Regional Water Quality NEWSLETTER

DATE: Report for November 2009
Sampling conducted November 2 & 3, 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 is between 5 to 10 ng/L in SRP and CAP canals . This is a level if not removed is noticeable only to very sensitive consumers.
2. **SRP will be moving water from the Verde River BACK to the Salt River starting next week**. This is unusual during this time of year, when normally Verde River water is used. This is due to construction on the Bartlett Reservoir Dam. **Salt River water (5 mg/L) has higher DOC than Verde River water (~ 3.2 mg/L) and will lead to increases in THM formation**. Saguaro Lake on the Salt River also has higher MIB (~ 15 ng/L) compared to Bartlett Lake (~ 10 ng/L).
3. As water sources have been gradually shifting this fall we conducted intensive monitoring in the source water and canals to ascertain if changes in salt composition would result in release of MIB or geosmin from canal walls. Over nearly six weeks we observed changes in conductance and shifts in Calcium to sodium ion ratios, but these changes did not cause lysis or release of T&O compounds along the length of the canal. This was somewhat unexpected because previous lab tests suggested that ionic composition changes could cause T&O compound release. We now suspect that the change has been gradual enough not to "shock" the algae. In prior years, source waters could change quickly (overnight) and in those cases may cause lysis of algae and release of MIB or geosmin.

Table 1
SRP/CAP OPERATIONS - Values in cfs, for November 2, 2009

System	SRP Diversions	CAP
Arizona Canal	514	0
South Canal	573	0
Pumping	85	0
Total	1172	0

- **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: 1195 cfs.

Supply Source change in SRP water delivery system from the Verde River to the Salt River.

The target elevation for the lowering of Bartlett Lake is expected to be reached by the middle of next week. At that time**, SRP will begin moving the water order back to the Salt River from the Verde River**. The water order will remain on the Salt at least until the Bartlett Dam repairs are completed (mid-December), and maybe longer depending on a number of factors, including the weather conditions and forecasts.

PICTURE OF BARTLETT DAM

Table 2 - Water Treatment Plants – November 2, 2009			
Sample Description	**MIB (ng/L)**	**Geosmin (ng/L)**	**Cyclocitral (ng/L)**
24th Street WTP Inlet	**6.5**	**7.6**	**3.8**
24th Street WTP Treated	**<2.0**	**3.2**	**<2.0**
Deer Valley Inlet	**6.9**	**6.3**	**3.4**
Deer Valley WTP Treated	**4.5**	**4.8**	**2.8**
Val Vista Inlet	**6.7**	**<2.0**	**<2.0**
Val Vista WTP Treated –East	**2.4**	**<2.0**	**<2.0**
Val Vista WTP Treated -West	**<2.0**	**<2.0**	**<2.0**
Union Hills Inlet	**4.3**	**<2.0**	**<2.0**
Union Hills Treated	**3.6**	**<2.0**	**<2.0**
Tempe North Inlet	**3.8**	**4.8**	**3.5**
Tempe North Plant Treated	**4.9**	**5.9**	**3.7**
Tempe South WTP			
Tempe South Plant Treated			
Greenway WTP Inlet	**4.2**	**2.7**	**<2.0**
Greenway WTP Treated	**2.4**	**2.4**	**<2.0**
Glendale WTP Inlet	**4.7**	**5.2**	**4.6**
Glendale WTP Treated	**<2.0**	**<2.0**	**<2.0**

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.

All WTPs are now back to having less than 10 ng/L of MIB and geosmin in their source water for the first time in several months.

