REGIONAL WATER QUALITY NEWSLETTER

DATE: Report for July 12, 2006
Samples Collected on July 13, 2006
From the Phoenix, Tempe, 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. Geosmin concentrations in the upper water column **of Saguaro Lake are 300 to 1000 ng/L!!!** The geosmin concentration is still low in the bottom of the reservoir where water is released, but this will probably change rapidly over the next 30 days. Expect very high geosmin concentrations over the next month if Salt River water continues to be used.
2. **ASU will conduct additional sampling at the end of July to monitor Saguaro Lake**
   WTPs on the SRP system are experiencing low MIB but geosmin concentrations of 6 to 18 ng/L.
3. MIB and geosmin in WTP effluents remain low – due in part to PAC addition for DBP control.
4. DOC concentrations remain quite high in the SRP system (~ 4.5 mg/L) and only slightly lower in the CAP system (~3.5 mg/L)
5. SRP funds two new related projects at ASU on algae and DBPs

Table 1 Summary of WTP Operations

	Union Hills	24th Street WTP	N.Tempe J.G. Martinez	Deer Valley	Greenway WTP	Val Vista	South Tempe	Chandler WTP
Location	**CAP**	**Arizona Canal System**				**South Canal System**		
PAC Type and Dose	No	Norit 20B until Tuesday afternoon	Calgon WPH-C / 20ppm	21.8 ppm	No		Calgon WPH-C, AT 10 ppm	
Copper Sulfate	No	No	No	No	No		No	
PreOxidation	No	No	No	No	2.0 mg/L		No	
Alum Dose Alkalinity pH	12 ppm[1] 138 ppm 7.3	50 ppm 134 ppm 6.75	39 ppm 130 ppm 7.35	55ppm 90 ppm 6.7	10 ppm 139 ppm 7.5		22.3 ppm 134 ppm 7.67	
WTP Comments		Cleaning out Norit PAC and will try Calgon WPH						
Raw water DOC % DOC removal[2]	21%	37%	28%	37%	11%	41%	7%	
Process recommendations							Although PAC dose is high and alum dose high it appears very little DOC or Geosmin is removed – we need to discuss sampling locations	

[1] **Ferric chloride instead of alum**

[2] Calculated based upon influent and filtered water DOC

MONITORING RESULTS

Table 2 - Water Treatment Plants – July 11, 2006

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
24th Street WTP Inlet	**2.2**	**10.4**	**9.7**
24th Street WTP Treated	**<2.0**	**4.5**	**<2.0**
Deer Valley Inlet	**4.7**	**15.9**	**17.2**
Deer Valley WTP Treated	**<2.0**	**<2.0**	**<2.0**
Val Vista Inlet	**<2.0**	**15.7**	**3.7**
Val Vista WTP Treated –East	**<2.0**	**6.4**	**<2.0**
Val Vista WTP Treated -West	**2.0**	**7.6**	**3.6**
Union Hills Inlet	**<2.0**	**<2.0**	**4.6**
Union Hills Treated	**<2.0**	**2.3**	**<2.0**
Tempe North Inlet	**<2.0**	**15.2**	**7.8**
Tempe North Plant Treated	**<2.0**	**3.5**	**2.6**
Tempe South WTP	**<2.0**	**6.1**	**<2.0**
Tempe South Plant Treated	**<2.0**	**5.5**	**<2.0**
Chandler WTP Inlet	**3.5**	**10.8**	**<2.0**
Chandler WTP Treated	**2.9**	**7.2**	**<2.0**
Greenway WTP Inlet	**<2.0**	**13.3**	**6.2**
Greenway WTP Treated	**<2.0**	**4.9**	**5.5**

