

REGIONAL WATER QUALITY NEWSLETTER

DATE: Report for July 2007

Samples Collected on July 9-10, 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. MIB is now present in the Arizona Canal at > 10 ng/L - a level detectable by consumers. Their appears to be a “front” of MIB moving down through the Arizona Canal. ASU will follow-up with some additional sampling in 2 weeks rather than waiting until August to provide additional data to support your operations.
2. While visiting a hotel on 7th Street near Shea Blvd in Phoenix, the hot water system clearly contained geosmin noticeable to my taste.
3. The CAP canal has low MIB and geosmin concentrations, but there is a low percentage of CAP water flowing into the South or Arizona Canals to dilute MIB SRP water coming primarily from the Salt River system (released from the bottom – hypolimnion – of Saguaro Lake).
4. For S. Tempe WTP there appears to be in-plant formation of geosmin. This has occurred several years ago. The use of periodic prechlorination was used at the time to control in-plant algae growth. This topic is the focus of a current AwwaRF project by Malcolm Pirnie/ASU (Sommerfeld): <http://www.awwarf.org/research/TopicsAndProjects/projectSnapshot.aspx?pn=3111>
5. For N. Tempe WTP in-plant T&O production may also be occurring.
6. A link for an update on Zebra mussels in the CAP system is attached below
7. DBP work continues and ASU will prepare a final report on DBP formation in SRP reservoirs, after coagulation treatment, and subsequent data modeling near the end of August 2007.

Table 1 Summary of WTP Operations

	Union Hills	24 th 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	None	Norit 20B 10 ppm	Hydro-darco O 17.3 ppm	Norit 20B 10.8 ppm	None	Norit 20B 10 ppm	None	no ne
Copper Sulfate	None	None	None	None	None	0.25 ppm	None	
PreOxidation	None	None	None	None	2 mg/L ozone		None	
Alum Dose	11.8 ppm ¹	45 ppm	35 ppm	45 ppm	36 ppm	51 ppm	17 ppm	
Alkalinity	136/122	140/118		140/112	143 ppm	150 ppm	140 ppm	
pH	7.0	6.75	7.37	6.75	7.23	6.8	7.57	
Finished water DOC	2.6 mg/L	3.3 mg/L	4.1 mg/L	3.3 mg/L	2.3 mg/L	3.3 mg/L	4.2 mg/L	
DOC removal ²	17%	31%	17%	31%	44%	30%	7%	
WTP plant comments			We have received T&O complaints.					
Recommendations			Consider one-time pre-Cl ₂ to kill algae causing in-plant geosmin release				This is a very low alum dose and consequently low DOC removal Consider one-time pre-Cl ₂ to kill algae causing in-plant geosmin release	

¹ **Ferric chloride instead of alum**

² Calculated based upon influent and filtered water DOC (note that DOC – not TOC – is used in this calculation)

³ Also adding 4.4 mg/L floc aid

Table 2 - Water Treatment Plants – July 9, 2007

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
24 th Street WTP Inlet	4.4	<2.0	<2.0
24 th Street WTP Treated	3.2	<2.0	<2.0
Deer Valley Inlet	3.5	<2.0	<2.0
Deer Valley WTP Treated	3.8	<2.0	<2.0
Val Vista Inlet	4.8	<2.0	<2.0
Val Vista WTP Treated –East	3.0	<2.0	<2.0
Val Vista WTP Treated -West	3.7	<2.0	<2.0
Union Hills Inlet	<2.0	<2.0	<2.0
Union Hills Treated	<2.0	<2.0	<2.0
Tempe North Inlet	5.0	<2.0	<2.0
Tempe North Plant Treated	12.1	5.8	4.4
Tempe South WTP	8.4	3.9	2.1
Tempe South Plant Treated	8.3	6.3	2.1
Greenway WTP Inlet	5.7	4.8	3.7
Greenway WTP Treated	<2.0	<2.0	<2.0

For S. Tempe WTP there appears to be in-plant formation of geosmin. This has occurred several years ago. The use of periodic prechlorination was used at the time to control in-plant algae growth. This topic is the focus of a current AwwaRF project by Malcolm Pirnie/ASU (Sommerfeld):

<http://www.awwarf.org/research/TopicsAndProjects/projectSnapshot.aspx?pn=3111>

For N. Tempe WTP in-plant T&O production may also be occurring.

