REGIONAL WATER QUALITY NEWSLETTER

DATE: Report for October 2011

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

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

Sampling dates: October 3 & 4, 2011

SUMMARY: EVALUATION AND RECOMMENDATIONS

1. MIB levels are high in the Salt River water supply now being used – around 15 ng/L. MIB plus geosmin levels are above 10 ng/L – levels noticeable to consumers. There appears to be some production of MIB in the Canal from the Arizona Canal around 56th street to the North Tempe JM WTP. While the facility is removing MIB, levels are still elevated in the treated water. As previously observed through PAC addition, geosmin is removed more efficiently than MIB. The CAP system is now showing low levels of MIB (5 to 8 ng/L) for the first time this year.
2. The Salt and Verde River lakes are now thermally destratified and mixing with depth can occur, which often leads to blooms of predators of algae and their by-products.
3. Our **ANNUAL WORKSHOP** was held on September 30th with nearly 60 attendees (thanks for coming). Presentations from the meeting are posted on our website if you want to review them: http://enpub.fulton.asu.edu/pwest/tasteandodor.htm We discussed the focus areas for the next year:
   - Continue long term monitoring of MIB, geosmin throughout the system
   - Focus Organic monitoring in the watershed since most WTPs now have daily DOC records that can be accessed
   - Focus organic monitoring on molecular weights within WTPs, and relating different size fractions to DBP formation
   - Consider implementing quarterly sampling of wastewater tracers (like sucralose) in the watershed
   - Understand the when/if of impacts from the Wallow forest fire
4. As a follow-up to the workshop, results from the poll on the percentage of treated wastewater present in our drinking water supply is provided.

Quick Update of Water Supplies for October 2011
(during day of sampling – October 4, 2011)

Source	Trend in supply	Discharge to water supply system	Flow into SRP Canal System	**MIB** * Concentration (ng/L)	Dissolved organic carbon Concentration (mg/L) **
Salt River	Reservoirs at 81% full	1078 cfs	549 cfs into **Arizona Canal**	**20 ng/l [15 ng/L]**	5.0 mg/L
Verde River	Reservoirs At 31% full	125 cfs	682 cfs into **South Canal (90% Salt River Water)**	**23 ng/L [23 ng/L]**	3.7 mg/L
Colorado River	Reservoirs at near historic lows (Lake Pleasant is 37% full)	2400 cfs from CAP (Lake Pleasant NOT releasing water)	83 cfs of **CAP water** into Arizona Canal	**4 ng/L**	3.4 mg/L
Groundwater	Generally increasing due to recharge	90 cfs pumping by SRP	90 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
Data from the following websites:

- http://www.srpwater.com/dwr/
- http://www.cap-az.com/Operations/LakePleasantOps.aspx

Taste and Odor Data

MIB plus geosmin levels above 10 ng/L in finished water lead to noticeable earthy-musty odors by customers. Currently MIB+geosmin levels are above 10 ng/L in the canals.

Water Supply Sources

Reservoir Samples – October 5, 2011

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant (September 11)	Eplimnion	**<2.0**	**<2.0**	**<2.0**
Lake Pleasant (September 11)	Hypolimnion	**3.9**	**<2.0**	**<2.0**
Verde River @ Beeline		**8.1**	**5.7**	**2.2**
Bartlett Reservoir	Epilimnion	**23.1**	**3.5**	**2.7**
Bartlett Reservoir	Epi-near dock	**23**	**3.1**	**8.0**
Bartlett Reservoir	Hypolimnion	**3.0**	**7.9**	**6.1**
Salt River @ BluePt Bridge		**15.6**	**4.7**	**2.8**
Saguaro Lake	Epilimnion	**19.4**	**4.7**	**2.3**
Saguaro Lake	Epi - Duplicate	**21.0**	**5.4**	**3.7**
Saguaro Lake	Epi-near dock	**17.3**	**5.8**	**3.2**
Saguaro Lake	Hypolimnion	**10.9**	**2.9**	**<2.0**
Lake Havasu (September 11)		**<2.0**	**2.1**	**<2.0**
Verde River at Tangle Creek (August 11)		**33.5**	**3.5**	**<2.0**

The lakes are almost completely thermally destratified – which has lead to mixing with depth of MIB and geosmin, such that MIB and geosmin are exiting the reservoirs through the bottom release gates in Bartlett and Saguaro Lakes. This is leading to high MIB levels in the SRP system, as predicted last month. Fortunately, MIB also biodegrades in the reservoir at a rate of about 1 ng/L/day.