Table 3 - Canal Sampling – July 11, 2006

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	**2.4**	**<2.0**	**12.4**
	Union Hills Inlet	**<2.0**	**<2.0**	**4.6**
	CAP Canal at Cross-connect	**<2.0**	**3.9**	**7.7**
AZ Canal	Salt River @ Blue Pt Bridge	**2.5**	**18.4**	**6.5**
	Verde River @ Beeline	**19.6**	**10.7**	**22.0**
	AZ Canal above CAP Cross-connect	**<2.0**	**4.4**	**6.3**
	AZ Canal below CAP Cross-connect	**3.5**	**14.3**	**10.6**
	AZ Canal at Highway 87	**4.0**	**13.5**	**7.5**
	AZ Canal at Pima Rd.	**<2.0**	**13.7**	**9.3**
	AZ Canal at 56th St.	**<2.0**	**13.7**	**10.2**
	AZ Canal - Inlet to 24th Street WTP	**2.2**	**10.4**	**9.7**
	AZ Canal - Central Avenue	**<2.0**	**12.4**	**25.4**
	AZ Canal - Inlet to Deer Valley WTP	**4.7**	**15.9**	**17.2**
	AZ Canal - Inlet to Greenway WTP	**<2.0**	**13.3**	**6.2**
South and Tempe Canals	South Canal below CAP Cross-connect	**2.7**	**16.2**	**8.7**
	South Canal at Val Vista WTP	**<2.0**	**15.7**	**3.7**
	Head of the Tempe Canal	**<2.0**	**15.8**	**8.2**
	Tempe Canal - Inlet to Tempe's South Plant	**<2.0**	**6.1**	**<2.0**
	Chandler WTP – Inlet	**3.5**	**10.8**	**<2.0**

Table 4 - Reservoir Samples – July 11, 2006

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant	Eplimnion	<2.0	<2.0	<2.0
Lake Pleasant	Hypolimnion	7.8	2.5	6.8
Verde River @ Beeline		19.6	10.7	22.0
Bartlett Reservoir	Epilimnion	19.4	<2.0	3.6
Bartlett Reservoir	Epi-near dock	60.3	2.4	3.4
Bartlett Reservoir	Hypolimnion	3.0	26.3	3.3
Salt River @ BluePt Bridge		2.5	18.4	6.5
Saguaro Lake	Epilimnion	3.0	368.2	9.3
Saguaro Lake	Epi - Duplicate	3.1	375.1	9.1
Saguaro Lake	Epi-near doc	<2.0	1130	20.7
Saguaro Lake	Hypolimnion	<2.0	2.9	3.1
Verde River at Tangle		21.2	18.4	12.5
Havasu		<2.0	2.1	6.7

YES – GEOSMIN CONCENTRATIONS ARE ACTUALLY 300 TO 1100 NG/L IN SAGUARO LAKE!!

ASU will conduct additional sampling at the end of July to monitor Saguaro Lake

Table 5 - SRP/CAP OPERATIONS

Values in cfs, for July 12, 2006

System	SRP Diversions	CAP
Arizona Canal	851	135
South Canal	816	0
Pumping	193	0
Total	1860	135

SRP is releasing water from both Verde and Salt River Systems. Salt River release from Saguaro Lake: 1567 cfs; Verde River release from Bartlett Lake: 119 cfs.

Operations and Maintenance Update

7/11/2006

WADDELL RELEASE SCHEDULE

		% Flow	Date	Time
Current Waddell Releases	2500 cfs	84%	07/11/06	14:00
Current Pass-Thru Flow	470 cfs	16%	07/11/06	14:00
New Waddell Releases	2600 cfs	85%	07/12/06	06:00
New Pass-Thru Flow	470 cfs	15%	07/12/06	06:00
New Waddell Releases				
New Pass-Thru Flow				
New Waddell Releases				
New Pass-Thru Flow				

SPECIAL NOTES / AQUEDUCT ACTIVITIES

7/12/2006 06:00 Due to an increase in the south load Waddell releases will increase.

ORGANIC MATTER DATA

DOC concentrations remain quite high in the SRP system (~ 4.5 mg/L) and only slightly lower in the CAP system (~3.5 mg/L)

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA	TDN (mg/L)
24th Street WTP Inlet	**4.61**	**0.0921**	**2.0**	**0.740**
24th Street WTP Treated	**2.89**	**0.0303**	**1.0**	**0.413**
Deer Valley Inlet	**4.47**	**0.0907**	**2.0**	**0.255**
Deer Valley WTP Treated	**2.83**	**0.0246**	**0.9**	**0.228**
Val Vista Inlet	**4.67**	**0.1032**	**2.2**	**0.239**
Val Vista WTP Treated –East	**2.77**	**0.0376**	**1.4**	**0.183**
Val Vista WTP Treated -West	**2.75**	**0.0353**	**1.3**	**0.179**
Union Hills Inlet	**3.60**	**0.0563**	**1.6**	**0.383**
Union Hills Treated	**2.86**	**0.0279**	**1.0**	**0.353**
Tempe North Inlet	**4.47**	**0.0897**	**2.0**	**0.457**
Tempe North Plant Treated	**3.23**	**0.0401**	**1.2**	**0.142**
Tempe South WTP	**4.42**	**0.0975**	**2.2**	**0.244**
Tempe South Plant Treated	**4.10**	**0.0642**	**1.6**	**0.295**
Chandler WTP Inlet				
Chandler WTP Treated				
Greenway WTP Inlet	**4.40**	**0.0861**	**2.0**	**0.497**
Greenway WTP Treated	**3.91**	**0.0302**	**0.8**	**0.965**

