Regional Water Quality NEWSLETTER

DATE: Report for October 2013
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: EVALUATION AND RECOMMENDATIONS

1. Thanks for making our September regional water quality workshop a success. Over 70 local water experts attended. Copies of the slides will be updated this week on our website: http://faculty.engineering.asu.edu/pwesterhoff/research/regional-water-quality-issues/

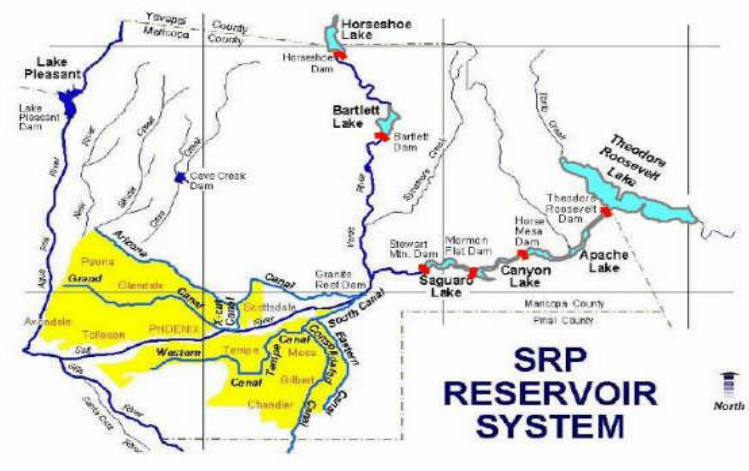
2. Items brought up during the workshop that will be a focus for the next year include: in-situ GAC regeneration, GAC utilization, predictions for impacts of droughts and forest fires on TOC and water quality, trace metals
3. MIB levels this month are high in the Arizona canal, and show near doubling of MIB and geosmin over a stretch of 5 miles (Pima Road to 56th Street). MIB and geosmin levels are HIGH in the lower CAP canal (7 ng/L to 16 ng/L around the Mesa Turnout and Salt-Pima pump station). These sites add to the Consolidated Canal in-canal production of geosmin earlier this year, and indicate a need to identify sources of T&O producing organisms in the canal and understand how/when to treat them.
4. Overall levels of MIB are modest in the reservoirs (~10 ng/L) now that reservoir thermal destratification has occurred and caused mixing of MIB with depth in the reservoir.
5. The effects of destratification of the reservoirs has also impacted profiles of DOC in the reservoir. DOC levels are quite high near the reservoir surface in response to mixing of the reservoirs with depth and enrichment of nutrients in the sunlight surface which is producing algae and DOC.
6. Trace metals data are in for August 2013. As discussed at the workshop, earlier in the year elevated levels of U238 were observed in the CAP system (values above 20 ng/L). For August 2013, the levels in Lake Havasu are lower (3 ng/L). This fall ASU and CAP are analyzing split samples for U238 analysis. IF ANY UTILITIES HAVE uranium data, please forward to us for a meta-analysis over the past 3 years.
7. This month we will continue T&O sampling – let us know if you have a special request. We are also conducting a second round of hexavalent chromium continuous monitoring on the Consolidated Canal, including an ISCO sampler and a passive sampler.

Quick Update of Water Supplies for October 2013
(during day of sampling – October 7th)

Source	Trend in supply	Discharge to water supply system	Flow into SRP Canal System	Dissolved organic carbon Concentration (mg/L) **
Salt River	Reservoirs at 54% full	217 cfs	419 cfs into **Arizona Canal**	5 mg/L
Verde River	Reservoirs At 62% full	496 cfs	303 cfs into **South Canal** **(70% Verde River Water)**	5 mg/L
Colorado River	Lake Pleasant is 48% full (Lake Powell is ??% full – not available due to gov shutdown)	Lake Pleasant is being filled from the CAP canal	75 cfs of **CAP water** into Arizona Canal	2.8 mg/L
Groundwater	Generally increasing due to recharge	493 cfs pumping by SRP	493 cfs **Groundwater Pumping** into SRP Canals	0.5 to 1 mg/L

