REGIONAL WATER QUALITY NEWSLETTER

DATE: Report for April 2014 A Tempe, Glendale, Peoria, Chandler, Phoenix, ADEQ, CAP, SRP, Epcor NSF Central Arizona-Phoenix Long-Term Ecological Research ASU Regional Water Quality Partnership

http://faculty.engineering.asu.edu/pwesterhoff/research/regional-water-quality-issues/

SUMMARY

- Taste and odor levels in April 2014 are NOT insignificant in the Arizona Canal. MIB is 2-6 ng/L and Geosmin is 3-7 ng/L, or cumulatively exceed 10 ng/L and may be noticable to the public. These compounds seem to be formed in the lower Verde River, rather than in the reservoirs or canals.
- 2. Dissolved organic carbon (DOC) levels remain low in the reservoirs (2.8 to 4.7 mg/L).
- The Arizona snowpack is below normal through April 12, 2014. Most basins in Az have <25% of normal snowpack right now. On the Colorado River, Lake Powell is only 39% full and the snowpack is average this year across the Colorado River basin.
- 4. What does low runoff in Arizona mean? We can expect lower TOC, because the runoff is not transporting organic matter from across the watershed or nutrients (N&P). Nutrients fuel algae growth. As they grow, algae release DOC.
- 5. Drought conditions this year also increase the risk of forest fires.

6. SRP and CAP say the "switch is on". This means SRP will switch from the Verde River as the dominant source to the Salt River : SRP will begin the transition from the Verde to the Salt on April 14. The process will take a few days and will end with at least 100 cfs coming from the Verde and the remaining river supply coming from the Salt. CAP will begin releasing water from Lake Pleasant into the Waddell Canal and the CAP Canal beginning in May and continue through August, with water being release from the lower (deeper) gates in Lake Pleasant to avoid algae-related problems.

Topics Du jure

Will this year be a bad fire year?

All indications are that fire season will start early this year in Arizona, and that there is significant fuel conditions in the Salt and Verde River watersheds, as well as the lower elevations which influence important streams like Sycamore Creek and Aqua Fria River which drain into the lower Verde River and Lake Pleasant, respectively.



Fuel Conditions

Drought continues to be the predominant factor determining fuel conditions across the western U.S. Significant drought stretching from Oregon through California into the southern Plains, continues to stress and damage vegetation. This condition will make many more fuels available to burn by reducing live fuel moistures and increasing mortality. Furthermore, March and April precipitation will provide a short term benefit for fuels. leading to increased fine fuel growth and heavier, more continuous fuel beds but not be enough to overcome prolonged moisture deficits.

Poor snowpack in the southwestern U.S., from southern Oregon to California to New Mexico, will have a double effect on fuels. There will be little soil moisture to promote much growth and greenup and it will expose fuels to heating and drying earlier than normal, potentially leading to an earlier start to fire season in those areas.

The remainder of the U.S. has little concern from abnormal fuel conditions. In the Southeast, the Intermountain region and the interior Northwest, fuels are significantly wetter than would be expected this time of year.







Quick Update of Water Supplies for April 2014 (during day of sampling – April 7, 2014)

Source	Trend in supply	Discharge to water supply system	Flow into SRP Canal System	Dissolved organic carbon Concentration (mg/L) **
Salt River	Reservoirs at 58% full	8 cfs	498 cfs into Arizona Canal	4.5 mg/L
Verde River	Reservoirs At 48% full	465 cfs	173 cfs into South Canal (Significant groundwater and CAP water)	3.5 mg/L
Colorado River	Lake Pleasant is 83% full (Lake Powell is 39% full)	Lake Pleasant is being filled from the CAP canal	194 cfs of CAP water into Arizona Canal	3.0 mg/L
Groundwater	Generally increasing due to recharge	196 cfs pumping by SRP	542 cfs Groundwater Pumping into SRP Canals	0.5 to 1 mg/L

*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/index.php/departments/water-operations/lake-pleasant
- <u>http://lakepowell.water-data.com/</u>





Example of Chandler WTP on the South Canal.

No CAP water in the South Canal, but many operating wells.



Example on the Arizona Canal

Significant CAP input and a few wells operating above the Chaparral WTP.

SNOWPACK UPDATE

http://www.thorntonweather.com/snow-basins.php

With exception of the San Francisco Peaks river basin, much of Arizona has significantly less snowpack than average. Snowpack for Lake Powell on the Colorado River is running slightly above average (107% of average for this time of year).

