Regional Water Quality NEWSLETTER

DATE: Report for April 10-11, 2006
Samples Collected on April12, 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. MIB and geosmin concentrations are low throughout most of the water supply system – although Cyclocitral levels are higher than typically seen at this time of year. Cyclocitral can cause earthy-must odors, based upon FPA tests conducted by the City of Pheonix.
2. Cyclocitral was not removed at most WTPs, except Peoria which was using ozone and GAC. Cyclocitral concentration increased at Tempe South WTP.
3. This newsletters describes the lack of runoff entering the reservoirs, despite the rain/snow event in mid March.
4. DOC data is summarized for the reservoirs – additional data in the canals and WTPs is collected and available upon request. In general, DOC concentrations entering the WTPs are ~ 0.5 mg/L higher over the past month than in March – as SRP shifts from Verde to Salt River water.
5. An analysis of disinfection byproducts (DBP) formation and speciation during the winter 2005 rainfall is presented as a means of better understanding the precursors for DBP formation.

Table 1 Summary of WTP Operations

	Union Hills	24th Street WTP	North Tempe	Deer Valley	Greenway WTP	Val Vista	South Tempe	Chandler WTP
Location	**CAP**	**Arizona Canal System**				**South Canal system**		
PAC Type and Dose	None	None	Off-line until April		--	None	None	
Copper Sulfate	None	None			None	None	None	
PreOxidation	No	No			0.5ppm Cl_2 1.2ppm O_3	No	1.7 ppm	
Alum Dose Alkalinity pH	2.25ppm* 139ppm 7.7	50 ppm 146 ppm 6.7-7.8			18 ppm 155 ppm 7.5	50 ppm 146 ppm 6.8-7.1	20.5ppm 144 ppm 7.7	
WTP Comments	No T&O complaints	No T&O complaints			No T&O complaints	No T&O complaints	No T&O complaints	
Raw water DOC % DOC removal	2.31 mg/L 9%			4.74 33%	4.56 11%	4.52 28%	4.46 3%	
Process Recomendations	No changes for T&O control			No changes for T&O control (Tempe South may consider that in-plant algae control is occurring and releasing cyclocitral)				

*** Ferric chloride instead of alum**

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MONITORING RESULTS

Table 2 - Water Treatment Plants – April 10, 2006

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
24th Street WTP Inlet			
24th Street WTP Treated			
Deer Valley Inlet	**<2.0**	**<2.0**	**3.6**
Deer Valley WTP Treated	**<2.0**	**<2.0**	**8.0**
Val Vista Inlet	**<2.0**	**<2.0**	**5.1**
Val Vista WTP Treated –East	**<2.0**	**<2.0**	**5.5**
Val Vista WTP Treated -West	**<2.0**	**<2.0**	**5.2**
Union Hills Inlet	**<2.0**	**<2.0**	**6.6**
Union Hills Treated	**<2.0**	**<2.0**	**4.6**
Tempe North Inlet			
Tempe North Plant Treated			
Tempe South WTP	**<2.0**	**<2.0**	**3.6**
Tempe South Plant Treated	**<2.0**	**<2.0**	**11.4**
Chandler WTP Inlet			
Chandler WTP Treated			
Greenway WTP Inlet	**<2.0**	**<2.0**	**7.2**
Greenway WTP Treated	**<2.0**	**<2.0**	**<2.0**

Table 3 - Canal Sampling – April 10, 2006

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	**<2.0**	**<2.0**	**2.1**
	Union Hills Inlet	**<2.0**	**<2.0**	**6.6**
	CAP Canal at Cross-connect	**<2.0**	**<2.0**	**<2.0**
AZ Canal	Salt River @ Blue Pt Bridge	**<2.0**	**<2.0**	**12.3**
	Verde River @ Beeline	**5.6**	**<2.0**	**6.7**
	AZ Canal above CAP Cross-connect	**<2.0**	**<2.0**	**3.1**
	AZ Canal below CAP Cross-connect	**<2.0**	**<2.0**	**12.6**
	AZ Canal at Highway 87	**<2.0**	**<2.0**	**2.2**
	AZ Canal at Pima Rd.	**<2.0**	**<2.0**	**5.0**
	AZ Canal at 56th St.	**<2.0**	**<2.0**	**17.1**
	AZ Canal - Inlet to 24th Street WTP			
	AZ Canal - Central Avenue	**<2.0**	**<2.0**	**4.7**
	AZ Canal - Inlet to Deer Valley WTP	**<2.0**	**<2.0**	**3.6**
	AZ Canal - Inlet to Greenway WTP			
South and Tempe Canals	South Canal below CAP Cross-connect	**<2.0**	**<2.0**	**11.8**
	South Canal at Val Vista WTP	**<2.0**	**<2.0**	**5.1**
	Head of the Tempe Canal	**<2.0**	**<2.0**	**9.8**
	Tempe Canal - Inlet to Tempe's South Plant	**<2.0**	**<2.0**	**3.6**
	Chandler WTP – Inlet	**<2.0**	**<2.0**	**7.2**