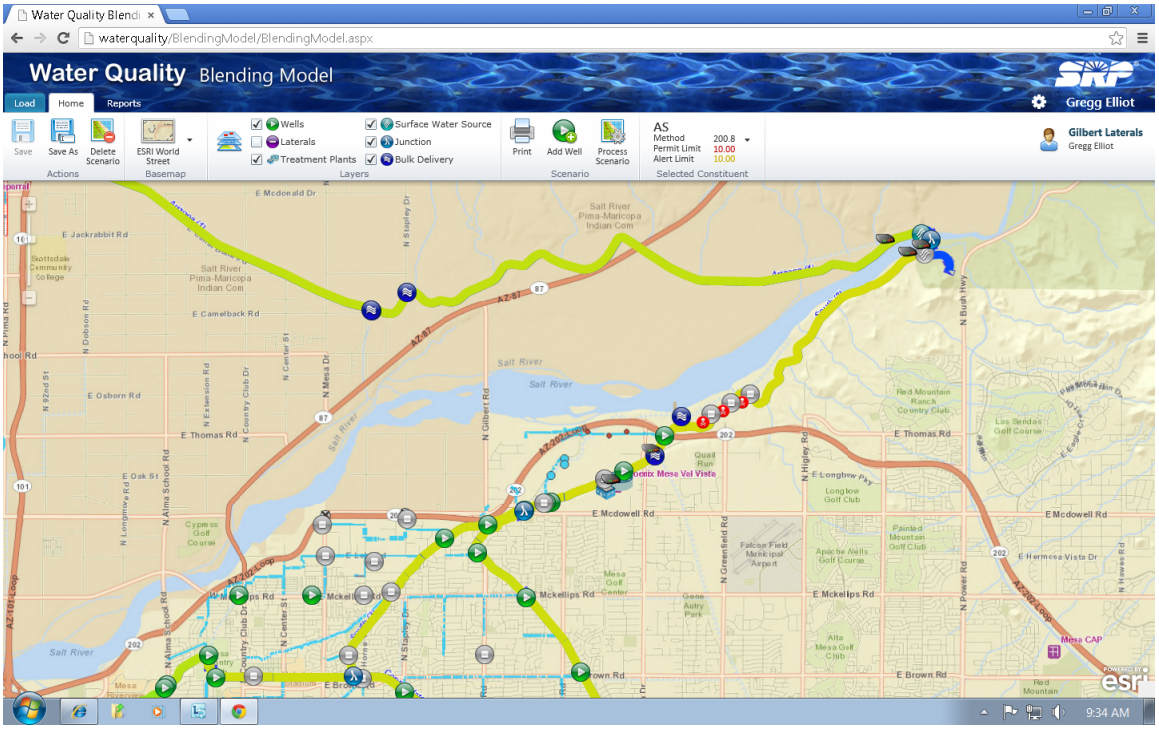
*Concentration of these taste and odor compounds in the upper [lower] levels of the terminal reservoir (Saguaro Lake on the Salt River; Bartlett Lake on the Verde River; Lake Pleasant on the CAP system
**Concentration of DOC in the terminal reservoir
*** On paper cities are receiving CAP water in the 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/index.php/departments/water-operations/lake-pleasant
- http://lakepowell.water-data.com/



SRP has a new website to monitor operations and water quality. It requires a password which will be sent within a day after logging in:

https://environmental.srpnet.com/TreatmentPlantViewer/



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

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Havasu (Sep)		2.9	0.057	2.0	0.5
Lake Pleasant (Sep)	Epilimnion	2.9	0.046	1.6	0.4
	Hypolimnion	2.8	0.043	1.5	0.3
Verde River (Aug)	@ Tangle	1.5	0.051	3.4	0.5
Verde River	@ Beeline Hwy	3.9	0.1	3.2	0.4
Bartlett Reservoir (Sep)	Epilimnion	5.0	0.095	1.9	0.5
	Hypolimnion	5.5	0.145	2.7	0.6
Saguaro Lake (Sep)	Epilimnion	7.1	0.075	1.1	0.6
	Epi - Duplicate	8.5	0.083	1.0	1.1
	Hypolimnion	5.1	0.073	1.4	0.8
Salt River (Sep)	@ Blue Point Bridge	4.0	0.070	1.8	0.6

