

REGIONAL WATER QUALITY NEWSLETTER

DATE: Report for February 2012

A Tempe, Glendale, Peoria, Chandler, CAP, SRP, Arizona American Water– ASU Regional Water Quality Partnership

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

Sampling dates: Jan & Feb 6-7 2012

SUMMARY: EVALUATION AND RECOMMENDATIONS

1. SRP is currently releasing Verde River water and **MIB levels are not low**. Data for January were < 5 ng/L.
2. SRP will be switching from nearly 95% Verde River Water to almost all Salt River water during the second half of February 2012. This will increase TOC concentrations at WTPs and affect chemical treatment requirements, and based upon our model simulations increase THM formation. Information to help you understand these charges are included in this email.
3. A 7th grader is interested in the water quality effects from the Wallow Forest fire. Read an email about their interest, and let me know if you are interested in helping out (Scottsdale already is).

It has been dry:

As of February 1, snowpack levels are now well below normal in the Verde River Basin, and at or slightly below normal in the other major basins. Precipitation for the month of January was well below normal. Snow water equivalent levels are now well below normal in the Verde River Basin at 63 percent of average. The Salt, Little Colorado River, and San Francisco-Upper Gila River Basins are close to normal levels, ranging from 90 to 102 percent of average. The statewide snowpack is below normal at 71 percent of average.

Percent (%) of 30-Yr. Average Snowpack Levels as of February 1	
Basin	
-----	-----
Salt River Basin	92%
Verde River Basin	63%
San Francisco-Upper Gila River Basin	102%
Little Colorado River Basin	90%
Other Points of Interest	
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Central Mogollon Rim	85%
Chuska Mountains	56%
Grand Canyon	42%
San Francisco Peaks	75%
Statewide Snowpack	71%

Quick Update of Water Supplies for December 2011
(during day of sampling – December 5, 2011)

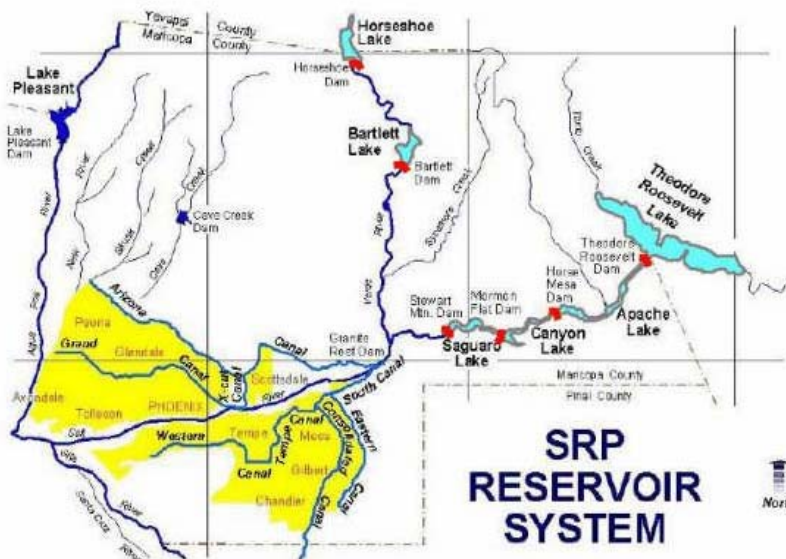
Source	Trend in supply	Discharge to water supply system	Flow into SRP Canal System	Dissolved organic carbon Concentration (mg/L) **
Salt River	Reservoirs at 72% full	8 cfs	261 cfs into Arizona Canal 361 cfs into South Canal (98% Verde River Water)	4.8 mg/L
Verde River	Reservoirs At 24% full	633 cfs		3.7 mg/L
Colorado River	Lake Pleasant is 84% full (Lake Powell is 64% full)	2082 cfs from Colorado River (Lake Pleasant NOT releasing water)	0 cfs of CAP water into Arizona Canal	3.3 mg/L
Groundwater	Generally increasing due to recharge	122 cfs pumping by SRP	122 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