Table 3 - Canal Sampling – November 2, 2009

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	**3.8**	**2.2**	**<2.0**
	Union Hills Inlet	**4.3**	**<2.0**	**<2.0**
	CAP Canal at Cross-connect			
	Salt River @ Blue Pt Bridge			
	Verde River @ Beeline	**8.8**	**<2.0**	**<2.0**
AZ	AZ Canal above CAP Cross-connect			
Canal	AZ Canal below CAP Cross-connect	**6.5**	**2.1**	**3.7**
	AZ Canal at Highway 87	**5.9**	**3.8**	**4.0**
	AZ Canal at Pima Rd.	**7.2**	**9.6**	**3.0**
	AZ Canal at 56th St.	**5.6**	**7.3**	**2.8**
	AZ Canal - Inlet to 24th Street WTP	**6.5**	**7.6**	**3.8**
	AZ Canal - Central Avenue	**6.0**	**11.5**	**3.7**
	AZ Canal - Inlet to Deer Valley WTP	**6.9**	**6.3**	**3.4**
	AZ Canal - Inlet to Glendale WTP	**4.7**	**5.2**	**4.6**
South	South Canal below CAP Cross-connect	**7.1**	**<2.0**	**4.3**
and	South Canal at Val Vista WTP	**6.7**	**<2.0**	**<2.0**
Tempe	Head of the Tempe Canal			
Canals	Tempe Canal - Inlet to Tempe's South Plant			

Table 4 - Reservoir Samples – November 3, 2009

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant	Eplimnion			
Lake Pleasant	Hypolimnion			
Verde River @ Beeline		**8.8**	**<2.0**	**<2.0**
Bartlett Reservoir	Epilimnion	**13.7**	**<2.0**	**<2.0**
Bartlett Reservoir	Epi-near dock	**11.3**	**<2.0**	**<2.0**
Bartlett Reservoir	Hypolimnion	**12.2**	**<2.0**	**<2.0**
Salt River @ BluePt Bridge				
Saguaro Lake	Epilimnion	**12.9**	**3.3**	**<2.0**
Saguaro Lake	Epi - Duplicate	**14.2**	**2.6**	**<2.0**
Saguaro Lake	Epi-near dock	**18.0**	**2.8**	**<2.0**
Saguaro Lake	Hypolimnion	**15.9**	**2.2**	**<2.0**

Organic Matter Status In the Treatment Plants

Table 2 - Water Treatment Plants – November 02, 2009						
Sample Description	**DOC (mg/L)**	**UV254 (1/cm)**	**SUVA (L/mg-m)**	**TDN**		**DOC removal (%)**
24th Street WTP Inlet	**3.15**	**0.067**	**2.13**	**0.32**		
24th Street WTP Treated	**2.08**	**0.028**	**1.36**	**0.34**		**34**
Deer Valley Inlet	**3.07**	**0.065**	**2.12**	**0.73**		
Deer Valley WTP Treated	**2.25**	**0.038**	**1.69**	**0.66**		**26**
Val Vista Inlet	**3.03**	**0.068**	**2.24**	**0.31**		
Val Vista WTP Treated –East	**1.71**	**0.023**	**1.35**	**0.24**		**44**
Val Vista WTP Treated -West	**1.71**	**0.027**	**1.58**	**0.25**		**44**
Union Hills Inlet	**2.83**	**0.040**	**1.40**	**0.48**		
Union Hills Treated	**2.22**	**0.023**	**1.01**	**0.43**		**22**
Tempe North Inlet	**3.19**	**0.070**	**2.18**	**0.30**		
Tempe North Plant Treated	**2.57**	**0.045**	**1.75**	**0.29**		**19**
Tempe South WTP						
Tempe South Plant Treated						
Greenway WTP Inlet	**2.94**	**0.063**	**2.16**	**1.25**		
Greenway WTP Treated	**2.61**	**0.024**	**0.92**	**1.23**		**11**
Glendale WTP Inlet	**3.02**	**0.062**	**2.07**	**0.63**		
Glendale WTP Treated	**2.12**	**0.035**	**1.64**	**0.52**		**30**

