Regional Water Quality NEWSLETTER

DATE: Report for November 2007

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

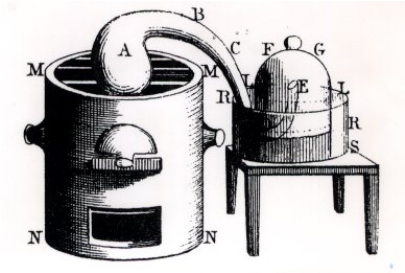
1. SRP has shifted over to releasing nearly 100% Verde River water and <2% of Salt River water. There is no a considerable amount of CAP water entering the SRP canal systems (see Table 5)
2. Because the Salt River system has higher organic carbon concentrations than the Verde River or CAP systems, the TOC concentrations in the SRP service area are considerably lower now that Verde River and CAP water are being used. Consequently, the disinfection byproduct formation should be lower now than one month ago.
3. MIB and geosmin concentrations are less than 10 ng/L throughout most of the water supply system.
4. Data is reported on the occurrence of pharmaceuticals and personal care products in our watersheds based upon data we are collect for a new project.
5. A section on "where does our **TURBIDITY** come from" identifies 4 sources of turbidity and approaches to develop an early warning system.

Meeting Announcement

WTP OPERATORS FORUM

Tuesday, Nov 27th[th]
9am-11am
SRP PERA CLUB
1 E. Continental Drive
Tempe, Arizona

TOPIC: SRP & CAP WATER QUALITY PROGRAMS



Just where and when do we sample?
How can you get the data? What new sites or parameters would you like to see?
Join us to discuss what we know about your raw water supply and what we need to learn!!
Also, a brief history of SRP, plus time for networking and refreshments.

Please RSVP by Nov 16 to
Gregg Elliott, SRP 602-236-5545 Gregg.Elliott@srpnet.com

Table 2 - Water Treatment Plants – November16, 2007

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
24th Street WTP Inlet	**3.0**	**<2.0**	**<2.0**
24th Street WTP Treated	**<2.0**	**<2.0**	**<2.0**
Deer Valley Inlet	**3.2**	**4.1**	**<2.0**
Deer Valley WTP Treated	**3.1**	**2.6**	**<2.0**
Union Hills Inlet	**<2.0**	**<2.0**	**<2.0**
Union Hills Treated	**<2.0**	**<2.0**	**<2.0**
Tempe North Inlet	**<2.0**	**2.9**	**<2.0**
Tempe North Plant Treated	**3.1**	**4.9**	**<2.0**
Glendale WTP Inlet	**3.4**	**3.5**	**<2.0**
Glendale WTP Treated	**<2.0**	**<2.0**	**<2.0**
Glendale WTP Treated (Lab)			

Table 3 - Canal Sampling – November 16, 2007

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	**<2.0**	**2.3**	**2.7**
	Union Hills Inlet	**<2.0**	**<2.0**	**<2.0**
	CAP Canal at Cross-connect	**<2.0**	**<2.0**	**<2.0**
AZ Canal	Salt River @ Blue Pt Bridge	**6.7**	**3.5**	**<2.0**
	Verde River @ Beeline	**3.3**	**3.6**	**<2.0**
	AZ Canal above CAP Cross-connect	**7.2**	**2.2**	**2.4**
	AZ Canal below CAP Cross-connect	**3.0**	**<2.0**	**<2.0**
	AZ Canal at Highway 87	**4.2**	**<2.0**	**<2.0**
	AZ Canal at Pima Rd.	**2.2**	**2.7**	**<2.0**
	AZ Canal at 56th St.	**2.2**	**2.3**	**<2.0**
	AZ Canal - Inlet to 24th Street WTP	**3.0**	**<2.0**	**<2.0**
	AZ Canal - Central Avenue	**2.8**	**3.2**	**<2.0**
	AZ Canal - Inlet to Deer Valley WTP	**3.2**	**4.1**	**<2.0**
	AZ Canal - Inlet to Glendale WTP	**3.4**	**3.5**	**<2.0**
South and Tempe Canals	South Canal below CAP Cross-connect	**3.7**	**<2.0**	**<2.0**
	South Canal at Val Vista WTP			
	Head of the Tempe Canal	**2.1**	**2.3**	**<2.0**
	Tempe Canal - Inlet to Tempe's South Plant			
	Chandler WTP – Inlet			