Organic Matter in Canal

Table 3 - Rivers and Canals – October 6, 2013

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Waddell Canal	2.8	0.052	1.8	0.5
Anthem WTP Inlet	3.1	0.048	1.5	0.5
Union Hills Inlet	2.7	0.049	1.8	0.5
CAP Salt-Gila Pump Station (Sep)	3.0	0.048	1.6	0.4
CAP Mesa Turnout (Sep)	2.9	0.046	1.6	2.5
CAP Canal at Cross-connect	2.9	0.053	1.9	0.5
Salt River @ Blue Pt Bridge (Sep)	4.0	0.070	1.8	0.6
Verde River @ Beeline	3.9	0.122	3.2	0.4
AZ Canal above CAP Cross-connect	3.5	0.077	2.2	0.5
AZ Canal below CAP Cross-connect	3.5	0.077	2.2	0.5
AZ Canal at Highway 87	3.6	0.087	2.4	0.4
AZ Canal at Pima Rd.	3.7	0.090	2.4	0.4
AZ Canal at 56th St.	4.1	0.085	2.1	0.9
AZ Canal - Central Avenue	4.7	0.082	1.7	0.5
AZ Canal - Inlet to Glendale WTP	3.0	0.074	2.5	1.2
AZ Canal - Inlet to GreenwayWTP	not accessible			
South Canal below CAP Cross-connect	3.8	0.096	2.5	0.4
Head of the Tempe Canal	2.0	0.055	2.7	0.4
Tempe Canal - Inlet to Tempe's South Plant	0.6	0.015	2.6	2.6
Head of the Consolidated Canal	2.2	0.056	2.5	1.0
Middle of the Consolidated Canal	1.7	0.037	2.2	2.5
Chandler WTP – Inlet	1.1	0.026	2.4	4.2

Organics at the Water Treatment Plants

Table 2 - Water Treatment Plants –October 6, 2013

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN	DOC removal (%)
Union Hills Inlet	2.7	0.049	1.8	0.5	
Union Hills Treated	2.6	0.026	1.0	0.4	4
Tempe North Inlet	3.3	0.081	2.5	1.0	
Tempe North Plant Treated	2.4	0.035	1.5	0.7	28
Tempe South Inlet	0.6	0.015	2.6	2.6	
Tempe South Plant Treated	0.5	0.010	2.1	2.1	16
Greenway WTP Inlet	not accessible				
Greenway WTP Treated					
Glendale WTP Inlet	3.0	0.074	2.5	1.2	
Glendale WTP Treated	1.6	0.018	1.2	1.5	47
Anthem WTP Inlet	3.1	0.048	1.5	0.5	
Anthem WTP Treated	2.8	0.048	1.7	0.5	10
Chandler WTP Inlet	1.1	0.026	2.4	4.2	
Chandler WTP Treated	1.1	0.018	1.7	3.9	0

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.

