

REGIONAL WATER QUALITY NEWSLETTER

DATE: Report for March 2010

Sampling conducted March 1-2, 2010

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 plus geosmin levels above 10 ng/L in finished water lead to noticeable earthy-musty odors by customers. Currently MIB+geosmin levels are below 10 ng/L.
2. Dissolved organic carbon (DOC) concentrations in the reservoirs are ~ 4 mg/L (Lake Pleasant) and slightly higher 4.5 to 5 mg/L in the Salt River (Saguaro Lake). The Verde River has a unique DOC profile, with nearly 7 mg/L near the surface and only 2.6 mg/L with depth in the reservoir. This is because of the high turbidity, but also the nutrients are fueling a significant biological community within Bartlett Lake which should be capable of transforming this DOC over the next few months.
3. All the SRP reservoirs are nearing capacity, and the Bill Williams River will be releasing water (and turbidity) that will be impacting the CAP system and WTPs this week.
4. Many WTPs will be restarting operations over the next month, and one approach to restarting a WTP after several months of shut-down is attached. We want more stories from you as your plant restarts.
5. Improvements in DBP formation models and the effectiveness of PAC are presented.
6. Our final report on Pharmaceuticals in Arizona is now complete and will be uploaded later this week to our website: <http://enpub.fulton.asu.edu/pwest/tasteandodor.htm>

Table 1a Summary of WTP Operations February 1, 2010

	Verde WTP	Union Hills	24 th Street WTP	N. Tempe J.G. Martinez	Deer Valley	Glendale Cholla WTP ³	Peoria Greenway WTP	Val Vista	South Tempe
	Verde River	CAP Canal	Arizona Canal					South Canal	
PAC Type and Dose			12 ppm Calgon WPH	Off-line until April		Off-line until April	None	10 ppm	
Copper Sulfate			None				None	None	
PreOxidation			None				Ozone/DOC dose = 0.5	None	
Alum Dose Alkalinity pH			50 ppm 127/110 6.7-6.9	25 ppm 120 7.0			30 ppm 135/125 7.1	40 ppm ¹ 70 6.9	
Finished water DOC DOC removal ²		2.2 mg/L 16%	2.6 mg/L 47%					2.1(east) / 3.9 (west) 59% / 25%	2.9 mg/L 44%
Average turbidity over last 7 days			21-40 NTU (using more sed basins to improve treatment)	14 NTU			8.5 NTU	25 NTU	
Notes from operators	Peoria: uses GAC. Adds polymer during rapid mix, but not as a filter aid. Tempe North Plant, Val Vista & 24 th Street WWTP do not use GAC in their filters								

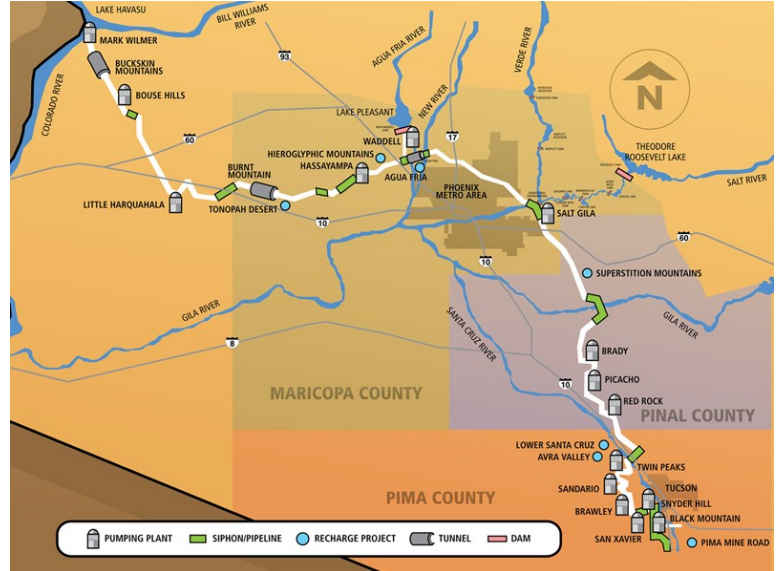
¹ Ferric chloride instead of alum; plus ppm sulfuric acid; ² Calculated based upon influent and filtered water DOC (note that DOC and not TOC is used in this calculation); ³ Sample from finished water includes a blend of surface and ground water sources sometimes