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	2.93	0.040	1.37	0.59
Union Hills Inlet	2.83	0.040	1.40	0.48
CAP Canal at Cross-connect				
Salt River @ Blue Pt Bridge				
Verde River @ Beeline	2.97	0.066	2.22	0.31
AZ Canal above CAP Cross-connect				
AZ Canal below CAP Cross-connect	3.05	0.067	2.21	0.31
AZ Canal at Highway 87	3.12	0.064	2.06	0.33
AZ Canal at Pima Rd.	3.12	0.066	2.10	0.30
AZ Canal at 56th St.	3.10	0.066	2.13	0.32
AZ Canal - Inlet to 24th Street WTP	3.15	0.067	2.13	0.32
AZ Canal - Central Avenue	3.14	0.065	2.08	0.31
AZ Canal - Inlet to Deer Valley WTP	3.07	0.065	2.12	0.73
AZ Canal - Inlet to Glendale WTP	3.02	0.062	2.07	0.63
AZ Canal - Inlet to Greenway WTP	2.94	0.063	2.16	1.25
South Canal below CAP Cross-connect	3.03	0.068	2.25	0.34
South Canal at Val Vista WTP	3.03	0.068	2.24	0.31
Head of the Tempe Canal				
Tempe Canal - Inlet to Tempe's South Plant				
Chandler WTP – Inlet				

Reservoirs

Table 4 - Reservoir Samples – November 02, 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
Lake Pleasant	Eplimnion				
Lake Pleasant	Hypolimnion				
Verde River @ Beeline		2.97	0.066	2.22	0.31
Bartlett Reservoir	Epilimnion	3.22	0.066	2.03	0.30
Bartlett Reservoir	Epi-near dock				
Bartlett Reservoir	Hypolimnion	3.69	0.068	1.83	0.52
Salt River @ BluePt Bridge					
Saguaro Lake	Epilimnion	5.05	0.097	1.91	0.46
Saguaro Lake	Epi - Duplicate	4.99	0.097	1.94	0.46
Saguaro Lake	Epi-near doc				
Saguaro Lake	Hypolimnion	5.28	0.096	1.82	0.53

Variations in Ionic Composition in SRP Canals during source water switches

As water sources have been gradually shifting this fall we conducted intensive monitoring in the source water and canals to ascertain if changes in salt composition would result in release of MIB or geosmin from canal walls.

Data is shown on the following page

Over nearly six weeks we observed changes in conductance and shifts in Calcium to sodium ion ratios, but these changes did not cause lysis or release of T&O compounds along the length of the canal. This was somewhat unexpected because previous lab tests suggested that ionic composition changes could cause T&O compound release. We now suspect that the change has been gradual enough not to "shock" the algae. In prior years, source waters could change quickly (overnight) and in those cases may cause lysis of algae and release of MIB or geosmin.