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant (Sept)	Eplimnion	**<2.0**	**<2.0**	**<2.0**
Lake Pleasant (Sept)	Hypolimnion	**16.2**	**<2.0**	**<2.0**
Verde River @ Beeline		**4.9**	**13.5**	**<2.0**
Bartlett Reservoir	Epilimnion	**9.9**	**<2.0**	**<2.0**
Bartlett Reservoir	Epi-near dock	**15.0**	**<2.0**	**<2.0**
Bartlett Reservoir	Hypolimnion	**<2.0**	**<2.0**	**<2.0**
Salt River @ BluePt Bridge				
Saguaro Lake	Epilimnion	**9.5**	**2.1**	**<2.0**
Saguaro Lake	Epi - Duplicate	**9.2**	**<2.0**	**<2.0**
Saguaro Lake	Epi-near dock	**8.2**	**2.1**	**<2.0**
Saguaro Lake	Hypolimnion	**5.4**	**<2.0**	**<2.0**
Lake Havasu		**3.2**	**2.3**	**<2.0**
Verde River at Tangle Creek (Aug)		**4.2**	**2.5**	**<2.0**
Roosevelt at Salt River Inlet (Aug)		**<2.0**	**<2.0**	**<2.0**
Verde River at Tangle Creek (Aug)		**5.6**	**3.8**	**<2.0**
Roosevelt at Salt River Inlet		**<2.0**	**<2.0**	**<2.0**

Table 2 - Water Treatment Plants – October 7, 2013

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Union Hills Inlet	2.6	<2.0	<2.0
Union Hills Treated	2.5	<2.0	<2.0
Tempe North Inlet	12.7	6.4	<2.0
Tempe North Plant Treated	11.5	3.1	<2.0
Tempe South WTP	<2.0	<2.0	<2.0
Tempe South Plant Treated	<2.0	<2.0	<2.0
Anthem Inlet	2.6	<2.0	<2.0
Anthem Treated	2.2	<2.0	<2.0
Chandler Inlet	<2.0	<2.0	<2.0
Chandler Treated	<2.0	<2.0	<2.0
Greenway WTP Inlet			
Greenway WTP Treated			
Glendale WTP Inlet	4.3	<2.0	<2.0
Glendale WTP Treated	<2.0	<2.0	<2.0

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	2.6	3.5	<2.0
	Union Hills Inlet	2.6	<2.0	<2.0
	CAP Canal at Cross-connect	3.0	3.0	<2.0
AZ Canal	Salt River @ Blue Pt Bridge			
	Verde River @ Beeline	4.9	13.5	<2.0
	AZ Canal above CAP Cross-connect			
	AZ Canal below CAP Cross-connect	8.0	4.2	<2.0
	AZ Canal at Highway 87	9.9	4.6	<2.0
	AZ Canal at Pima Rd.	17.2	9.3	<2.0
	AZ Canal at 56th St.	22.3	13.7	<2.0
	AZ Canal - Central Avenue	20.7	10.0	<2.0
	AZ Canal - Inlet to Glendale WTP	4.3	<2.0	<2.0
	Head of the Consolidated Canal	3.7	13.1	<2.0
	Middle of the Consolidated Canal	2.0	<2.0	<2.0
	Head of the Consolidated Canal	<2.0	<2.0	<2.0
	Middle of the Consolidated Canal	<2.0	<2.0	<2.0
Canals	Tempe Canal - Inlet to Tempe's South Plant	<2.0	<2.0	<2.0
	Mesa Turnout	7.2	<2.0	<2.0
	Salt-Gila Pump	7.3	16.2	<2.0

BI-WEEKLY sampling data

Table 2 - Water Treatment Plants – September 23, 2013

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Union Hills Inlet			
Union Hills Treated			
Tempe North Inlet			
Tempe North Plant Treated			
Tempe South WTP	**<2.0**	**<2.0**	**<2.0**
Tempe South Plant Treated	**<2.0**	**<2.0**	**<2.0**
Anthem Inlet			
Anthem Treated			
Chandler Inlet	**2.7**	**<2.0**	**<2.0**
Chandler Treated	**<2.0**	**<2.0**	**<2.0**
Greenway WTP Inlet			
Greenway WTP Treated			
Glendale WTP Inlet	**4.2**	**<2.0**	**<2.0**
Glendale WTP Treated	**<2.0**	**<2.0**	**<2.0**
24th In	**15.6**	**5.4**	**<2.0**
24th Out	**<2.0**	**<2.0**	**<2.0**