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA	TDN (mg/L)
Lake Pleasant	Eplimnion	**3.50**	**0.0495**	**1.4**	**0.356**
Lake Pleasant	Hypolimnion	**4.18**	**0.0443**	**1.1**	**0.243**
Verde River @ Beeline		**1.72**	**0.0236**	**1.4**	**0.209**
Bartlett Reservoir	Epilimnion	**2.38**	**0.0285**	**1.2**	**0.110**
Bartlett Reservoir	Hypolimnion	**5.10**	**0.0994**	**1.9**	**0.521**
Salt River @ BluePt Bridge		**4.81**	**0.1019**	**2.1**	**0.367**
Saguaro Lake	Epilimnion	**5.70**	**0.1005**	**1.8**	**0.723**
Saguaro Lake	Epi - Duplicate	**5.62**	**0.1011**	**1.8**	**0.370**
Saguaro Lake	Hypolimnion	**2.85**	**0.0494**	**1.7**	**0.167**
Verde River at Tangle		**1.19**	**0.0275**	**2.3**	**0.133**
Havasu		**2.89**	**0.0275**	**1.0**	**0.458**

ADDITIONAL INFORMATION

I. Research initiated under the Regional Water Quality project lead to AwwaRF funding and now the final report is published:

> http://www.imakenews.com/awwarf2/e_article000611625.cfm?x=b11,0,w
> Five-Minute Interview: Paul Westerhoff on Organic Nitrogen
> AwwaRF asked Paul Westerhoff, Ph.D, PE, of Arizona State University to discuss *Organic Nitrogen in Drinking Water and Reclaimed Wastewater* (order # 91116, project #2900). Westerhoff was principal investigator on this project, which sought to develop accurate dissolved organic nitrogen (DON) quantification methods and measure DON concentrations in raw and finished drinking waters and reclaimed wastewaters.

II. Salt River Project funds two ASU studies starting in July 2006:

1. Molecular and Cytological Approaches to Determine Sources of Biotoxins in the Salt River Project Water Supply System (Qiang Hu & Milt Sommerfeld)

2. Predicting Organic Carbon and Disinfection ByProduct Precursors in Metro-Phoenix Surface Water Reservoirs (Paul Westerhoff)

   This project will conduct laboratory experiments on water from the three terminal reservoirs (Bartlett Lake, Saguaro Lake, Lake Pleasant) and use the data to calibrate models for municipal users of water (DOC removal models, DBP formation models). Such models will be useful in years to come for SRP to decide with the cities when certain reservoir water qualities are particular troublesome or desirable to assist cities in complying with DBP regulations. Specific objectives include:

   - To conduct coagulation jar tests with water from each reservoir during different seasons to reflect variable hydrologic conditions and processes that affect DOC and DBP precursors (e.g., algae growth cycles, runoff, thermal stratification).
   - To conduct DBP formation tests on water before and after coagulation tests
   - To calibrate existing DOC removal and DBP formation models using experimental data and field data from City of Phoenix water treatment plants. This data has already been provided to ASU as part of the ongoing Regional Water Quality Project which ASU leads, in partnership with Phoenix, Tempe, Peoria, Chandler, CAP, and SRP.

III. A New Environmental Friendly Oxidant

Research literature suggests that ferrate (FeO_4^-) may be an environmentally friendly oxidant. ASU has conducted preliminary experiments with ferrate as an oxidant/coagulant with the expectation that it may both removed DOC and oxidize DBP precursors. Preliminary experiments confirm it removes DOC, but on a mgFe/L basis is equivalent to ferric chloride. Experiments will continue to explore this potentially new treatment process.