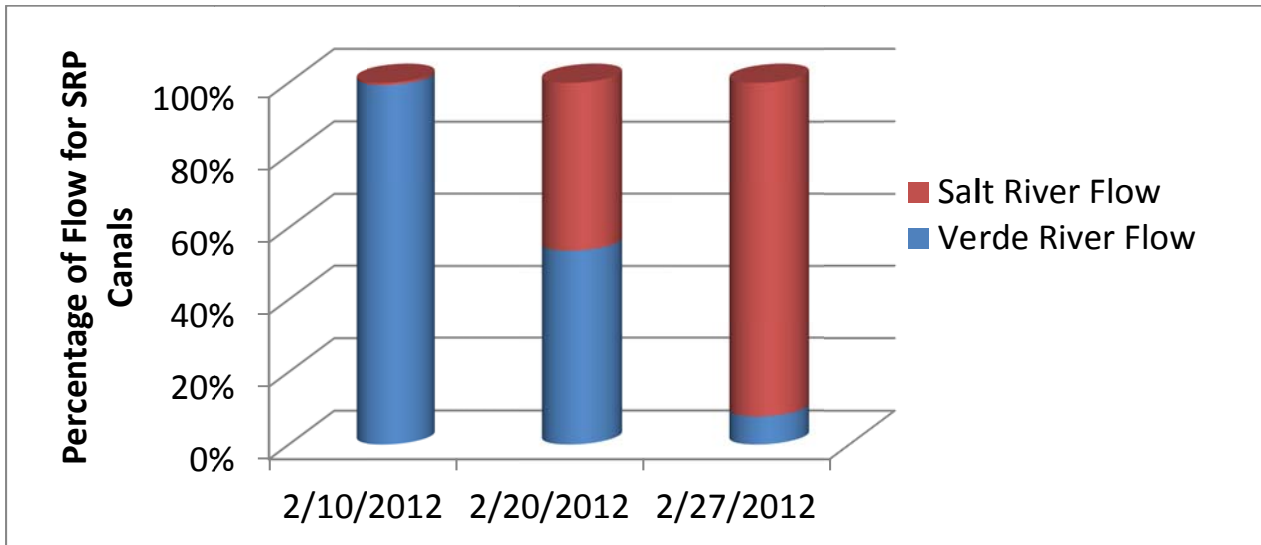
Data from the following websites:

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

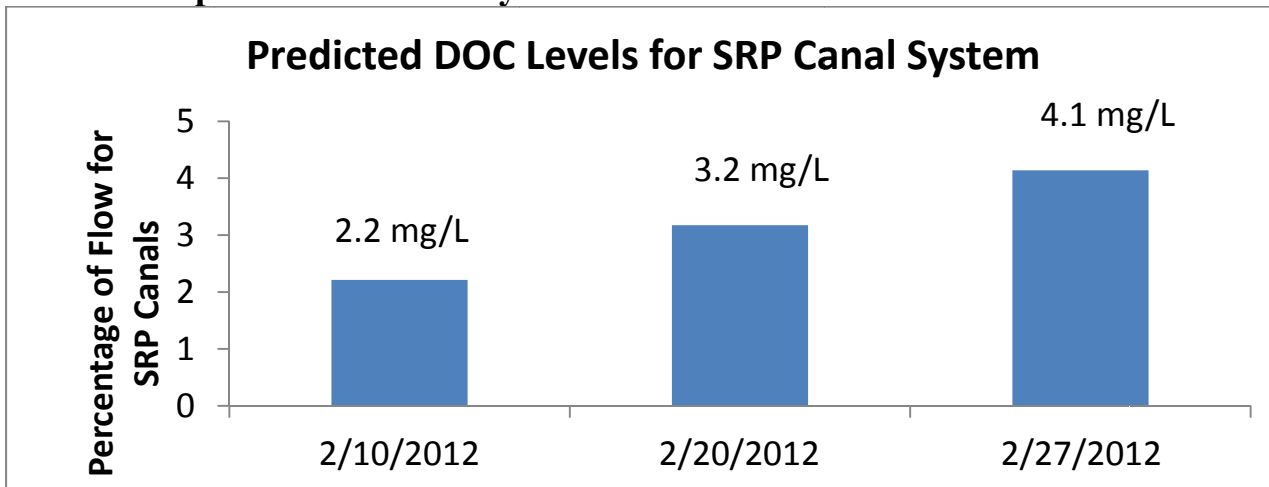


BIG CHANGES COMING SOON!!!!!!