Table 4 - Reservoir Samples – November 13, 2007

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant (6Nov07)	Eplimnion	**9.7**	**<2.0**	**<2.0**
Lake Pleasant (6Nov07)	Hypolimnio	**11.1**	**<2.0**	**<2.0**
Verde River @ Beeline		**3.3**	**3.6**	**<2.0**
Bartlett Reservoir	Epilimnion	**7.9**	**<2.0**	**2.6**
Bartlett Reservoir	Epi-near dock	**6.0**	**<2.0**	**5.1**
Bartlett Reservoir	Hypolimnio	**4.4**	**<2.0**	**<2.0**
Salt River @ BluePt Bridge		**6.7**	**3.5**	**<2.0**
Saguaro Lake	Epilimnion	**11.1**	**<2.0**	**<2.0**
Saguaro Lake	Epi - Duplicate	**11.2**	**<2.0**	**<2.0**
Saguaro Lake	Epi-near doc	**8.3**	**3.9**	**<2.0**
Saguaro Lake	Hypolimnio	**9.9**	**<2.0**	**<2.0**
Verde River at Tangle (31Oct07)		**<2.0**	**4.2**	**<2.0**
Havasu (6Nov07)		**<2.0**	**<2.0**	**<2.0**

Table 5 - SRP/CAP OPERATIONS
Values in cfs, for November 15, 2007

System	SRP Diversions	CAP
Arizona Canal	484	322
South Canal	389	205
Pumping	195	0
Total	1068	527

SRP is releasing water from both Verde and Salt River Systems. Salt River release from Saguaro Lake: 8 cfs; Verde River release from Bartlett Lake: 200 cfs.

Table 6 - Water Treatment Plants – November 15, 2007

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN	DOC removal (%)
24th Street WTP Inlet	2.78	0.044	1.6	0.632	
24th Street WTP Treated	2.16	0.023	1.1	0.633	22
Deer Valley Inlet	2.73	0.044	1.6	0.612	
Deer Valley WTP Treated	2.27	0.028	1.2	0.589	17
Val Vista Inlet					
Val Vista WTP Treated –East					
Val Vista WTP Treated -West					
Union Hills Inlet	2.86	0.041	1.43	0.629	
Union Hills Treated	2.30	0.020	0.87	0.533	20
Tempe North Inlet	2.80	0.043	1.54	0.746	
Tempe North Plant Treated	2.37	0.026	1.10	0.662	15
Tempe South WTP					
Tempe South Plant Treated					
Glendale WTP Inlet	2.95	0.046	1.6	0.639	
Glendale WTP Treated	2.66	0.014	0.5	1.644	10

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)

Table 7 - Canal Sampling – November 15, 2007

System	Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
CAP	Waddell Canal	3.04	0.040	1.3	0.645
	Union Hills Inlet	2.86	0.041	1.43	0.629
	CAP Canal at Cross-connect	2.77	0.039	1.41	0.605
AZ Canal	Salt River @ Blue Pt Bridge	3.97	0.086	2.17	0.333
	Verde River @ Beeline	2.56	0.047	1.84	0.504
	AZ Canal above CAP Cross-connect	2.17	0.061	2.81	0.490
	AZ Canal below CAP Cross-connect	2.56	0.044	1.72	0.507
	AZ Canal at Highway 87	2.08	0.058	2.79	0.447
	AZ Canal at Pima Rd.	2.72	0.044	1.62	0.914
	AZ Canal at 56th St.	2.85	0.044	1.54	0.598
	AZ Canal - Inlet to 24th Street WTP	2.78	0.044	1.58	0.632
	AZ Canal - Central Avenue	2.81	0.044	1.57	0.625
	AZ Canal - Inlet to Deer Valley WTP	2.73	0.044	1.61	0.612
	AZ Canal - Inlet to Glendale WTP	2.95	0.046	1.56	0.639
South and Tempe Canals	South Canal below CAP Cross-connect	2.95	0.043	1.46	0.555
	South Canal at Val Vista WTP				
	Head of the Tempe Canal	2.22	0.039	1.76	0.473
	Tempe Canal - Inlet to Tempe's South Plant				
	Chandler WTP – Inlet				

Table 8 - Reservoir Samples – November 15, 2007

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Lake Pleasant	Eplimnion	3.23	0.043	1.33	0.412
Lake Pleasant	Hypolimnion	3.28	0.043	1.31	0.413
Verde River @ Beeline		2.56	0.047	1.84	0.504
Bartlett Reservoir	Epilimnion	2.82	0.071	2.52	0.431
Bartlett Reservoir	Epi-near dock				
Bartlett Reservoir	Hypolimnion	3.24	0.073	2.25	0.552
Salt River @ BluePt Bridge		3.97	0.086	2.17	0.333
Saguaro Lake	Epilimnion	5.27	0.094	1.78	0.618
Saguaro Lake	Epi - Duplicate	5.41	0.093	1.72	0.614
Saguaro Lake	Epi-near doc				
Saguaro Lake	Hypolimnion	5.34	0.094	1.76	0.614
Verde River at Tangle		0.93	0.021	2.26	0.198
Havasu		2.85	0.037	1.30	0.554