Table 4 - Reservoir Samples – April 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	**<2.0**	**<2.0**	**<2.0**
Verde River @ Beeline		**5.6**	**<2.0**	**6.7**
Bartlett Reservoir	Epilimnion	**2.7**	**<2.0**	**6.4**
Bartlett Reservoir	Epi-near dock	**3.4**	**6.0**	**5.3**
Bartlett Reservoir	Hypolimnion	**<2.0**	**<2.0**	**5.5**
Salt River @ BluePt Bridge		**<2.0**	**<2.0**	**<2.0**
Saguaro Lake	Epilimnion	**<2.0**	**<2.0**	**3.7**
Saguaro Lake	Epi - Duplicate	**<2.0**	**<2.0**	**5.4**
Saguaro Lake	Epi-near doc	**<2.0**	**<2.0**	**<2.0**
Saguaro Lake	Hypolimnion	**<2.0**	**<2.0**	**<2.0**
Verde River at Tangle (February)		**<2.0**	**2.2**	**<2.0**
Havasu		**3.5**	**<2.0**	**4.2**

Table 5 - SRP/CAP OPERATIONS

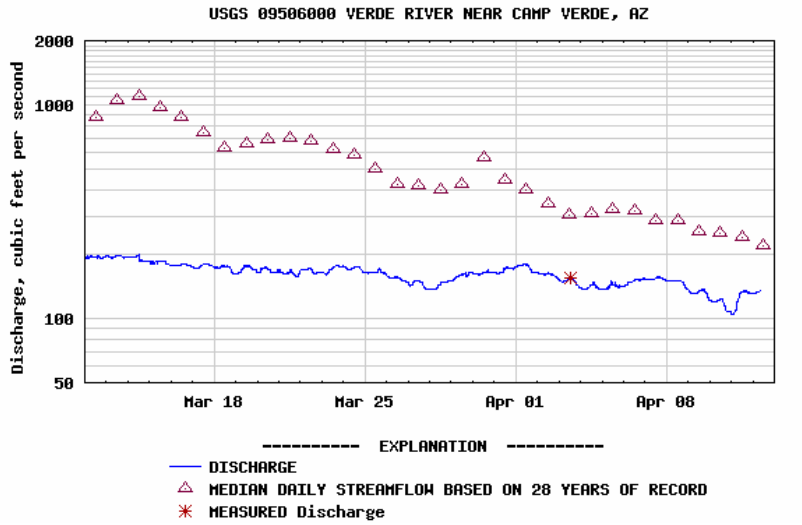
Values in cfs, for April 10, 2006

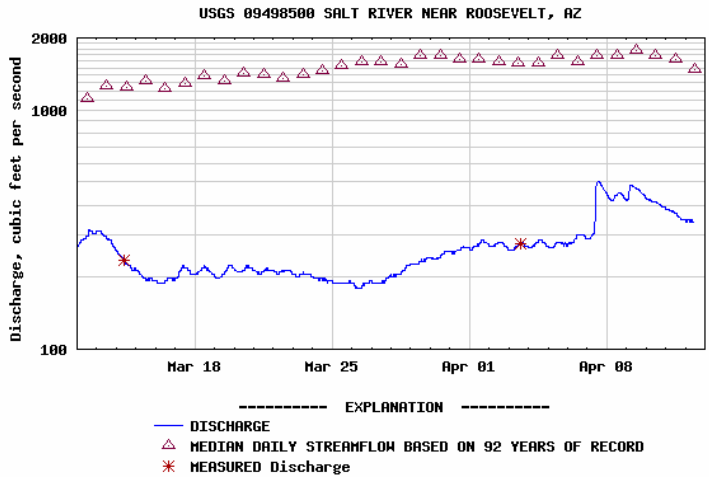
System	SRP Diversions	CAP
Arizona Canal	587	44
South Canal	662	0
Pumping	63	0
Total	1312	44

SRP is releasing water from both Verde and Salt River Systems. Salt River release from Saguaro Lake: 1138 cfs; Verde River release from Bartlett Lake: 129 cfs. Horseshoe Lake is at 0% capacity.

Did the Rain/Snow in March Help???