SRP is planning to move 300cfs or approximately half of the water order to the Salt on 2/20/2012. On 2/27/2012 the remainder of the order less the minimum required on the Verde will be moved to the Salt.



This will impact TOC levels in your source water



These changes in source water will impact TOC levels and hence impact THM formation!

THM modeling results

From our project with SRP on evaluating economic trade-offs between water quality in different source waters, treatment chemical costs versus hydropower generation, we have a very nice Excel model for the SRP / CAP water system. The model predicts THM formation, chemical use, etc based upon water quality. I took the above Verde River and Salt River water quality data (next page) along with the projected changes in TOC and ran model simulations for THMs later in February as SRP shifts from nearly 100% Verde River water to nearly 100% Salt River water. I made a few assumptions (40 mg/L alum, 25 mL sulfuric acid, 15 mg/L Ca(OH)₂ lime, final pH ~7.0, 1 mgCl₂/L chlorine residual after 24 hour contact time). This is a high level of treatment. For a low level of treatment, I did 20 mg/L alum only (final pH ~7.3, 1 mgCl₂/L chlorine residual after 24 hour contact time)

Date of SRP Operations	THM (ug/L) for a HIGH level of treatment (1 day residence time)	THM (ug/L) for a LOW level of treatment (1 day residence time)
2/11/12	24 µg/L	32 µg/L
2/20/12	29	39
2/27/12	32	45

Here is the latest water quality data on the two SRP Water sources (December 2012)

Sample Location						
	VerdeBlwBartlet	SaltBlwStwrtMtn				
	Date	Date				
	12/12/11 8:30	12/12/2011				
Constituent	Result	Result	Unit	Limit	Method	Lab
SILVER	BRL	BRL	UG/L	1.0	200.8	IPMS
ALUMINUM	282	BRL	UG/L	10.0	200.8	IPMS
ALKALINITY AS CaCO3	225	131	MG/L	1	SM2320B	WC1
ARSENIC	16.7	3.7	UG/L	1.0	200.8	IPMS
BORON	0.166	0.097	MG/L	0.020	200.7	IP
BARIIUM	49	65	UG/L	10	200.7	IP
BERYLLIUM	BRL	BRL	UG/L	1.0	200.8	IPMS
BROMIDE	BRL	BRL	MG/L	0.10	300.0	WC2
CALCIUM	45.2	50.7	MG/L	1.00	200.7	IP
CADMIUM	BRL	BRL	UG/L	1.0	200.8	IPMS
CHLORIDE	24.2	223	MG/L	1.25	300.0	WC2
CARBONATE	BRL	BRL	MG/L	1	SM2320B	WC1
CHROMIUM	BRL	BRL	UG/L	10	200.7	IP
COPPER	BRL	BRL	UG/L	10	200.7	IP
DIBROMOCHLOROPROPANE	BRL	BRL	UG/L	0.02	504.1	OR
CONDUCTIVITY	640	1110	UMHOS/CM	100	120.1	FLD
ETHYLENE DIBROMIDE	BRL	BRL	UG/L	0.02	504.1	OR
FLUORIDE	0.33	0.26	MG/L	0.10	300.0	WC2
IRON	163	11	UG/L	10	200.7	IP
HARDNESS AS CaCO3	252	184	MG/L		CALC	DM
BICARBONATE	274	160	MG/L	1	SM2320B	WC1
MERCURY	BRL	BRL	UG/L	0.2	245.1	AA1
POTASSIUM	2.8	4.8	MG/L	2.0	200.7	IP
MAGNESIUM	33.8	13.9	MG/L	1.00	200.7	IP
MANGANESE	27	10	UG/L	10	200.7	IP
SODIUM	39.9	154	MG/L	1.00	200.7	IP
NON CARBONATE HARDNESS	27	53	MG/L		CALC	DM
NICKEL	1.0	BRL	UG/L	1.0	200.8	IPMS
NITRATE AS NO3	BRL	BRL	MG/L	0.20	300.0	WC2
NITRITE AS NO2	BRL	BRL	MG/L	0.20	300.0	WC2
NITRITE AS NITROGEN	BRL	BRL	MG/L	0.06	CALC	DM
NITRATE AS NITROGEN	BRL	BRL	MG/L	0.04	CALC	DM
LEAD	BRL	BRL	UG/L	1.0	200.8	IPMS
ION BALANCE CALCULATION	7.72	7.65	%		CALC	DM
PH	8.4	7.8	UNITS	1.0	SM4500-H	FLD
ORTHOPHOSPHATE	BRL	BRL	MG/L	0.05	300.0	WC2
ANTIMONY	BRL	BRL	UG/L	1.0	200.8	IPMS
SELENIUM	BRL	BRL	UG/L	1.0	200.8	IPMS
SILICA	20.6	11.6	MG/L	0.50	200.7	IP
SULFATE	55.8	39.6	MG/L	1.25	300.0	WC2
TOTAL DISSOLVED SOLIDS	337	565	MG/L		CALC	DM
TEMPERATURE	12.6	13.0	DEGREES C		SM4500-H	FLD
THALLIUM	BRL	BRL	UG/L	1.0	200.8	IPMS
VANADIUM	7.2	1.6	UG/L	1.0	200.8	IPMS
ZINC	BRL	BRL	UG/L	10	200.7	IP