Sample	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)	conductance(ms)	UV254	Ca (mg/L)	K (mg/L)	Mg (mg/L)	Na (mg/L)	Na/Ca
Collected on: 9/18/09										
Hwy 87	9.8	5.9	<2.0	1.065	0.0965	46.0	10.6	13.9	133.5	2.9
Pima	12.1	16.7	<2.0	1.080	0.0976	46.1	10.9	13.9	132.9	2.9
NP	10.4	14.1	<2.0	1.094	0.0959	46.0	10.7	14.2	132.3	2.9
56th	9.3	15.1	<2.0	1.090	0.0984	46.4	10.6	14.3	132.8	2.9
24th	8.8	9.4	<2.0	1.077	0.0966	45.8	10.8	14.2	131.5	2.9
Central	8.9	10.0	<2.0	1.090	0.1023	45.4	10.6	14.1	131.7	2.9
DV	8.3	10.2	<2.0	1.090	0.0976	46.0	9.7	14.6	131.9	2.9
Collected on: 9/21/09										
Hwy 87	9.4	7.6	<2.0	1.005	0.0939	44.7	8.1	14.6	121.6	2.7
Pima	11.4	17.8	<2.0	1.021	0.0947	44.8	8.2	14.6	121.4	2.7
NP	9.2	13.9	<2.0	1.030	0.0964	45.0	10.0	14.8	122.5	2.7
56th	8.8	13.6	<2.0	1.025	0.0968	44.9	8.2	14.8	121.9	2.7
24th	9.2	12.0	<2.0	1.020	0.0948	44.6	9.9	14.8	122.7	2.8
Central	8.8	10.9	<2.0	1.030	0.0938	45.1	7.5	15.5	121.9	2.7
DV	7.0	11.8	<2.0	1.015	0.0962	45.0	10.1	15.2	122.5	2.7
Collected on: 9/23/09										
Hwy 87	9.5	6.1	<2.0	1.020	0.0944	45.4	7.4	14.9	120.8	2.7
Pima	9.8	11.6	<2.0	1.020	0.0949	44.9	8.1	14.8	120.7	2.7
NP	8.5	11.2	<2.0	1.015	0.0953	44.8	8.3	15.0	120.9	2.7
56th	9.3	10.8	<2.0	1.020	0.0956	45.0	8.1	15.2	120.9	2.7
24th	7.8	10.1	<2.0	1.017	0.0967	44.7	8.3	14.8	120.6	2.7
Central	8.1	10.5	<2.0	1.050	0.0927	44.8	8.3	14.9	121.9	2.7
DV	7.9	13.5	<2.0	1.015	0.0969	47.2	8.5	16.6	122.6	2.6
Collected on: 9/25/09										
Hwy 87	9.2	9.5	<2.0	0.900	0.0961	43.8	7.5	16.0	105.2	2.4
Pima	9.9	11.2	<2.0	0.892	0.0967	44.3	7.5	15.9	108.0	2.4
NP	4.6	10.4	<2.0	0.931	0.097	44.4	7.7	15.7	112.2	2.5
56th	8.7	11.7	<2.0	0.944	0.097	44.3	7.8	15.6	111.3	2.5
24th	10.2	9.0	<2.0	0.940	0.969	43.9	7.9	15.5	111.7	2.5
Central	8.5	8.7	<2.0	0.975	0.096	43.8	7.8	15.6	112.2	2.6
DV	9.1	9.2	<2.0	0.954	0.0973	45.5	8.0	16.7	113.9	2.5
Collected on: 9/28/09										
Hwy 87	9.4	10.9	<2.0	0.871	0.0946	43.5	6.7	16.7	99.0	2.3
Pima	10.0	6.1	<2.0	0.864	0.097	42.7	6.6	16.7	95.7	2.2
NP	7.4	10.6	<2.0	0.850	0.0954	42.7	6.4	16.9	95.0	2.2
56th	12.5	12.5	<2.0	0.845	0.0952	42.9	6.6	17.0	95.6	2.2
24th	9.1	9.7	<2.0	0.842	0.0954	43.4	5.5	17.2	95.2	2.2
Central	9.7	9.7	<2.0	0.857	0.0967	42.8	6.5	17.0	93.9	2.2
DV	10.7	10.1	<2.0	0.850	0.0981	43.4	6.2	17.0	95.9	2.2
Collected on: 9/30/09										
Hwy 87	7.9	6.1	<2.0	0.780	0.103	42.3	5.7	18.0	80.9	1.9
Pima	8.9	13.0	<2.0	0.817	0.0992	43.0	5.4	17.6	88.9	2.1
NP	8.6	11.6	<2.0	0.873	0.0969	42.7	6.9	16.6	97.3	2.3
56th	8.1	10.5	<2.0	0.976	0.0963	42.5	6.3	16.5	97.1	2.3
24th	9.1	9.7	<2.0	0.974	0.0969	42.7	6.3	16.6	97.2	2.3
Central	8.9	9.2	<2.0	0.976	0.0965	43.0	6.1	16.6	98.6	2.3
DV	9.7	10.2	<2.0	0.865	0.0975	42.3	6.8	16.5	100.0	2.4
Collected on:10/05/09										
Hwy 87	12.4	6.3	<2.0	0.670	0.096					
Pima	18.5	14.1	<2.0	0.654	0.095					
NP	15.5	13.1	<2.0	0.660	0.095					
56th	13.7	11.6	<2.0	0.670	0.098					
24th	11.1	12.4	<2.0	0.670	0.095					
Central	11.6	16.4	<2.0	0.670	0.097					
DV	13.6	16.4	<2.0	0.660	0.099					