On March 12, 2006 there was 2.8" of rain (as snow) at Roosevelt Lake and 1.65" at Bartlett Lake. However, streamflows resulting from this runoff have been far below normal runoff cycles (see graph below). The Peak flow in the Salt River above Roosevelt Lake was 325 cfs, and 284 cfs (on March 12th) on the Verde River above Horseshoe Lake.





Summer 2006 Lake Pleasant Operating Plans

CAP's Summer 2006 operating strategy will be similar to last year. In late June, we will begin to transition into our usual summer operation of releasing water from Lake Pleasant. In 2005, in response to complaints from our M&I Customers about problems treating Lake Pleasant water late in the season, no lake water was released after September 14. Based on the success of this strategy in minimizing taste and odor complaints, we will do it again in 2006.

The plan is to continuously pump from the west end, supplementing Lake Pleasant releases with pass-through pumping of Colorado River water. About 1100 cfs of Colorado River water may be blended with Lake Pleasant releases. Pumping operations may change based on energy market conditions. The west end pumping may be reduced and Lake Pleasant water may be increased for short periods of time between June and the end of summer, so the two water sources may be blended in varying amounts. For the benefit of our M&I users, treatment plants will be given as much advance notice as possible of all changes in water sources.

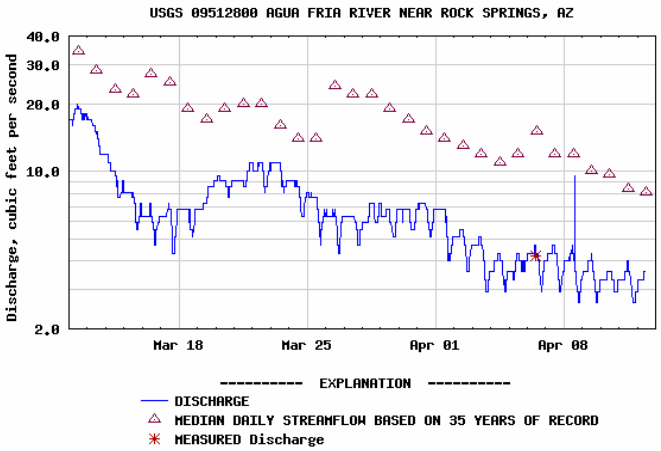
This summer there will be a short period in mid July through mid August when there will be no pass-through pumping. CAP will be inspecting both the Agua Fria Tunnel and the Agua Fria Siphon upstream of the Waddell Canal. The inspections will be done over a two day period but due to constraints involved in lowering the canal to accommodate the inspections, pass-through pumping will stop for approximately 35 days. Deliveries will be made from 100% Lake Pleasant water to customers downstream of the lake from July 17 through August 21. New trashrakes will be installed at Hassayampa Pumping Plant at the same time.

The lake level is projected to drop from elevation 1698 to elevation 1648 by the end of August. In an effort to supply customers with the best quality water, CAP=s operational strategy will be to make all releases exclusively from the lower gates all summer. This strategy has successfully minimized water quality impacts since 1998. The current plan calls for no releases from Lake Pleasant after August 31. Refilling of Lake Pleasant will begin around October 1.

Tentative plans are being made for a short (10 days) outage in November to strengthen the pipe and repair the hydrophone array in the Centennial Siphon. We would switch back to Lake Pleasant source water at that time, and the water quality effects should be minimal.

