Regional Water Quality NEWSLETTER

DATE: Report for September 2009
Sampling conducted August 31 & Sept 1, 2009
A Phoenix, Tempe, Glendale, Peoria, CAP, SRP – ASU Regional Water Quality Partnership

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

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SUMMARY: EVALUATION AND RECOMMENDATIONS

1. MIB plus geosmin levels above 10 ng/L in finished water lead to noticeable earthy-musty odors by customers. There are high levels of MIB (28 ng/L) near the surface of Saguaro Lake and 40 ng/L in Bartlett Lake; at deeper depths in the lakes the MIB concentrations are much lower. WTPs are experiencing MIB and Geosmin levels of 5 to 10 ng/L, each (10 to 20 ng/L of MIB plus geosmin) and treated waters contain < 10 ng/L of either Taste and Odor compound.
2. **Annual Regional Water Quality Workshop: Friday September 18 (8:30-11:30 am) in Phoenix City Hall Assembly Room A (**200 W Washington St)
3. SRP will switch to the Verde River for 1 week (9/18-9/25) and this may affect T&O and DBP levels in the SRP Canals.
4. Data for Pharmaceuticals and personal care products in swimming/recreational areas detect their presence up to 500 ng/L, and are mostly skin-applied products (sunscreen, soap, insect repellent) rather than orally taken medicines.

Table 1
SRP/CAP OPERATIONS - Values in cfs, for August 31, 2009

System	SRP Diversions	CAP
Arizona Canal	751	0
South Canal	809	0
Pumping	157	0
Total	1717	0

- **SRP is releasing water from both Verde and Salt River Systems**. Salt River release from Saguaro Lake: 1605 cfs; Verde River release from Bartlett Lake: 139 cfs.

From September 18-25th SRP will switch over to 100% Verde River water. They will do this to repair some equipment. This will change water quality in the SRP canal system.

During this period we plan to conduct intensive sampling to test the hypothesis that changing ionic strength (salt composition) in the Canals will result in a release of MIB and geosmin by organisms attached to the canal walls. The following locations will be monitored: Location: AZ canal at :Beeline, Pima, 56th, Tempe N plant, 24th Street WTP, Central, and Deer Valley WTP. We would appreciate any data you obtain during this period too.

The Verde River water has a lower DOC concentration than the Salt River. Therefore, the switch will affect DBP formation for ~ 1 week. THM formation should decrease dramatically while using Verde River water.

Table 4 - Reservoir Samples – August 31, 2009

Reservoir sampling will be conducted only monthly. CAP is sampling Lake Pleasant on slightly different days than the other reservoirs.

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN (mgN/L)
Lake Pleasant - August 2009	Eplimnion	3.18	0.045	1.41	0.51
Lake Pleasant	Hypolimnion		0.042		0.33
Verde River @ Beeline		2.51	0.059	2.33	0.26
Bartlett Reservoir	Epilimnion	4.39	0.068	1.55	0.42
Bartlett Reservoir	Hypolimnion	4.15	0.098	2.36	0.59
Salt River @ BluePt Bridge		4.52	0.097	2.15	0.39
Saguaro Lake	Epilimnion	5.37	0.104	1.93	0.41
Saguaro Lake	Epi - Duplicate	5.74	0.105	1.83	0.49
Saguaro Lake	Hypolimnion	5.92	0.114	1.92	0.71
Verde River at Tangle	Jul-09	1.25	0.033	2.65	0.16
Havasu	Augst 2009	5.19	0.042	0.81	0.56

Table 2 - Water Treatment Plants – Aug 31, 2009

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
24th Street WTP Inlet	**7.1**	**9.7**	**<2.0**
24th Street WTP Treated	**4.1**	**2.7**	**<2.0**
Deer Valley Inlet	**6.9**	**9.5**	**<2.0**
Deer Valley WTP Treated	**7.6**	**9.9**	**<2.0**
Val Vista Inlet	**8.1**	**3.7**	**<2.0**
Val Vista WTP Treated –East	**5.0**	**<2.0**	**<2.0**
Val Vista WTP Treated -West	**6.0**	**<2.0**	**<2.0**
Union Hills Inlet	**4.0**	**<2.0**	**<2.0**
Union Hills Treated	**4.0**	**<2.0**	**<2.0**
Tempe North Inlet	**8.2**	**10.9**	**<2.0**
Tempe North Plant Treated	**5.4**	**4.3**	**<2.0**
Tempe South WTP	**5.6**	**2.3**	**<2.0**
Tempe South Plant Treated	**3.0**	**<2.0**	**<2.0**
Greenway WTP Inlet	**<2.0**	**<2.0**	**<2.0**
Greenway WTP Treated	**<2.0**	**<2.0**	**<2.0**
Glendale WTP Inlet	**7.5**	**12.7**	**<2.0**
Glendale WTP Treated	**<2.0**	**<2.0**	**<2.0**
Glendale WTP Treated (Lab)			