Thermal Stratification of the Verde and Salt River lakes are weak to non-existent and mixing with depth is occurring.

Bartlett	
Depth (ft)	Temp (°C)
0	24.1
15	24.1
30	24.1
45	24
60	20.1
75	19.1
90	18.4
105	17.6

Saguaro	
Depth (ft)	Temp (°C)
0	23.6
15	23.6
30	22.1
45	21.7
60	21.3
75	21.1
90	20.8

MIB and Geosmin at WTPs and in the Canals

Table - Water Treatment Plants – October 3, 2011

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Union Hills Inlet	3.5	5.3	7.4
Union Hills Treated	4.2	6.8	<2.0
Tempe North Inlet	29.1	19.8	4.4
Tempe North Plant Treated	11.8	4.5	<2.0
Tempe South WTP	3.6	2.0	<2.0
Tempe South Plant Treated	2.8	<2.0	<2.0
Anthem Inlet	4.5	3.7	39.1
Anthem Treated	4.6	3.8	<2.0
Chandler Inlet	5.8	3.8	4.1
Chandler Treated	10.1	5.5	3.4
Greenway WTP Inlet	4.8	2.9	<2.0
Greenway WTP Treated	6.8	3.6	3.8
Glendale WTP Inlet	13.4	11.1	2.3
Glendale WTP Treated	<2.0	<2.0	<2.0

Table - Canal Sampling –October 3, 2011

System	Sample Description			
CAP	Waddell Canal	4.7	5.6	19.7
	Union Hills Inlet	3.5	5.3	7.4
	CAP Canal at Cross-connect	3.1	3.2	4.2
	Salt River @ Blue Pt Bridge	15.6	4.7	2.8
	Verde River @ Beeline	8.1	5.7	2.2
AZ	AZ Canal above CAP Cross-connect			
Canal	AZ Canal below CAP Cross-connect	5.5	4.8	<2.0
	AZ Canal at Highway 87	11.4	4.9	5.8
	AZ Canal at Pima Rd.	11.6	5.7	<2.0
	AZ Canal at 56th St.	15.9	11.7	<2.0
	AZ Canal - Central Avenue	12.7	10.5	<2.0
	AZ Canal - Inlet to Glendale WTP	13.4	11.1	2.3
	Head of the Consolidated Canal	10.0	7.1	10.2
	Middle of the Consolidated Canal	10.0	4.9	8.0
South	South Canal below CAP Cross-connect	9.7	5.8	3.8
Tempe	Head of the Tempe Canal	12.7	6.8	5.5
Canals	Tempe Canal - Inlet to Tempe's South Plant	3.6	2.0	<2.0

There appears to be some production of MIB in the Canal from the Arizona Canal around 56th street to the North Tempe JM WTP. While the facility is removing MIB, levels are still elevated in the treated water. As previously observed through PAC addition, geosmin is removed more efficiently than MIB. The CAP system is now showing low levels of MIB (5 to 8 ng/L) for the first time this year.