Douglas R. Crosby

Supervisor, Water Systems Operation
Central Arizona Project 623-869-2426 Office



DISSOLVED ORGANIC CARBON

Reservoir Samples – April 10, 2006

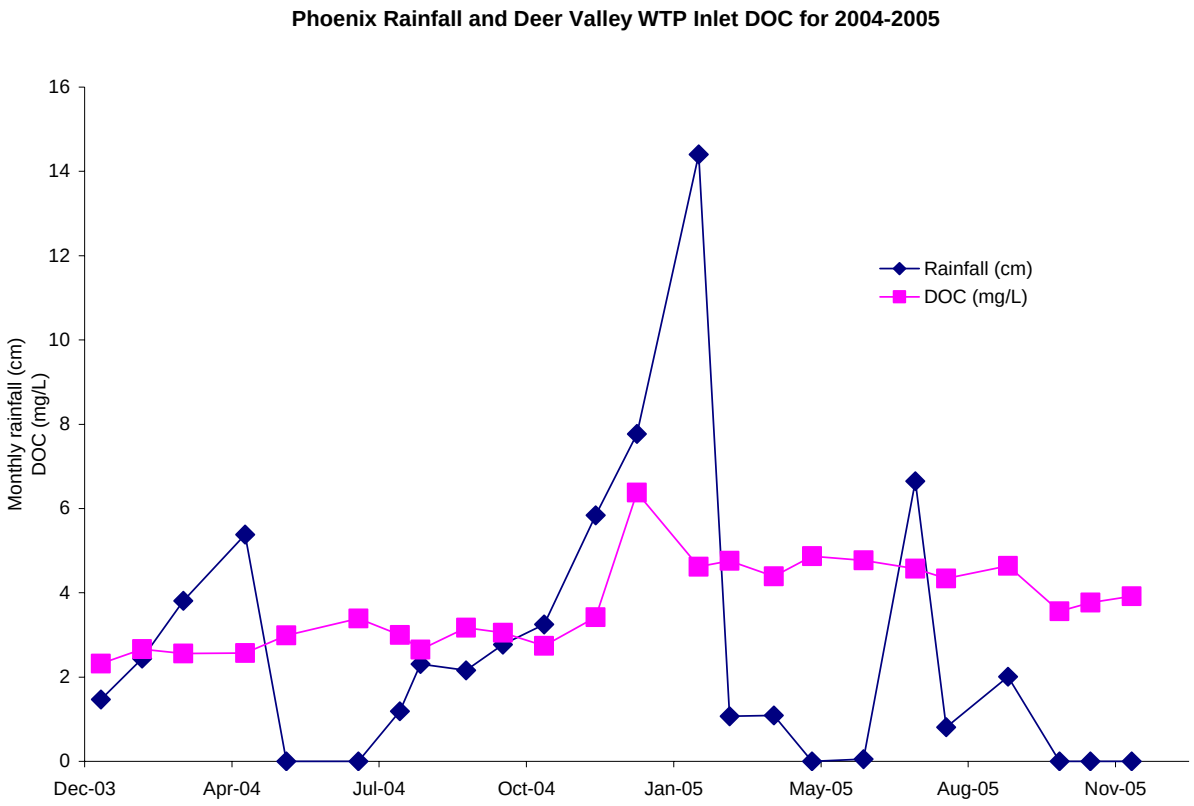
Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA	TDN
Lake Pleasant	Eplimnion	3.28	0.0461	1.4	0.387
Lake Pleasant	Hypolimnion	3.31	0.0479	1.4	0.403
Verde River @ Beeline		1.79	0.0320	1.8	0.262
Bartlett Reservoir	Epilimnion	2.42	0.0436	1.8	0.164
Bartlett Reservoir	Epi-near dock	2.33	0.0379	1.8	0.175
Bartlett Reservoir	Hypolimnion	2.64	0.0543	2.1	0.263
Salt River @ BluePt Bridge		4.92	0.1002	2.0	0.382
Saguaro Lake	Epilimnion	5.56	0.1004	1.8	0.469
Saguaro Lake	Epi - Duplicate	5.17	0.0955	1.8	0.374
Saguaro Lake	Epi-near doc	5.31	0.0943	1.8	0.354
Saguaro Lake	Hypolimnion	5.06	0.0984	1.9	0.447
Verde River at Tangle		0.99	0.0128	1.3	0.152
Havasu		2.53	0.0207	0.8	0.613

TDN = Total Dissolved Nitrogen (mgN/L)