Table 1 - SRP/CAP OPERATIONS - Values in cfs, for March 1, 2010

System	SRP Diversions	CAP
Arizona Canal	236	0
South Canal	365	0
Pumping	19	0
Total	620	0

- **SRP is releasing water from both Verde and Salt River Systems.** Salt River release from Saguaro Lake: 4250 cfs; Verde River release from Bartlett Lake: 2000 cfs.
- **Water is being released over Granite Reef Dam at 6100 cfs because the SRP reservoirs are nearing capacity:**
 - **Verde River system at 91% of full capacity**
 - **Salt River system at 98% of full capacity**
 - **SRP must release water to prevent overflowing of reservoirs, especially with the expected rainfall this weekend (March 7th) and flows in tributaries into the reservoirs averaging >200% of average flow (Salt River, Tonto Creek, Verde River)**
 - **This is good news for water management from 2 perspectives:**
 - Reservoirs are full and will be capable of meeting summer-time SRP demand without payment of higher-cost CAP water
 - Water in the Salt River channel as it flows through the Phoenix-metro area is recharging our local groundwater. At 6000 cfs released over Granite Reef dam that equates to roughly 12,000 acre-feet per day of water available to recharge into the Salt River channel. Unfortunately the recharge rate is only about 1 ft/day
 - Unfortunately USGS gauging stations on the Salt River through the Phoenix-metro area and downstream were discontinued in 2010 due to lack of funding – so it is difficult to estimate the volume of runoff being infiltrated. USGS gauging stations on the Gila River downstream of the confluence with the Salt River have been running 2000 to 4000 cfs lower than the Salt River at Priest Drive. This suggests we may be infiltrating a few thousand cfs along this reach of the Salt River, which equates to roughly 2000 to 3000 acre-feet per day.

- The Aqua Fria River flows into Lake Pleasant, and has been experiencing above average flows as shown in the hydrograph below
- The Bill Williams River flows into the Colorado just above the CAP intake and has plans to release high flows Sunday March 7th.
- Lake Pleasant is currently 92% full and CAP is pumping water *into* the Lake for the next few weeks.



Experience has shown that Alamo releases above 2000 cfs will generate **higher-than-normal turbidity levels** at our Colorado River intake, and the turbidity could linger up to 60 days. CAP cannot curtail our west pumping this long, so we will not change our normal springtime pumping plan, which is 100% Colorado River water until June 1. Lake Pleasant releases are planned June 1 through August 31 as usual.

The travel time of the turbid water from Alamo Lake down the Bill Williams River to Lake Havasu is about 24 hours, arriving at CAP's Mark Wilmer Pumping Plant around 0800 Monday morning. The water quality changes through the CAP canal may be monitored on our website, at http://www.cap-az.com/water_quality

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Taste and Odor Data

Data have been collected as usual. ALL sampling locations have MIB < 2 ng/L and Geosmin < 4 ng/L. Specific data is available upon request.

MIB plus geosmin levels above 10 ng/L in finished water lead to noticeable earthy-musty odors by customers. Currently MIB+geosmin levels are below 10 ng/L.

Organic Matter in Water Treatment Plants

Table 2 - Water Treatment Plants – March 01, 2010				
Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
24 th Street WTP Inlet	5.03	0.153	3.05	1.13
24 th Street WTP Treated	2.64	0.044	1.66	1.14
Deer Valley Inlet	4.85	0.145		1.02
Deer Valley WTP Treated				
Val Vista Inlet	5.23	0.156	2.98	1.02
Val Vista WTP Treated –East	2.12	0.033	1.56	0.86
Val Vista WTP Treated -West	3.93	0.117	2.97	0.96
Union Hills Inlet	2.62	0.041	1.57	0.52
Union Hills Treated	2.20	0.024	1.09	0.46
Tempe North Inlet				
Tempe North Plant Treated				
Tempe South WTP	5.21	0.151	2.91	1.02
Tempe South Plant Treated	2.92	0.053	1.81	0.87
Greenway WTP Inlet				
Greenway WTP Treated				
Glendale WTP Inlet	5.54	0.138	2.49	1.03
Glendale WTP Treated				

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)

