# **REGIONAL WATER QUALITY NEWSLETTER**

DATE: Report for April 2013 A Tempe, Glendale, Peoria, Chandler, Phoenix, ADEQ, CAP, SRP, Epcor ASU Regional Water Quality Partnership

http://enpub.fulton.asu.edu/pwest/tasteandodor.htm

## SUMMARY: EVALUATION AND RECOMMENDATIONS

- 1. MIB and geosmin levels are < 10 ng/L everywhere, even for Chandler WTP which had been experiencing high geosmin levels for the past 3 months.
- 2. DOC levels are increasing rapidly in Bartlett Lake on the Verde River because of runoff during middle of March when it warmed up for two weeks and melted snow from the upper basin. This runoff brings DOC into the reservoir system.

Source	Trend in supply	Discharge to	Flow into SRP	Dissolved organic carbon
		water supply	Canal System	Concentration (mg/L) **
		system		
Salt River	Reservoirs at	113 cfs	442 cfs into	4.0 mg/L
	60% full		Arizona	
Verde River	Reservoirs	632 cfs	Canal	4.1 mg/L
	At 78% full		279 cfs into	
			South Canal	
			(77% Verde	
			River Water)	
Colorado River	Lake Pleasant is 82% full (Lake Powell is 48% full)	Lake Pleasant RELEASING water into the CAP canal	21 cfs of <b>CAP</b> water into	2.8 mg/L
Groundwater	Generally increasing due to recharge	299 cfs pumping by SRP	364cfs Groundwater Pumping into SRP Canals	0.5 to 1 mg/L

#### Quick Update of Water Supplies for April 2013 (during day of sampling – April 1<sup>st</sup>)

\*Concentration of these taste and odor compounds in the upper [lower] levels of the terminal reservoir (Saguaro Lake on the Salt River; Bartlett Lake on the Verde River; Lake Pleasant on the CAP system \*\*Concentration of DOC in the terminal reservoir

\*\*\* On paper cities are receiving CAP water in the SRP canals, but as a method of "paying back" from the last drought for excess CAP deliveries – SRP is delivering wet water only from the Salt and Verde Rivers

Data from the following websites:

- <u>http://www.srpwater.com/dwr/</u>
- http://www.cap-az.com/Operations/LakePleasantOps.aspx
- http://lakepowell.water-data.com/



# **Dissolved Organic Carbon In Reservoirs and Treatment Plants**

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)

### **Reservoir Samples**

Reservoir sampling conducted monthly. CAP is sampling Lake Pleasant and Havasu, and USGS is sampling Verde River at Tangle on different days than the other reservoirs.

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg- m)	TDN
Havasu (March)		2.7	0.050	1.9	0.7
Laka Diaggant (Marah)	Epilimnion	2.9	0.047	1.6	0.6
Lake Pleasant (March)	Hypolimnion	2.9 0.058   1.4 0.036		2.0	0.8
Verde River (March)	@ Tangle	1.4	0.036	2.6	0.3
Verde River	@ Beeline Hwy	2.8	0.085	3.0	0.5
Doutlatt Dagamagin	Epilimnion	5.0	0.154	3.1	0.4
Barnett Reservon	Hypolimnion	4.1	0.121	2.9	0.5
Roosvelt Reservoir Inlet (March)		3.1	0.1	4.3	0.8
Saguaro Lake	Epilimnion Epi - Duplicate Hypolimnion	4.6 4.2 4.0	0.073 0.071 0.068	1.6 1.7 1.7	0.6 0.5 0.6
Salt River	@ Blue Point Bridge	3.8	0.069	1.8	1.8