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

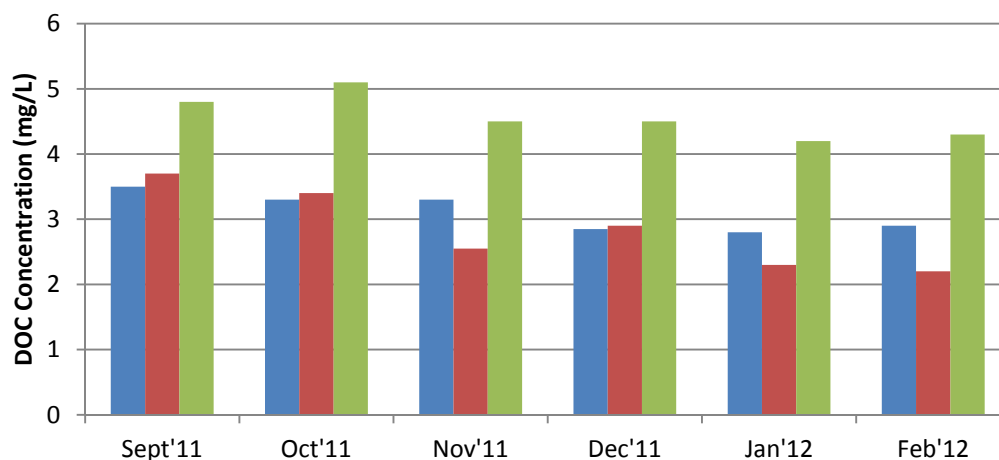
TDN = Total dissolved nitrogen (mgN/L)

Reservoir Samples – February 2012

Reservoir sampling will be conducted only monthly.

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Lake Pleasant	Epilimnion	3.0	0.04	1.5	0.45
Lake Pleasant	Hypolimnion	2.8	0.05	1.6	0.45
Verde River @ Beeline		2.0	0.04	1.8	0.3
Bartlett Reservoir	Epilimnion	2.3	0.04	1.9	0.29
Bartlett Reservoir	Epi- near dock	2.1	0.04	1.9	0.23
Bartlett Reservoir	Hypolimnion	2.3	0.04	1.8	0.3
Salt River @ BluePt Bridge		no water			
Saguaro Lake	Epilimnion	4.2	0.07	1.7	0.4
Saguaro Lake	Epi - Duplicate	4.4	0.07	1.6	0.4
Saguaro Lake	Epi- near dock	4.2	0.07	1.7	0.4
Saguaro Lake	Hypolimnion	4.3	0.07	1.6	0.5
Verde River at Tangle		0.7	0.02	2.4	0.15
Havasu		2.6	0.05	1.7	0.52

