2.0**

	Union Hills Inlet	**<2.0**	**<2.0**
	CAP Canal at Cross-connect	**<2.0**	**<2.0**
AZ Canal	Salt River @ Blue Pt Bridge	**2.4**	**<2.0**
	Verde River @ Beeline	**<2.0**	**<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.	**<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**	**<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 (April)	**<2.0**	**<2.0**
	Mesa Turnout (April)	**<2.0**	**<2.0**

Table 3 - Reservoir Samples – May 9, 2017

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)
Lake Pleasant (April)	Eplimnion	**2.3**	**<2.0**
Lake Pleasant (April)	Hypolimnion	**3.3**	**<2.0**
Verde River @ Beeline		**<2.0**	**<2.0**
Bartlett Reservoir	Epilimnion	**9.0**	**3.0**
Bartlett Reservoir	Epi-near dock	**12.1**	**8.0**
Bartlett Reservoir	Hypolimnion	**<2.0**	**<2.0**
Salt River @ BluePt Bridge		**2.4**	**<2.0**
Saguaro Lake	Epilimnion	**8.2**	**<2.0**
Saguaro Lake	Epi - Duplicate	**8.1**	**<2.0**
Saguaro Lake	Epi-near dock	**ns**	**ns**
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 (January)		**<2.0**	**<2.0**