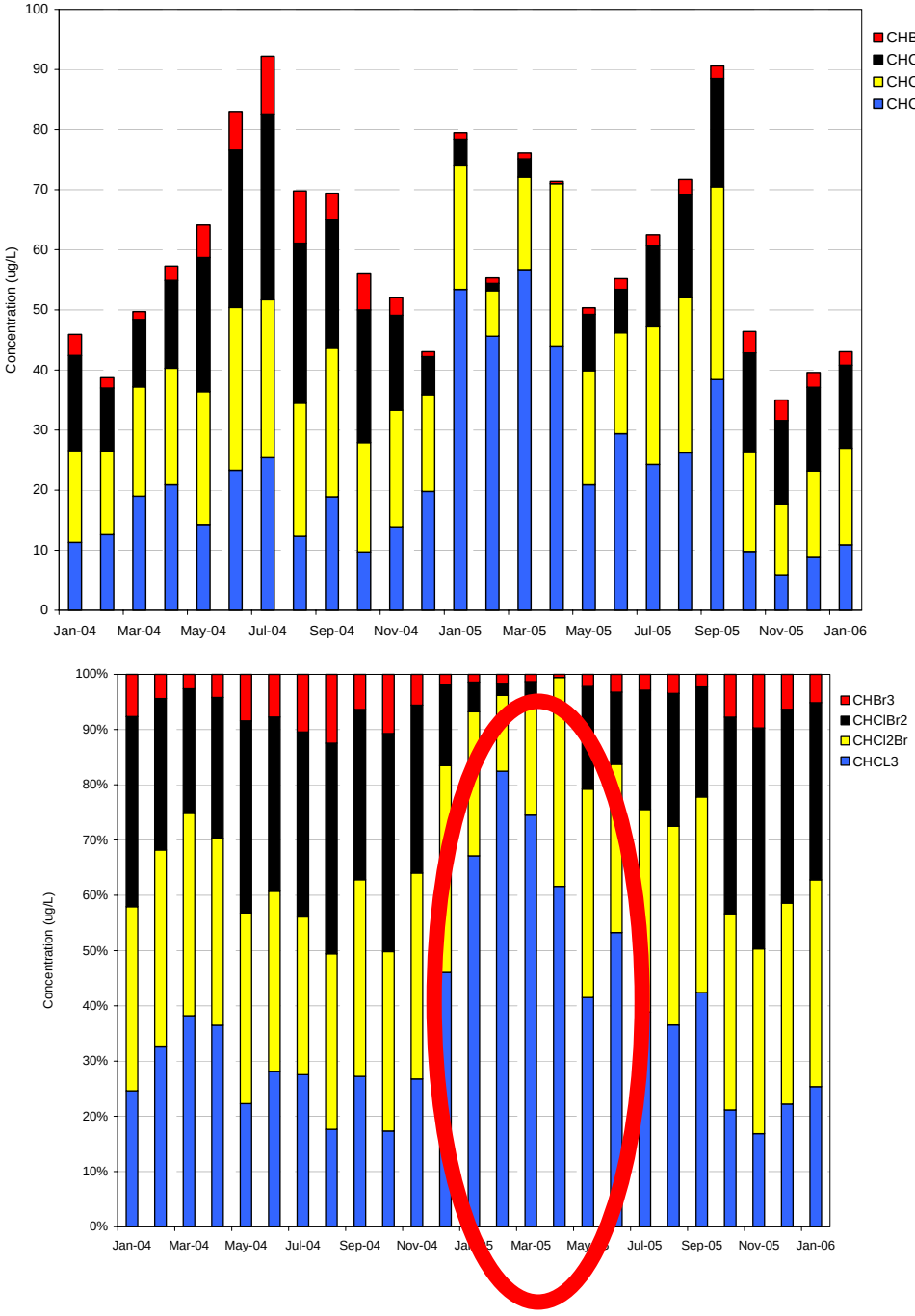
DISINFECTION BYPRODUCTS

This months Newsletter addresses the effects of the elevated precipitation & runoff in the winter of 2005 on DOC and DBPs in Valley. DBP data was obtained from several WTPs, but for presentation purposes only data from Deer Valley will be included now. The **purpose** of this section is to educate readers on how hydrologic variations affect both DOC and Bromide concentrations – which affect the regulatory concentration of THM4 and HAA5 and the speciation of these DBPs.

The graph below illustrates precipitation patterns and DOC concentrations at Deer Valley WTP in 2004-2005.



The figure below is THM4 data provided by the WTP for plant effluents. DBPs formation are related to the amount and location of chlorine addition, TOC in the water, bromide of the water, temperature of the water, and contact time between chlorine and TOC. THM4 are usually higher in the summer, due to higher water temperatures. However, in the spring of 2005, following the wet winter rains the DBP concentrations were elevated. **Note the higher relative percentage of chlorinated (rather than bromide-containing) DBPs during the wet winter period**. Rain will increase TOC concentrations, but dilute bromide concentrations. This shifts the DBPs from brominated (e.g., dibromochloromethane – CHBrCl2) to more chlorinated species (e.g., chloroform – CHCl3). This shift is more pronounced when we evaluate the percentage of each THM specie (bottom plot – see read circle area).



The same patterns occur for haloacetic acids (HAAs). There are nine HAA species, but currently only 5 are regulated (HAA5), the City of Phoenix only measures 6 of the 9 HAA species. Before the winter rains, dichloracetic acid (DCAA) was the dominate HAA, with contributions from some of the brominated species (although the 3 non-measured HAA species contain bromide, but are unaccounted for in HAA5 or HAA6 measurement). After the rains (January 2005) trichloroacetic acid (TCAA) consisted of the primary HAA specie. This occurs due to less bromide (same idea as THM4 speciation above). So – while DOC increased only slightly during this period (see above) – a major effect of the rain was a shift from brominated HAA (of which not all species are measured – and therefore unaccounted for before the rain event), to chlorinated HAA species (TCAA and DCAA almost exclusively) after the rainfall.