

REGIONAL WATER QUALITY NEWSLETTER

DATE: Report for September 2012

A Tempe, Glendale, Peoria, Chandler, CAP, SRP, Arizona American Water– ASU Regional Water Quality Partnership

<http://enpub.fulton.asu.edu/pwest/tasteandodor.htm>

September 11, 2012

SUMMARY: EVALUATION AND RECOMMENDATIONS

1. Thank you everyone who attended and helped make our September Annual Workshop a success, with a special thanks to the students that made presentations. Presentations will be uploaded to our website by the middle of this week. Summary of key topics wanting to hear about were, in order of preference: GAC regeneration, Wallow/Sunflower fire turbidity issues, Hexavalent Chrome, current water quality, CAP turbidity due to changing CAP operations, nitrate reduction, TOC speciation.
2. We did some added verticle sampling in Saguaro Lake this month, which clearly shows in-reservoir production of DOC – which is important for the long-term source and characteristics of DOC in the Salt River reservoir system.
3. We continue bi-weekly MIB sampling as the levels being released from the SRP reservoirs now exceed 10 ng/L.
4. Lake Pleasant on the CAP system is essentially not releasing water now and a “low flow” condition in the Waddell canal exists as CAP switches over soon towards moving only Colorado River (no Lake Pleasant Releases) through the CAP canal system. Soon they will start to refill Lake Pleasant.

Quick Update of Water Supplies for September 2012 (during day of sampling – September 11)

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	818 cfs	607 cfs into Arizona Canal 364 cfs into South Canal (90% Salt River Water)	4.5 mg/L
Verde River	Reservoirs At 28% full	100 cfs		2.7 mg/L
Colorado River	Lake Pleasant is 51% full (Lake Powell is 58% full)	Lake Pleasant releasing 7 cfs into CAP canal	0 cfs of CAP water into Arizona Canal	3.5 mg/L
Groundwater	Generally increasing due to recharge	247 cfs pumping by SRP	247 cfs Groundwater Pumping into SRP Canals	0.5 to 1 mg/L

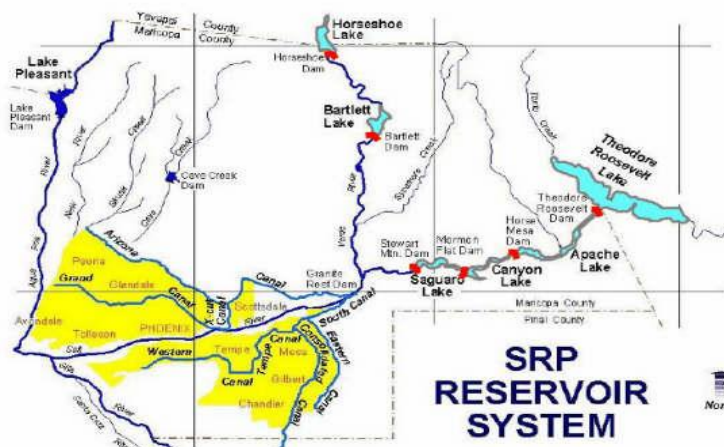
*Concentration of these taste and odor compounds in the upper [lower] levels of the terminal reservoir (Saguaro Lake on the Salt River; Bartlett Lake on the Verde River; Lake Pleasant on the CAP system)

**Concentration of DOC in the terminal reservoir

*** On paper cities are receiving CAP water in the SRP canals, but as a method of “paying back” from the last drought for excess CAP deliveries – SRP is delivering wet water only from the Salt and Verde Rivers

Data from the following websites:

- <http://www.srpwater.com/dwr/>
- <http://www.cap-az.com/Operations/LakePleasantOps.aspx>
- <http://lakepowell.water-data.com/>