Table 3 - Canal Sampling – July 9, 2007

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	<2.0	<2.0	2.4
	Union Hills Inlet	<2.0	<2.0	<2.0
	CAP Canal at Cross-connect	<2.0	3.5	5.4
AZ Canal	Salt River @ Blue Pt Bridge	18.8	3.9	3.7
	Verde River @ Beeline	10.8	8.4	6.3
	AZ Canal above CAP Cross-connect	site not available this Access to . . month		
	AZ Canal below CAP Cross-connect	14.7	5.0	5.9
	AZ Canal at Highway 87	10.8	5.8	6.1
	AZ Canal at Pima Rd.	15.3	5.0	3.9
	AZ Canal at 56th St.	10.7	4.9	4.1
	AZ Canal - Inlet to 24 th Street WTP	4.4	<2.0	<2.0
	AZ Canal - Central Avenue	9.3	6.3	4.5
	AZ Canal - Inlet to Deer Valley WTP	3.5	<2.0	<2.0
South and Tempe Canals	AZ Canal - Inlet to Greenway WTP	5.7	4.8	3.7
	South Canal below CAP Cross-connect	13.6	5.7	5.7
	South Canal at Val Vista WTP	4.8	<2.0	<2.0
	Head of the Tempe Canal	6.7	5.3	5.9
	Tempe Canal - Inlet to Tempe's South Plant	8.4	3.9	2.1

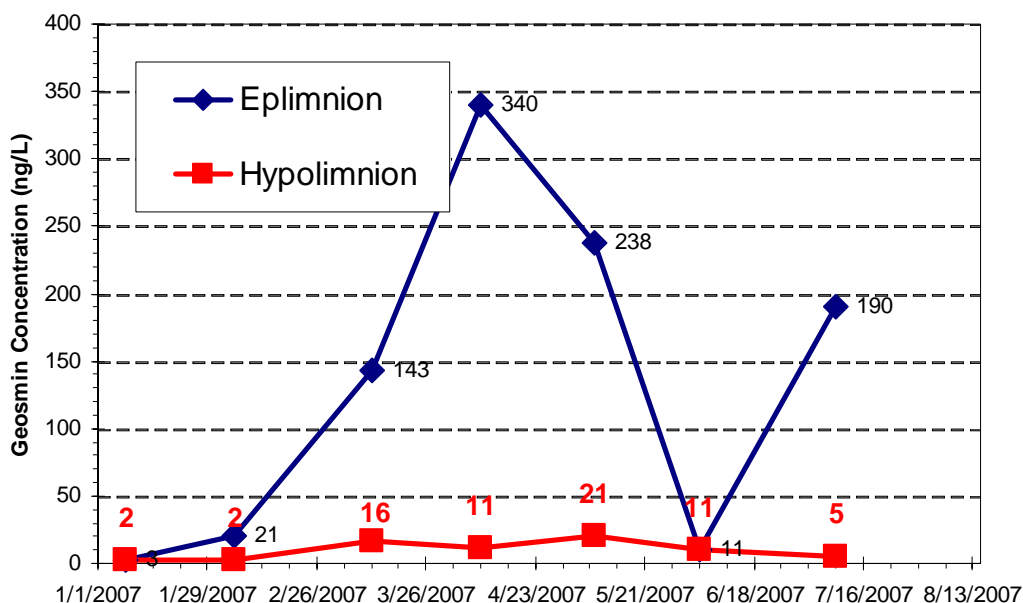
MIB is now present in the Arizona Canal at > 10 ng/L - a level detectable by consumers. Their appears to be a “front” of MIB moving down through the Arizona Canal. Based upon SRP websites, there were no wells operating between 56th street and 24th street that would have diluted the MIB. Wells were operating between Deer Valley WTP (24th street) and Peoria’s Greenway WTP.

The CAP canal has low MIB and geosmin concentrations, but there is a low percentage of CAP water flowing into the South or Arizona Canals to dilute MIB SRP water coming primarily from the Salt River system (released from the bottom – hypolimnion – of Saguaro Lake).