## Organic Matter in Canal

Sample Description	DOC (mg/L)	UV254	SUVA (L/mg-	TDN
		(1/cm)	m)	IDN
Waddell Canal	2.9	0.047	1.6	0.4
Anthem WTP Inlet	2.7	0.011	0.4	0.8
Union Hills Inlet		No access		
CAP Salt-Gila Pump Station (February)	2.7	0.048	1.8	0.6
CAP Mesa Turnout (February)	2.7	0.048	1.8	0.6
CAP Canal at Cross-connect		No access		
Salt River @ Blue Pt Bridge	3.8	0.069	1.8	0.5
Verde River @ Beeline	2.8	0.085	3.0	0.5
AZ Canal above CAP Cross-connect	2.6	0.089	3.4	0.2
AZ Canal below CAP Cross-connect	2.6	0.076	2.9	0.5
AZ Canal at Highway 87	2.7	0.075	2.8	0.4
AZ Canal at Pima Rd.	3.0	0.076	2.6	0.5
AZ Canal at 56th St.	2.9	0.073	2.5	0.6
AZ Canal - Central Avenue	2.8	0.077	2.8	0.5
AZ Canal - Inlet to Glendale WTP	2.6	0.073	2.9	0.6
AZ Canal - Inlet to GreenwayWTP	3.0	0.073	2.4	0.7
South Canal below CAP Cross-connect	2.6	0.075	2.9	0.4
Head of the Tempe Canal	1.9	0.054	2.8	1.3
Tempe Canal - Inlet to Tempe's South Plant	0.9	0.080	8.8	2.7
Head of the Consolidated Canal	2.1	0.064	3.0	1.3
Middle of the Consolidated Canal	1.7	0.047	2.8	2.3
Chandler WTP – Inlet	1.4	0.064	4.7	3.0

#### **Organics at the Water Treatment Plants**

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg- m)	TDN	
Union Hills Inlet		No access			
Union Hills Treated	1.4	0.011	0.8	0.8	
Tempe North Inlet Tempe North Plant Treated		Offline			
Tempe South Inlet	0.9	0.080	8.8	2.7	
Tempe South Plant Treated	0.7	0.027	4.0	3.2	
Greenway WTP Inlet	3.0	0.073	2.4	0.7	
Greenway WTP Treated	1.7	0.023	1.3	0.9	
Glendale WTP Inlet	2.6	0.073	2.9	0.6	
Glendale WTP Treated	1.5	0.027	1.8	0.6	
Anthem WTP Inlet	2.7	0.011	0.4	0.8	
Anthem WTP Treated	2.5	0.011	0.4	0.8	
Chandler WTP Inlet	1.4	0.064	4.7	3.0	
Chandler WTP Treated	1.0	0.018	1.9	3.2	

DOC removal (%)
r
25
43
43
6
29

## **Taste and Odor**

MIB, Geosmin and Cyclocitral are compounds naturally produced by algae in our reservoirs and canals, usually when the water is warmer and algae are growing/decaying more rapidly. They are non toxic, but detectable to consumers of water because of their earthy-musty-moldy odor. The human nose can detect these in drinking water because the compounds are semi-volatile. Since compounds are more volatile from warmer water, these tend to be more noticable in the summer and fall. The human nose can detect roughly 10 ng/L of these compounds. Our team collects samples from the water sources and raw/treated WTP samples. We usually present all the data when concentrations start to exceed 5 ng/L.

- Data for this month on the next pages. MIB and geosmin levels are very low now.
- This is a HUGE change for the Consolidated canal and Chandler WTP, which had been experiencing very high geomsin levels (see graph below) since January. There are still 15 groundwater wells operating along the Consolidated Canal above the WTP, but geosmin levels have dropped to nearly zero. We thought this might be associated with a return flow canals from the Eastern Canal, but working with Chandler we never were exactly able to identify the culprit source of geosmin this winter.



Table 2 -	Water	Treatment	Plants -	- April 1,	2013
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Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Union Hills Inlet	<2.0	<2.0	<2.0
Union Hills Treated	<2.0	<2.0	<2.0
Tempe North Inlet	<2.0	<2.0	<2.0
Tempe North Plant Treated	<2.0	<2.0	<2.0
Tempe South WTP	<2.0	<2.0	<2.0
Tempe South Plant Treated	<2.0	<2.0	<2.0
Anthem Inlet	<2.0	<2.0	<2.0
Anthem Treated	<2.0	<2.0	<2.0
Chandler Inlet	<2.0	2.9	<2.0
Chandler Treated	<2.0	<2.0	<2.0
Greenway WTP Inlet	<2.0	5.2	<2.0
Greenway WTP Treated	<2.0	2.9	<2.0
Glendale WTP Inlet	<2.0	<2.0	<2.0
Glendale WTP Treated	<2.0	<2.0	<2.0