■ Lake Pleasant (CAP System) ■ Bartlett Lake (Verde River) ■ Saguaro Lake (Salt River)



Organic Matter in Canal and WTPs

February 6 2012

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Waddell Canal	2.7	0.04	1.4	0.5
Anthem WTP Inlet	2.8	0.04	1.2	0.6
Union Hills Inlet	2.7	0.04	1.5	0.5
CAP Canal at Cross-connect	no water			
Salt River @ Blue Pt Bridge	no water			
Verde River @ Beeline	2.0	0.04	1.8	0.3
AZ Canal above CAP Cross-connect	2.0	0.04	1.9	0.3
AZ Canal below CAP Cross-connect	2.0	0.04	1.9	0.3
AZ Canal at Highway 87	2.0	0.04	1.8	0.3
AZ Canal at Pima Rd.	2.1	0.04	1.8	0.3
AZ Canal at 56th St.	2.0	0.04	1.8	0.4
AZ Canal - Central Avenue	2.5	0.05	1.8	0.3
AZ Canal - Inlet to Glendale WTP	2.5	0.04	1.8	1.4
AZ Canal - Inlet to GreenwayWTP	offline			
South Canal below CAP Cross-connect	2.0	0.04	1.9	0.3
Head of the Tempe Canal	1.7	0.03	1.7	0.3
Tempe Canal - Inlet to Tempe's South Plant	1.7	0.03	1.7	0.6
Head of the Consolidated Canal	1.8	0.03	1.7	0.3
Middle of the Consolidated Canal	1.8	0.03	1.8	0.3
Chandler WTP – Inlet	1.7	0.03	1.7	0.3

Organics at the Water Treatment Plants

February 6, 2012

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN		DOC removal (%)
Union Hills Inlet	2.7	0.04	1.5	0.5		
Union Hills Treated	2.2	0.02	0.9	0.5		16
Tempe North Inlet	offline					
Tempe North Plant Treated						
Tempe South WTP	1.7	0.03	1.7	0.6		
Tempe South Plant Treated	1.1	0.01	0.9	0.7		40
Greenway WTP Inlet	offline					
Greenway WTP Treated						
Glendale WTP Inlet	2.5	0.04	1.8	1.4		
Glendale WTP Treated	offline					
Anthem WTP Inlet	2.8	0.04	1.2	0.6		
Anthem WTP Treated	2.6	0.03	1.3	0.5		10
Chandler WTP Inlet	1.7	0.03	1.7	0.0		
Chandler WTP Treated	1.3	0.02	1.2	0.0		21

7th Graders Care about effects of the Forest Fires

Hello Dr. Westerhoff;

I hate to bother you with this, but my son who is only in the 7th grade has taken a fancy for sustainability/environment issues and is interested to write to you about a science fair project he is working on thru' his school. Last year his project on Building Orientation to Conserve Energy won him first place at State Science Fair in Engineering for his age category...that has motivated him more.

His current project looks at the impact of Wallow fire on Salt River quality. I mentioned that you are an expert in this field and, therefore, he is eager to seek your guidance. He understands your time constraints and his knowledge constraints...but he is keen to write to you. Would it be OK if he does so?

So far, I purchased him a Hach field water test kit and been taking him to Roosevelt Lake once/month to sample incoming and outgoing water. One of my clients (Scottsdale water) has been helping him with TOC analysis. Last weekend, we went to Alpine to see the burn area and he collected samples of the typical burned soil and of the virgin (unburned) soil.

Based on my (distant) past experience with water treatability tests, I have set him up with a simple experiment, where he will run several gallons of water thru' the two beds of samples and analyze water quality of the leachate at regular intervals. This will give him a direct comparison between what leaches out of the two soils, and hence make some assessments of what could be expected of Roosevelt lake quality in the coming months. Scottsdale, again, has agreed to help him with TOC analysis.

He will carry forward the project on his own from this point on...without my help. A discussion with you will immensely motivate him. No worries if your time is very limited.

If you or your organization want to help this student, drop me an email.