Table 4 - Reservoir Samples – July 10, 2007

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant (July 3, 2007)	Epilimnion	<2.0	<2.0	4.5
Lake Pleasant	Hypolimnion	<2.0	<2.0	2.3
Verde River @ Beeline		5.6	12.3	4.1
Bartlett Reservoir	Epilimnion	21.7	<2.0	3.5
Bartlett Reservoir	Hypolimnion	11.1	<2.0	2.5
Salt River @ BluePt Bridge		18.8	3.9	3.7
Saguaro Lake	Epilimnion	9.7	190	4.7
Saguaro Lake	Epi - Duplicate	11.3	161	5.1
Saguaro Lake	Hypolimnion	15.5	4.8	2.9
Verde River at Tangle (June 27, 2007)		5.6	12.3	4.1
Havasu (July 3, 2007)		<2.0	<2.0	<2.0

Geosmin concentrations are VERY high in the near-surface waters of Saguaro Lake, and continues an unusual seasonal trend that has not previously be observed in the reservoir over the past 8 years. This year we have very high geosmin concentrations, that can decrease rapidly and appear a month later. This may pose a serious problem when Saguaro Lake thermally destrafies and mixes with depth – usually the end of September or early October. Right now the Saguaro Lake is weakly thermally stratified – see graph below. This is weak stratification is typical for Saguaro Lake because of upstream SRP operations. Bartlett lake exhibits a more common, strong thermally stratified profile (see below). The shall secchi disk depth in Saguaro lake is also an indicator of a high level of algal biomass in the water column near the surface.



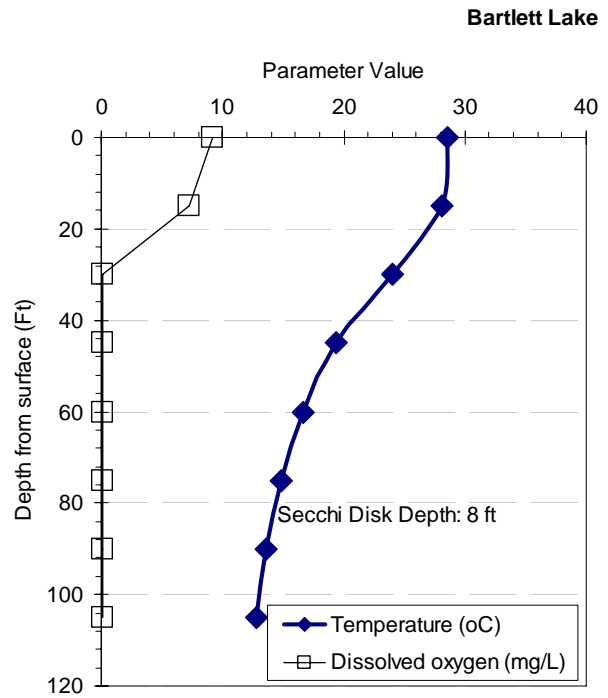
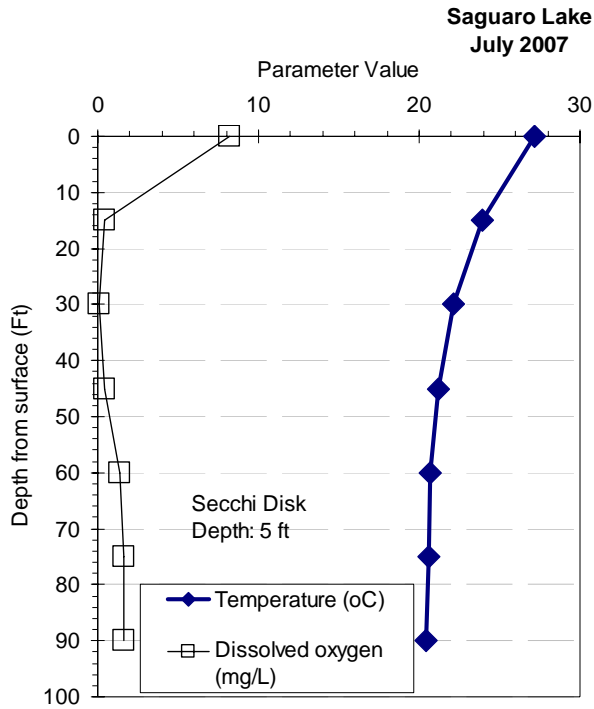


Table 5 - SRP/CAP OPERATIONS

Values in cfs, for July 9, 2007

System	SRP Diversion	CAP
Arizona Canal	855	42
South Canal	742	41
Pumping	183	0
Total	1780	83

SRP is releasing water from both Verde and Salt River Systems. Salt River release from Saguaro Lake: 1540 cfs; Verde River release from Bartlett Lake: 139 cfs.