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	<2.0	<2.0	<2.0
	Union Hills Inlet	<2.0	<2.0	<2.0
	CAP Canal at Cross-connect	<2.0	<2.0	<2.0
	Salt River @ Blue Pt Bridge	<2.0	<2.0	<2.0
	Verde River @ Beeline	<2.0	<2.0	<2.0
AZ	AZ Canal above CAP Cross-	1		
	connect	<2.0	<2.0	<2.0
Canal	AZ Canal below CAP Cross-	1		
	connect	<2.0	<2.0	<2.0
	AZ Canal at Highway 87	<2.0	<2.0	<2.0
	AZ Canal at Pima Rd.	<2.0	<2.0	<2.0
	AZ Canal at 56th St.	<2.0	<2.0	<2.0
	AZ Canal - Central Avenue	<2.0	<2.0	<2.0
	AZ Canal - Inlet to Glendale	1		
	WTP	<2.0	<2.0	<2.0
	Head of the Consolidated	1		
	Canal	<2.0	<2.0	<2.0
	Middle of the Consolidated			
	Canal	<2.0	<2.0	<2.0
South	South Canal below CAP Cross-			
	connect	<2.0	<2.0	<2.0
Tempe	Head of the Tempe Canal	<2.0	<2.0	<2.0
Canals	Tempe Canal - Inlet to Tempe's			
	South Plant	<2.0	<2.0	<2.0
	Mesa Turnout	<2.0	<2.0	<2.0
	Salt-Gila Pump	<2.0	<2.0	<2.0

Table 4 - Reservoir Samples – April	12,2013
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Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant (March)	Eplimnion	2.4	<2.0	<2.0
Lake Pleasant	Hypolimnion	<2.0	<2.0	<2.0
Verde River @ Beeline		<2.0	<2.0	<2.0
Bartlett Reservoir	Epilimnion	<2.0	<2.0	<2.0
Bartlett Reservoir	Epi-near dock	<2.0	<2.0	<2.0
Bartlett Reservoir	Hypolimnion	<2.0	<2.0	<2.0
Salt River @ BluePt Bridge		<2.0	<2.0	<2.0
Saguaro Lake	Epilimnion	<2.0	<2.0	<2.0
Saguaro Lake	Epi - Duplicate	<2.0	<2.0	<2.0
Saguaro Lake	Epi-near dock	<2.0	<2.0	<2.0
Saguaro Lake	Hypolimnion	<2.0	<2.0	<2.0
Lake Havasu (March)		2.1	<2.0	<2.0
Verde River at Tangle Creek				
(March)		2.0	<2.0	<2.0
Roosevelt at Salt River Inlet		<2.0	<2.0	<2.0

#### **Reservoir Stratification & Inflows**

Every month we measure the stratification of temperature and dissolved oxygen (DO) in the reservoirs. As the water warms due to hotter days and longer sunlight hours, warmer less dense water stratifies onto the top 10 m or so of the lakes. The lakes are starting to stratify now in late March. By July the surface layer of the lake may be >25 C and will remain 10-15 C at the bottom. As the lake stratifies atmospheric oxygen can not get mixed with depth. Bacteria growing deeper in the lake respire oxygen, as they consume dissolved organic carbon (DOC). The DO profiles remain un-stratified, so not much DOC biodegradation is occurring yet. This will occur more over the next few month. Next month we will collect stratified DOC samples to illustrate this.



Stream runoff on the Verde River (left) and Salt River (right) above the SRP reservoirs are shown in blue below. Shown in yellow are the long-term average (median) daily discharges. This shows that the average streamflows in the Verde River peaked in mid-march during the warm-spell when snow melted in the higher elevations. On the Verde River, flows are now below the long-term average runoff. This runoff brings in DOC into the reservoir and is the main reason for the higher DOC levels now, this month, in Bartlett Lake (on the Verde River) compared to just a few months ago (See DOC trends below). During the same warm spell streamflows on the Salt River above Roosevelt increased, but overall the runoff down the Salt River has trended below the long-term averages.