Organic Matter Update

Organics in the Canal System

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Waddell Canal	3.1	0.0441	1.4	0.4
Anthem WTP Inlet	2.9	0.0424	1.5	0.4
Union Hills Inlet	3.1	0.0434	1.4	0.4
CAP Canal at Cross-connect	3.3	0.0437	1.3	0.4
Salt River @ Blue Pt Bridge	4.2	0.0751	1.8	0.3
Verde River @ Beeline	2.2	0.0473	2.2	0.3
AZ Canal below CAP Cross-connect	3.7	0.0654	1.7	0.3
AZ Canal at Highway 87	3.9	0.0692	1.8	0.2
AZ Canal at Pima Rd.	4.1	0.0710	1.7	0.3
AZ Canal at 56th St.	4.0	0.0708	1.8	0.3
AZ Canal - Central Avenue	4.0	0.0693	1.7	0.3
AZ Canal - Inlet to Glendale WTP	4.0	0.0727	1.8	0.3
AZ Canal - Inlet to GreenwayWTP	3.8	0.0702	1.8	0.3
South Canal below CAP Cross-connect	4.0	0.0721	1.8	0.3
Head of the Tempe Canal	4.1	0.0713	1.7	0.2
Tempe Canal - Inlet to Tempe's South Plant	3.6	0.0654	1.8	0.4
Head of the Consolidated Canal	4.1	0.0708	1.7	0.3
Middle of the Consolidated Canal	4.0	0.0731	1.8	0.3
Chandler WTP – Inlet	4.0	0.0701	1.8	0.3

Table - Reservoir Samples – October 03, 2011

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Lake Pleasant - September 2011	Eplimnion	3.38	0.05	1.4	0.37
Lake Pleasant - September 2011	Hypolimnion	3.57	0.04	1.2	0.29
Verde River @ Beeline		2.17	0.05	2.2	0.35
Bartlett Reservoir	Epilimnion	4.1	0.0498	1.2	0.2
Bartlett Reservoir	Hypolimnion	3.4	0.0823	2.4	0.3
Salt River @ BluePt Bridge		4.2	0.0751	1.8	0.3
Saguaro Lake	Epilimnion	5.1	0.0779	1.5	0.4
Saguaro Lake	Epi - Duplicate	4.9	0.0778	1.6	0.3
Saguaro Lake	Epi-near doc				
Saguaro Lake	Hypolimnion	5.3	0.0775	1.5	0.5
Verde River at Tangle	Aug-11	1.00	0.03	2.80	0.17
Havasu	Sep-11	2.89	0.04	1.5	0.48

Organics at the Water Treatment Plants

Table - Water Treatment Plants –October 03, 2011						
Sample Description	**DOC (mg/L)**	**UV254 (1/cm)**	**SUVA (L/mg-m)**	**TDN**		**DOC removal (%)**
Union Hills Inlet	**3.1**	**0.0434**	**1.4**	**0.4**		
Union Hills Treated	**2.7**	**0.0245**	**0.9**	**0.4**		**14**
Tempe North Inlet	**4.1**	**0.0713**	**1.8**	**0.3**		
Tempe North Plant Treated	**2.5**	**0.0321**	**1.3**	**0.6**		**39**
Tempe South WTP	**3.6**	**0.0654**	**1.8**	**0.4**		
Tempe South Plant Treated	**2.3**	**0.0267**	**1.2**	**0.4**		**36**
Greenway WTP Inlet	**3.8**	**0.0702**	**1.8**	**0.3**		
Greenway WTP Treated	**3.2**	**0.0350**	**1.1**	**0.3**		**16**
Glendale WTP Inlet	**4.0**	**0.0727**	**1.8**	**0.3**		
Glendale WTP Treated	**2.4**	**0.0268**	**1.1**	**0.3**		**40**
Anthem WTP Inlet	**2.9**	**0.0424**	**1.5**	**0.4**		
Anthem WTP Treated	**2.9**	**0.0393**	**1.4**	**0.4**		**2**
Chandler WTP Inlet	**4.0**	**0.0701**	**1.8**	**0.3**		
Chandler WTP Treated	**3.2**	**0.0479**	**1.5**	**0.2**		**20**

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)

Ask the Experts – Follow-up from the Workshop

At the workshop, before the presentations on wastewater in our watershed a short polling of a few questions was made. Below is how your set of experts responded. As you recall, our calculated estimates supported by Sucralose sampling was ~ 1% to 3% for the percentage of wastewater in CAP water and 0.2% to 0.8% in Salt and Verde River water, respectively. I thought it was interesting that people thought less water of wastewater origin was present in their home tap water than CAP water – does everyone really live in the SRP service area?