Organics in Canals

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN (mgN/L)
Waddell Canal	2.64	0.046	1.73	0.51
Union Hills Inlet	2.62	0.041	1.57	0.52
CAP Canal at Cross-connect				
Salt River @ Blue Pt Bridge	5.52	0.151	2.74	1.03
Verde River @ Beeline	4.72	0.168	3.56	1.06
AZ Canal above CAP Cross-connect	5.15	0.158	3.07	1.00
AZ Canal below CAP Cross-connect	5.18	0.159	3.07	1.01
AZ Canal at Highway 87	5.85	0.159	2.72	0.88
AZ Canal at Pima Rd.	5.66	0.158	2.80	0.88
AZ Canal at 56th St.	5.64	0.153	2.71	1.19
AZ Canal - Inlet to 24 th Street WTP	5.03	0.153	3.05	1.13
AZ Canal - Central Avenue	5.10	0.148	2.90	0.98
AZ Canal - Inlet to Deer Valley WTP	4.85	0.145	2.99	1.02
AZ Canal - Inlet to Glendale WTP	5.54	0.138	2.49	1.03
AZ Canal - Inlet to Greenway WTP				
South Canal below CAP Cross-connect				
South Canal at Val Vista WTP	5.23	0.156	2.98	1.02
Head of the Tempe Canal	5.25	0.157	3.00	1.08
Tempe Canal - Inlet to Tempe's South Plant	5.21	0.151	2.91	1.02
Chandler WTP – Inlet				

Reservoir Samples – March 01, 2010					
Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Lake Pleasant (Feb 2010)	Eplimnion	4.15	0.10	2.50	0.85
Lake Pleasant (Feb 2010)	Hypolimnion	4.12	0.10	2.49	0.85
Verde River @ Beeline		4.72	0.17	3.56	1.06
Bartlett Reservoir	Epilimnion	7.11	0.17	2.39	1.22
Bartlett Reservoir	Hypolimnion	2.64	0.21	8.12	0.53
Salt River @ BluePt Bridge		5.52	0.15	2.74	1.03
Saguaro Lake	Epilimnion	5.00	0.15	3.05	1.18
Saguaro Lake	Epi - Duplicate	5.00	0.15	3.01	1.18
Saguaro Lake	Hypolimnion	5.16	0.15	2.95	1.01
Verde River at Tangle	Jan-10	5.25	0.24	4.47	1.07
Havasu	Feb-10	4.84	0.040	0.83	0.95

High flows are bringing in organics from the watershed in runoff flows in the Verde River that are higher in DOC and have a high SUVA. This could pose challenges for treating this water to control DBPs later in the spring of 2010 and fall of 2010.

Starting up a WTP

Every year many WTPs on the SRP system shut down for maintenance themselves, and this period coincides with low water demands and periods when SRP maintains the canals. Restarting a WTP after it has been shut down for several months poses interesting challenges of getting flowrates and chemical dosing correct, while properly disinfecting all components of the system. Below is the strategy that one plant follows (Peoria WTP – thanks for the information):

- *We are presently running one of the two trains and three of the six filters have been prepped and are in service.*
- *The chemical feeds are as follows:*
 - *Al₂SO₄-35 mg/L*
 - *Polymer-1.50 mg/L*
 - *Chlorine residual target- 1.30 mg/L*
 - *NaOH (pH adjustment finished water) 10 mg/L*
- *Raw water turbidity values are 7-8 NTU*
- *Daily flow is 6 MGD*
- *We are presently prechlorinating and not using Ozone. We are not carrying a Cl₂ residual at the filter influent location prior to the GAC filters.*

DBP Modeling

Jeanne Jensen (ASU MS student (recently graduate) and DSWA Engineer) recently completed a project on **Tailoring a Water Quality Model: City of Mesa WTP and Distribution System**. This project will be briefly summarized:

- THM and HAA samples were predicted using a model for sites in the distribution systems at the longest residence time.
- Water age was simulated using a distribution system hydraulic model
- Representative TTHM data from the LRAA sampling for multiple sites (site names removed) is shown below. TTHM values were below the MCL of 0.08 mg/L, but above the goal of 64 ug/L (80% of the MCL which is the utility goal)
- Jar testing was done on multiple water sources (SRP and CAP) to obtain relationships between chemical dosing (including PAC)

and removal of organics. The effectiveness of PAC to remove DOC varies by source, but showed promising results to seasonally improve DOC control, which in turn could control DBPs.

- PAC removal was added into the existing DBP control models.