Dissolved Organic Carbon In Reservoirs and Treatment Plants

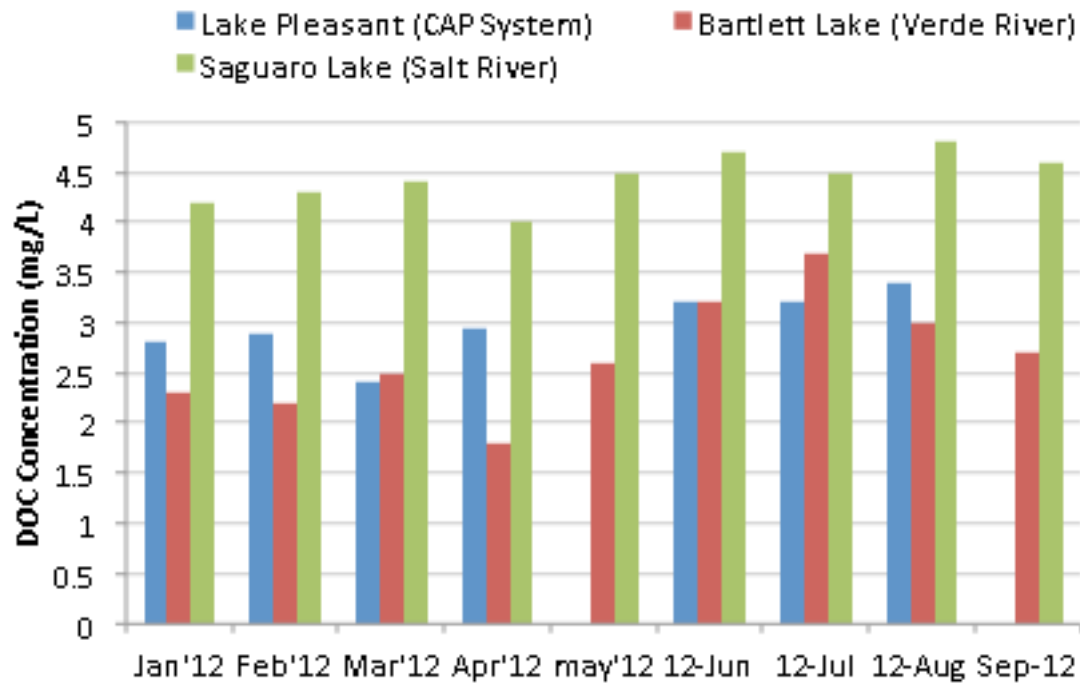
DOC = Dissolved organic carbon

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

SUVA = UV254/DOC

TDN = Total dissolved nitrogen (mgN/L)