SNOW - PRECIPITATION UPDA	T E De ef com		. 10 .0014
Based on Mountain Data from NRCS SNOTEL Site	AS OI SAT		_ 12 , 2014
STATE		PERCENT OF	Normal
RIVER BASIN	Number	Snow Water	Accum
	of Sites	Equivalent	Precip
ARIZONA			
VERDE RIVER BASIN	4 of 10	*	*
SAN FRANCISCO PEAKS	1 of 1	50	59
CENTRAL MOGOLLON RIM	3 of 4	0 *	52
LITTLE COLORADO - SOUTHERN HEADWATERS	5 of 6	8*	54
UPPER SALT RIVER BASIN / WHITE MOUNTAINS	7 of 8	18*	52
SAN FRANCISCO / UPPER GILA RIVER BASIN	7 of 8	3*	47
CHUSKA MOUNTAINS	0 of 2	*	*
* = Data are not available or data may not provid	de a valid	measure	
* = Data are not available or data may not provid	de a valid	measure	

of conditions for over half of the sites within the basin.





DATE: April 8, 2014

TO: Distribution

FROM: Brian Henning, CAP Water Control Manager

SUBJECT: Summer 2014 Lake Pleasant Operating Plan

CAP's summer 2014 operating strategy will be similar to the last two years. In an effort to maximize CAP's energy resources, releases will begin in May and continue through August. In previous years, CAP avoided Lake Pleasant releases in September altogether to avoid water quality problems. However, experience has shown we can continue releases until Mid-September without issue.

In order 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. Refilling of Lake Pleasant will begin around October 1. The lake level is projected to drop from elevation 1687 to elevation 1641 by the end of August.

The operating plan is to continuously pump from the west end of the CAP system, supplementing Lake Pleasant releases with pass-through pumping of Colorado River water. About 1,000 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 releases 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.

CAP maintenance at the west pumping plants will not affect pass-through pumping this summer. Half-plant outages are scheduled for early July through August.

CAP Operations will notify customers of any unscheduled changes as early as possible, so I hope this summer's operation will bring no surprises. If you have any further questions, you may contact me at (623) 869-2567, or Doug Crosby at (623) 869-2426.

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

Table 4 - Reservoir Samples - April 8, 2014

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

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg- m)	TDN
Havasu (Mar)		4.0	0.053	1.3	0.6
Laka Placant (Mar)	Epilimnion	2.8	0.042	1.5	0.3
Lake Pleasant (Mai)	Hypolimnion	2.8	0.041	1.5	0.4
Verde River (Apr)	@ Tangle	1.3	0.030	2.4	0.2
Verde River	@ Beeline Hwy	3.3	0.071	2.1	0.3
Bartlett Beservoir	Epilimnion	3.8	0.075	2.0	0.3
	Hypolimnion	3.3	0.073	2.2	0.3
	Epilimnion	4.1	0.060	1.4	0.3
Saguaro Lake	Epi - Duplicate	4.6	0.062	1.4	0.4
	Hypolimnion	4.3	0.063	1.5	0.5
Salt River	@ Blue Point Bridge	very low flow			
	above Roosevelt	1.8	0.046	2.5	0.2

Organic Matter in Canal & Water Treatment Plants

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg- m)	TDN	
Union Hills Inlet	2.7	0.043	1.6	0.5	
Union Hills Treated	2.2	0.021	1.0	0.5	
Tempe North Inlet Tempe North Plant Treated		offline			
Tempe South Inlet	0.7	0.005	0.7	2.6	
Tempe South Plant Treated	0.5	0.007	1.4	2.4	
Greenway WTP Inlet	2.5	0.052	2.1	0.8	
Greenway WTP Treated	1.6	0.014	0.9	1.5	
Glendale WTP Inlet	2.9	0.1	2.1	0.8	
Glendale WTP Treated	1.4	0.0	0.8	0.9	
Anthem WTP Inlet	3.2	0.046	1.4	0.5	
Anthem WTP Treated	3.0	0.037	1.2	0.6	
Chandler WTP Inlet	1.9	0.015	0.8	3.4	
Chandler WTP Treated	0.8	0.010	1.2	3.4	