MIB plus geosmin levels above 10 ng/L in finished water lead to noticeable earthy-musty odors by customers. Currently MIB+geosmin levels are near or slightly above 10 ng/L in several WTPs. However, treatment with PAC or GAC is bringing these levels down to less noticeable levels.

Table 3 - Canal Sampling – Aug 31, 2009

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	<2.0	<2.0	<2.0
	Union Hills Inlet	4.0	<2.0	<2.0
	CAP Canal at Cross-connect			
	Salt River @ Blue Pt Bridge	7.9	2.7	<2.0
	Verde River @ Beeline	6.7	3.7	<2.0
AZ	AZ Canal above CAP Cross-connect	8.7	3.9	<2.0
Canal	AZ Canal below CAP Cross-connect	8.7	3.9	<2.0
	AZ Canal at Highway 87	8.6	5.5	<2.0
	AZ Canal at Pima Rd.	8.5	9.5	<2.0
	AZ Canal at 56th St.	8.0	10.2	<2.0
	AZ Canal - Inlet to 24th Street WTP	7.1	9.7	<2.0
	AZ Canal - Central Avenue	6.9	10.2	<2.0
	AZ Canal - Inlet to Deer Valley WTP	6.9	9.5	<2.0
	AZ Canal - Inlet to Glendale WTP	7.5	12.7	<2.0
South	South Canal below CAP Cross-connect	8.7	3.4	<2.0
and	South Canal at Val Vista WTP	8.1	3.7	<2.0
Tempe	Head of the Tempe Canal	6.8	4.0	<2.0
Canals	Tempe Canal - Inlet to Tempe's South Plant	5.6	2.3	<2.0

Table 4 - Reservoir Samples – Sept 1, 2009

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant (July09)	Eplimnion	<2.0	<2.0	<2.0
Lake Pleasant (July09)	Hypolimnion	<2.0	<2.0	<2.0
Lake Pleasant (Aug09)	Eplimnion	2.3	<2.0	<2.0
Lake Pleasant (Aug09)	Hypolimnion	2.4	<2.0	<2.0
Verde River @ Beeline		6.7	3.7	<2.0
Bartlett Reservoir	Epilimnion	32.7	<2.0	<2.0
Bartlett Reservoir	Epi-near dock	46.6	<2.0	<2.0
Bartlett Reservoir	Hypolimnion	<2.0	<2.0	<2.0
Salt River @ BluePt Bridge		7.9	2.7	<2.0
Saguaro Lake	Epilimnion	27.0	5.8	2.6
Saguaro Lake	Epi - Duplicate	27.8	5.4	<2.0
Saguaro Lake	Epi-near dock	20.2	5.9	<2.0
Saguaro Lake	Hypolimnion	8.2	2.1	<2.0
Havasu (July09)		<2.0	<2.0	<2.0
Havasu (Aug09)		<2.0	<2.0	<2.0
Verde River at Tangle Creek				

Table 2 - Water Treatment Plants – August 31, 2009

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN		DOC removal (%)
24th Street WTP Inlet	4.58	0.098	2.14	0.35		
24th Street WTP Treated	2.74	0.038	1.37	0.30		40
Deer Valley Inlet	4.40	0.094	2.13	0.72		
Deer Valley WTP Treated	2.91	0.039	1.35	0.58		34
Val Vista Inlet	4.59	0.097	2.11	0.43		
Val Vista WTP Treated –East	2.73	0.039	1.42	0.34		41
Val Vista WTP Treated -West	2.65	0.039	1.45	0.27		42
Union Hills Inlet	3.43	0.043	1.26	0.45		
Union Hills Treated	2.58	0.024	0.92	0.34		25
Tempe North Inlet	4.58	0.097	2.11	0.35		
Tempe North Plant Treated	3.32	0.050	1.50	0.30		28
Tempe South WTP	4.46	0.095	2.13	0.35		
Tempe South Plant Treated	3.19	0.050	1.56	0.30		28
Greenway WTP Inlet	3.56	0.077	2.16	1.68		
Greenway WTP Treated	3.16	0.029	0.92	1.34		11
Glendale WTP Inlet	4.42	0.092	2.07	0.94		
Glendale WTP Treated	2.30	0.025	1.08	1.06		48