Reservoir Samples

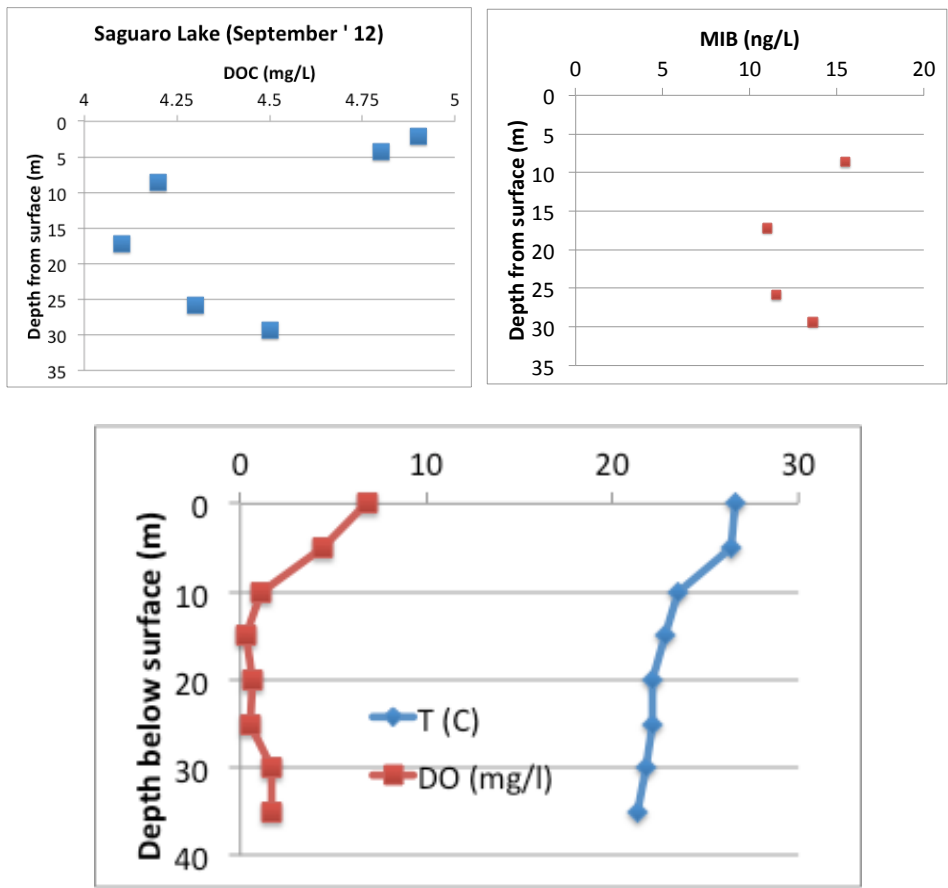


Reservoir Samples – September 11, 2012

Reservoir sampling conducted monthly. CAP is sampling Lake Pleasant and Havasu, and USGS is sampling Verde River at Tangle and Salt River above Roosevelt on slightly different days than the other reservoirs.

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Havasu		3.3	0.06	1.9	0.4
Lake Pleasant	Epilimnion	3.1	0.05	1.7	0.4
	Hypolimnion	3.7	0.05	1.4	0.3
Verde River	@ Tangle	4.5	0.17	3.7	0.4
Verde River	@ Beeline Hwy	2.2	0.07	3.1	0.5
Bartlett Reservoir	Epilimnion	2.6	0.05	2.1	0.2
	Hypolimnion	2.8	0.06	2.2	0.3
Salt River above Roosevelt	above Roosevelt	2.3	0.09	3.7	0.5
Saguaro Lake	Epilimnion	4.9	0.07	1.5	0.4
	Epi - Duplicate	4.8	0.07	1.5	0.4
	30 ft deep	4.2	0.07	1.7	0.4
	Hypolimnion	4.1	0.07	1.8	0.3
	90 ft deep	4.3	0.07	1.7	0.4
	102 ft (bottom)	4.5	0.09	2.0	0.6
Salt River	@ Blue Point Bridge	4.0	0.08	2.0	0.3

This month we measured stratification of organics in Saguaro Lake. The data is shown below. There was a clear profile of high DOC near the surface, presumably due to algal activity and release of soluble microbial products. Below 10 m deep the dissolved oxygen was very low because of settling dead algae were decaying due to respiration of bacteria. We say a slight profile in MIB concentrations too that mimicked that of DOC. Saguaro Lake is mildly stratified, in terms of temperature right now and complete lake mixing will like start soon. **Both DOC and MIB clearly show the formation of DOC within the reservoirs due to algae.** From previous work we believe some of the water deeper in the lake is also moving downward from Canyon lake because it is bottom release and colder water moves through Saguaro Lake to its outlet.



Organic Matter in Canal

Rivers and Canals – September 11, 2012

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Waddell Canal	3.4	0.06	1.6	0.5
Anthem WTP Inlet	5.5	0.05	0.9	0.5
Union Hills Inlet	3.5	0.09	2.4	0.5
CAP Canal at Cross-connect	no flow			
Salt River @ Blue Pt Bridge	4.0	0.08	2.0	0.3
Verde River @ Beeline	2.2	0.07	3.1	0.5
AZ Canal above CAP Cross-connect	not available			
AZ Canal below CAP Cross-connect	3.8	0.08	2.1	0.4
AZ Canal at Highway 87	3.7	0.08	2.3	0.3
AZ Canal at Pima Rd.	3.9	0.08	2.1	0.4
AZ Canal at 56th St.	4.0	0.09	2.3	0.5
AZ Canal - Central Avenue	4.5	0.09	2.0	0.6
AZ Canal - Inlet to Glendale WTP	3.8	0.10	2.7	1.1
AZ Canal - Inlet to GreenwayWTP	3.9	0.10	2.7	2.0
South Canal below CAP Cross-connect	4.5	0.08	1.9	0.4
Head of the Tempe Canal	3.3	0.08	2.4	0.5
Tempe Canal - Inlet to Tempe's South Plant	1.3	0.04	2.7	2.6
Head of the Consolidated Canal	3.9	0.09	2.2	0.5
Middle of the Consolidated Canal	2.3	0.06	2.5	1.7
Chandler WTP – Inlet	2.7	0.06	2.1	2.9