Table 2 - Water Treatment Plants – April 7, 2014

DOC removal (%) 19 29 34 50 6 57

Table 3 - Rivers and Canals – April 7, 2014

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg- m)	TDN
Waddell Canal		s		
Anthem WTP Inlet	3.2	0.046	1.4	0.5
Union Hills Inlet	2.7	0.043	1.6	0.5
CAP Salt-Gila Pump Station (Feb)	2.8	0.041	1.5	0.5
CAP Mesa Turnout (Feb)	2.8	0.044	1.6	0.4
CAP Canal at Cross-connect	2.6	0.044	1.7	0.5
Salt River @ Blue Pt Bridge		no flow		
Verde River @ Beeline	3.3	0.071	2.1	0.3
AZ Canal above CAP Cross-connect	5.0	0.070	1.4	0.3
AZ Canal below CAP Cross-connect	2.9	0.054	1.9	0.3
AZ Canal at Highway 87	0.7	0.064	8.9	0.4
AZ Canal at Pima Rd.	0.4	0.061	13.6	2.4
AZ Canal at 56th St.	3.0	0.062	2.1	0.4
AZ Canal - Central Avenue	3.2	0.063	2.0	0.4
AZ Canal - Inlet to Glendale WTP	2.9	0.061	2.1	0.8
AZ Canal - Inlet to GreenwayWTP	2.5	0.052	2.1	0.8
South Canal below CAP Cross-connect	3.6	0.070	2.0	0.4
Head of the Tempe Canal	3.4	0.023	0.7	1.7
Tempe Canal - Inlet to Tempe's South Plant	0.7	0.005	0.7	2.6
Head of the Consolidated Canal	1.9	0.023	1.2	1.6
Middle of the Consolidated Canal	0.7	0.013	1.8	3.3
Chandler WTP – Inlet	1.9	0.015	0.8	3.4

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.

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral
				(ng/L)
Lake Pleasant (Feb)	Eplimnion	4.2	<2.0	<2.0
Lake Pleasant (Feb)	Hypolimnion	4.1	2.1	<2.0
Verde River @ Beeline		3.2	4.5	<2.0
Bartlett Reservoir	Epilimnion	<2.0	<2.0	<2.0
Bartlett Reservoir	Epi-near			
	dock	2.4	<2.0	<2.0
Bartlett Reservoir	Hypolimnion			
		2.3	<2.0	<2.0
Salt River @ BluePt				
Bridge				
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 (Feb)		2.1	3.1	<2.0
Verde River at Tangle				
Creek (Feb)		<2.0	2.1	<2.0
Roosevelt at Salt River				
Inlet (Feb)		<2.0	<2.0	<2.0

 Table 4 - Reservoir Samples – March 4, 2014

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Union Hills Inlet			
Union Hills Treated	1		
Tempe North Inlet			
Tempe North Plant			
Tempe South WTP	<2.0	<2.0	<2.0
Tempe South Plant	<2.0	3.7	<2.0
Anthem Inlet	<2.0	<2.0	<2.0
Anthem Treated	<2.0	<2.0	<2.0
Chandler Inlet	<2.0	<2.0	<2.0
Chandler Treated	<2.0	<2.0	<2.0
Greenway WTP Inlet	<2.0	6.8	<2.0
Greenway WTP Treated	<2.0	<2.0	<2.0
Glendale WTP Inlet	2.2	2.6	-3.4
Glendale WTP Treated			
24th St. WTP Inlet			
24th St. WTP Outlet]		

Table 2 - Water Treatment Plants – March 3, 2014

Table 3 - Canal Sampling – March 3, 2014

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	<2.0	2.4	<2.0
	Union Hills Inlet			
	CAP Canal at Cross-			
	connect	<2.0	2.4	<2.0
	Salt River @ Blue Pt			
	Bridge			
	Verde River @ Beeline	3.2	4.5	<2.0
AZ	AZ Canal above CAP			
	Cross-connect	4.2	4.4	<2.0
Canal	AZ Canal below CAP			
	Cross-connect	4.7	4.9	<2.0
	AZ Canal at Highway 87	5.6	4.4	<2.0
	AZ Canal at Pima Rd.	6.9	6.6	<2.0
	AZ Canal at 56th St.	5.5	6.3	<2.0
	AZ Canal - Central			
	Avenue	2.3	2.8	<2.0
	AZ Canal - Inlet to			
	Glendale WTP	2.2	2.6	<2.0
	Head of the Consolidated			
	Canal	3.9	3.6	<2.0
	Middle of the			
	Consolidated Canal	<2.0	<2.0	<2.0
	Tempe Canal - Inlet to			
	Tempe's South Plant	<2.0	<2.0	<2.0
	Mesa Turnout (Feb)	2.1	2.5	<2.0
	Salt-Gila Pump (Feb)	2.0	2.6	<2.0