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)

Organic Matter Status In the Canals

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Waddell Canal	**3.09**	**0.044**	**1.43**	**0.50**
Union Hills Inlet	**3.43**	**0.043**	**1.26**	**0.45**
CAP Canal at Cross-connect				
Salt River @ Blue Pt Bridge	**4.52**	**0.097**	**2.15**	**0.39**
Verde River @ Beeline	**2.51**	**0.059**	**2.33**	**0.26**
AZ Canal above CAP Cross-connect	**4.52**	**0.098**	**2.17**	**0.35**
AZ Canal below CAP Cross-connect	**4.61**	**0.098**	**2.13**	**0.40**
AZ Canal at Highway 87	**4.59**	**0.098**	**2.14**	**0.33**
AZ Canal at Pima Rd.	**4.69**	**0.098**	**2.08**	**0.32**
AZ Canal at 56th St.	**4.60**	**0.098**	**2.14**	**0.35**
AZ Canal - Inlet to 24th Street WTP	**4.58**	**0.098**	**2.14**	**0.35**
AZ Canal - Central Avenue	**4.57**	**0.099**	**2.16**	**0.35**
AZ Canal - Inlet to Deer Valley WTP	**4.40**	**0.094**	**2.13**	**0.72**
AZ Canal - Inlet to Glendale WTP	**4.42**	**0.092**	**2.07**	**0.94**
AZ Canal - Inlet to Greenway WTP	**3.56**	**0.077**	**2.16**	**1.68**
South Canal below CAP Cross-connect	**4.49**	**0.098**	**2.18**	**0.35**
South Canal at Val Vista WTP	**4.59**	**0.097**	**2.11**	**0.43**
Head of the Tempe Canal	**4.51**	**0.097**	**2.16**	**0.34**
Tempe Canal - Inlet to Tempe's South Plant	**4.46**	**0.095**	**2.13**	**0.35**
Chandler WTP – Inlet				

Pharmaceuticals and Person Care Products (PPCPs) in Arizona Waters

This 2 year project has been completed and our final report will be available soon. Last year we observed hourly trends in PPCPs in the Salt River over the weekends which would flow to WTPs. To validate these observations we repeated sampling in June 2009. Similar results were obtained. Data for sunscreen products (Oxybenzone) are shown in the table below. Oxybenzone would wash off of skin into the water. Triclosan, which is in soaps also showed some increased in concentration within the Salt River over the course the day we monitored. Concentrations of pharmaceuticals which would have been excreted were < 10 ng/L and showed less variation of the course of the day (data not shown).

Sample Name	Oxybenzone	Triclosan
Salt River site1	99.6	0.7
Salt River site2	25.7	1.1
Salt River site4 9:00	14.2	0.7
Salt River site4 10:00	25.6	0.0
Salt River site4 11:00	18.9	0.0
Salt River site4 12:00	23.4	1.3
Salt River site4 13:00	150.0	0.5
Salt River site4 13:00-D	115.0	0.1
Salt River site4 14:00	296.0	1.3
Salt River site4 15:00	480.0	1.7
Salt River site4 16:00	582.0	4.5
Salt River site4 17:00	459.0	2.5
Salt River site4 18:00	429.0	2.0
Salt River site4 18:00-D	271.0	1.8

Similar results for oxybenzone were observed at Slide Rock recreational area on Oak Creek in Sedona, AZ. Oxybenzone concentrations were up to 500 ng/L. Later in the day we observed elevated levels of Caffeine and artificial sweetners (up to 260 ng/L) and DEET insect repellent (up to 100 ng/L), but low levels of orally taken pharmaceuticals. Triclosan concentrations were up to 56 ng/L. It appears most of the sources for these PPCPs are from skin-applied products.