Table 6 - Water Treatment Plants – July 9, 2007

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA	TDN
24 th Street WTP Inlet	5.34	0.102	1.9	0.375
24 th Street WTP Treated	3.71	0.048	1.3	0.356
Deer Valley Inlet	5.37	0.098	1.8	0.392
Deer Valley WTP Treated	3.72	0.050	1.3	0.329
Val Vista Inlet	5.24	0.094	1.80	0.429
Val Vista WTP Treated –East	3.61	0.044	1.22	0.370
Val Vista WTP Treated -West	3.77	0.054	1.44	0.371
Union Hills Inlet	3.52	0.045	1.28	0.437
Union Hills Treated	2.92	0.026	0.87	0.379
Tempe North Inlet	5.50	0.101	1.84	0.497
Tempe North Plant Treated	4.56	0.072	1.58	0.350
Tempe South WTP	5.37	0.087	1.62	0.469
Tempe South Plant Treated	3.72	0.076	2.05	0.407
Chandler WTP Inlet				
Chandler WTP Treated				
Greenway WTP Inlet	4.66	0.084	1.8	0.487
Greenway WTP Treated	2.34	0.028	1.2	0.396

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 – July 9, 2007

System	Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA	TDN
CAP	Waddell Canal	3.69	0.047	1.28	0.434
	Union Hills Inlet	3.52	0.045	1.28	0.437
	CAP Canal at Cross-connect	3.57	0.044	1.22	0.426
AZ Canal	Salt River @ Blue Pt Bridge	5.50	0.098	1.79	0.437
	Verde River @ Beeline	2.41	0.098	4.08	0.273
	AZ Canal above CAP Cross-connect				
	AZ Canal below CAP Cross-connect	4.97	0.087	1.76	0.388
	AZ Canal at Highway 87	5.47	0.098	1.79	0.463
	AZ Canal at Pima Rd.	6.00	0.099	1.65	0.508
	AZ Canal at 56th St.	5.39	0.100	1.85	0.418
	AZ Canal - Inlet to 24 th Street WTP	5.35	0.102	1.90	0.375
	AZ Canal - Central Avenue	5.28	0.099	1.87	0.374
	AZ Canal - Inlet to Deer Valley WTP	5.37	0.098	1.82	0.392
	AZ Canal - Inlet to Greenway WTP	4.66	0.084	1.80	0.487
South and Tempe Canals	South Canal below CAP Cross-connect	5.41	0.098	1.82	0.452
	South Canal at Val Vista WTP	5.24	0.094	1.80	0.429
	Head of the Tempe Canal	5.22	0.093	1.78	0.442
	Tempe Canal - Inlet to Tempe's South Plant	5.07	0.087	1.72	0.469
	Chandler WTP – Inlet				

Table 8 - Reservoir Samples – July 9, 2007

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA	TDN
Lake Pleasant	Epilimnion	4.90	0.049	1.01	0.301
Lake Pleasant	Hypolimnion	4.62	0.053	1.15	0.410
Verde River @ Beeline		2.41	0.098	4.08	0.273
Bartlett Reservoir	Epilimnion	3.36	0.043	1.27	0.296
Bartlett Reservoir	Epi-near dock				
Bartlett Reservoir	Hypolimnion	3.25	0.042	1.30	0.274
Salt River @ BluePt Bridge		5.50	0.098	1.79	0.437
Saguaro Lake	Epilimnion	7.19	0.094	1.31	0.416
Saguaro Lake	Epi - Duplicate	7.35	0.093	1.27	0.325
Saguaro Lake	Epi-near doc				
Saguaro Lake	Hypolimnion	6.95	0.094	1.35	0.591
Verde River at Tangle		1.29	0.033	2.54	0.108
Havasu		4.43	0.048	1.08	0.563

Here is a quick update on the quagga mussel situation in the CAP:

We have visual confirmation now that CAP is infected with Quaggas at least through Brady's forebay. These confirmations have come from two independent sampling methods and a variety of samples. It's a safe bet that the entire system is infected. PCR (DNA) testing is promised within a few days.

Larry Riley at AZGF is planning to proceed with a public announcement.

CAP is collaborating with SRP, USBR, and other agencies to monitor the spread and investigate management techniques. Metropolitan Water District of California has a similar situation. They stated that inspections in late June indicate that the mussels have spread extremely rapidly with detection of quaggas now 125 miles west of their Intake plant and quantities of mussels near 500 per square meter were found at their Intake plant. The recent proliferation is attributed to the spring spawning of quagga mussels in Lake Mead.

Attached is a powerpoint file showing test plates installed at Parker Dam.

The July/August 2007 issue of *Southwest Hydrology* has a good background article on quaggas. See http://www.swhydro.arizona.edu/archive/V6_N4/dept-ontheground.pdf

As a reminder, quagga mussels pose no known threat to public health.

I will try to update you with more information from time to time as it becomes available.

Tim