Organics at the Water Treatment Plants

Water Treatment Plants – September 11, 2012

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Union Hills Inlet	3.5	0.09	2.4	0.5
Union Hills Treated	3.0	0.03	1.1	0.4
Tempe North Inlet	4.4	0.09	2.0	0.6
Tempe North Plant Treated	3.9	0.06	1.4	0.5
Tempe South Inlet	1.3	0.04	2.7	2.6
Tempe South Plant Treated	0.9	0.02	2.1	2.6
Greenway WTP Inlet	3.9	0.10	2.7	2.0
Greenway WTP Treated	2.4	0.04	1.6	2.4
Glendale WTP Inlet	3.8	0.10	2.7	1.1
Glendale WTP Treated	2.4	0.04	1.6	1.4
Anthem WTP Inlet	5.5	0.05	0.9	0.5
Anthem WTP Treated	3.1	0.05	1.6	0.4
Chandler WTP Inlet	2.7	0.06	2.1	2.9
Chandler WTP Treated	1.5	0.03	2.2	2.6

DOC removal (%)
15
12
32
39
37
45
43

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. We usually present all the data when concentrations start to exceed 5 ng/L.

Reservoir Samples – Sept 11, 2012

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant	Eplimnion	2.1	2.0	<2.0
Lake Pleasant	Hypolimnion	4.3	5.8	<2.0
Verde River @ Beeline		26.4	5.0	<2.0
Bartlett Reservoir	Epilimnion	27.9	3.2	<2.0
Bartlett Reservoir	Epi-near dock	31.7	4.6	<2.0
Bartlett Reservoir	Hypolimnion	26.1	3.4	<2.0
Salt River @ BluePt Bridge		12.2	4.6	<2.0
Saguaro Lake	Epilimnion	13.2	5.3	<2.0
	Epi - Duplicate	13.8	5.0	<2.0
	Epi-near dock	12.7	4.9	<2.0
	Hypolimnion	11.0	3.7	<2.0
	30'	15.5	3.9	<2.0
	90'	11.5	3.9	<2.0
	102' (bottom)	13.6	4.0	<2.0
Lake Havasu		10.9	3.6	<2.0
Verde River at Tangle Creek				
Roosevelt at Salt River Inlet		<2.0	2.2	<2.0

Canal Sampling – Sept 11, 2012

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	3.7	4.5	<2.0
	Union Hills Inlet	2.6	2.9	<2.0
	CAP Canal at Cross-connect			
AZ Canal	Salt River @ Blue Pt Bridge	12.2	4.6	<2.0
	Verde River @ Beeline	26.4	5.0	<2.0
	AZ Canal above CAP Cross-connect			
	AZ Canal below CAP Cross-connect	15.8	4.4	<2.0
	AZ Canal at Highway 87	15.1	4.6	<2.0
	AZ Canal at Pima Rd.	13.8	3.6	<2.0
	AZ Canal at 56th St.	<2.0	<2.0	<2.0
	AZ Canal - Central Avenue	6.1	2.9	<2.0
	AZ Canal - Inlet to Glendale WTP	2.0	<2.0	<2.0
	Head of the Consolidated Canal	10.4	3.4	<2.0
	Middle of the Consolidated Canal	5.3	3.8	<2.0
South Tempe Canals	South Canal below CAP Cross-connect	16.5	4.8	<2.0
	Head of the Tempe Canal	10.0	3.4	<2.0
	Tempe Canal - Inlet to Tempe's South Plant	2.0	2.4	<2.0
	Salt-Gila	6.2	3.7	<2.0
	Mesa Turnout	5.7	3.8	<2.0

Water Treatment Plants –Sept 11, 2012

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Union Hills Inlet	2.6	2.9	<2.0
Union Hills Treated	<2.0	<2.0	<2.0
Tempe North Inlet	13.0	4.0	<2.0
Tempe North Plant Treated	11.0	4.1	<2.0
Tempe South WTP	13.2	4.0	<2.0
Tempe South Plant Treated	2.0	2.4	<2.0
Anthem Inlet	2.1	2.4	<2.0
Anthem Treated	<2.0	<2.0	<2.0
Chandler Inlet	3.1	4.2	<2.0
Chandler Treated	2.1	3.5	<2.0
Greenway WTP Inlet	<2.0	3.0	<2.0
Greenway WTP Treated	<2.0	<2.0	<2.0
Glendale WTP Inlet	2.0	<2.0	<2.0
Glendale WTP Treated	<2.0	<2.0	<2.0