First Samples from New Pharmaceutical Project

The first set of pharmaceuticals and personal care products (PPCPs) in the SRP watershed was collected in September 2007 and results are summarized below for several sites. The presence of caffeine, insect repellent (DEET) or sunscreen (oxybenzone) may be artifacts from sampling. Most of the other compounds occur at less than 10 ng/L. Compound concentrations are slightly higher in the CAP system compared to Verde River at highway 87. These are very low concentrations (ng/L) – on the same order of magnitude as MIB and geosmin – and pose no human or ecological significance at these levels. Additional sampling is ongoing and will be reported over the coming months.

Table 7 – Presence of Pharmaceuticals in our waters in parts per trillion (ng/L) for September 2007

	WTP INLET	WTP OUTLET	Hwy 87	AZ canal below CAP	CAP canal at cross-connect
Ibuprofen	N/A	N/A	N/A	N/A	N/A
Naproxen	N/A	2.87	N/A	3.02	3.16
Warfarin	0.66	N/A	N/A	<0	<0
Dilantin	N/A	0.62	1.08	0.75	2.19
Triclosan	N/A	4.78	8.62	N/A	N/A
Diclofenac	N/A	0.71	N/A	N/A	N/A
2,4,5-T	<0	1.11	<0	N/A	<0
2,4-DCPAA	<0	<0	<0	<0	<0
Acetaminophen	N/A	N/A	N/A	N/A	N/A
Caffine	5.65	4.76	9.73	4.75	156.00
Carbamazepine	<0	0.11	0.74	0.83	2.45
Cotinine	3.85	4.06	4.58	5.18	6.60
Diazepam	N/A	N/A	N/A	N/A	N/A
Fluoxetine	<0	<0	5.42	<0	<0
Hydrocodone	N/A	N/A	N/A	N/A	N/A
Meprobamate	0.55	0.34	2.24	2.28	5.78
Pentoxifylline	N/A	N/A	N/A	N/A	N/A
Oxybenzone	N/A	9.04	4.61	6.29	67.90
Sulfmethoxazole	0.46	0.76	1.02	1.13	2.66
DEET	7.64	10.70	10.50	9.93	7.33
Erythhromycin	N/A	N/A	N/A	N/A	N/A
Trimethoprim	N/A	N/A	N/A	N/A	N/A
Diuron	<0	<0	<0	<0	<0
Atrizine	0.35	0.37	0.58	0.61	1.14
Prometryne	0.25	0.26	0.25	0.25	0.24
Imazamox	N/A	N/A	N/A	N/A	N/A
Monuron	N/A	N/A	N/A	N/A	N/A
Imazthapyr	N/A	N/A	N/A	N/A	N/A
Primidone	N/A	N/A	N/A	0.00	0.00

Where does all our turbidity come from?

Issue: Water treatment plants in metro-Phoenix have trouble dealing with high suspended solids loadings (i.e., turbidity) to their facilities when there is no or very little advance notice.

Turbidity events can be divided into 4 cases:

1) Short-term turbidity pulses that result from short-duration / monsoon events (summertime) or multi-day rain events (winter/spring). Most of this turbidity is caused by flows in Sycamore Creek that flows into the Verde River near Fountain Hills, and not rainfall in the upper watershed because 100% of that water is retained usually in the reservoirs. One approach for monitoring this may involve Doppler radar in combination with stream flow measurements in Sycamore Creek.
2) Intermediate duration turbidity events are caused by prolonged rains that affect turbidity levels in Bartlett Lake or Lake Pleasant. Turbidity gauges should be install in these lakes – or alternatively we could use satellite imaging to monitor these.
3) Longer-term turbidity events caused by high runoff from the higher elevation watersheds that fill the reservoirs or significantly increase turbidity because when a larger percentage of the reservoir volume is recent runoff. Here stream gauges in the upper watersheds (Verde River, Salt River, Aqua Fria River, Bill Williams River) will be linked to common website and interpretive algorithms developed to compute volume loading of water to the reservoirs. We will use current data on reservoir volumes from CAP & SRP to estimate the impact of each runoff event. We will use historic relationships between streamflow and turibidity / suspended solids data to estimate turbidity in the reservoirs. Again – real time or remote sensing data in the reservoirs would support this early warning process.
4) Seasonal algae-related turbidity.