REGIONAL WATER QUALITY NEWSLETTER

DATE: Report for May 2010
Sampling conducted May 4, 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

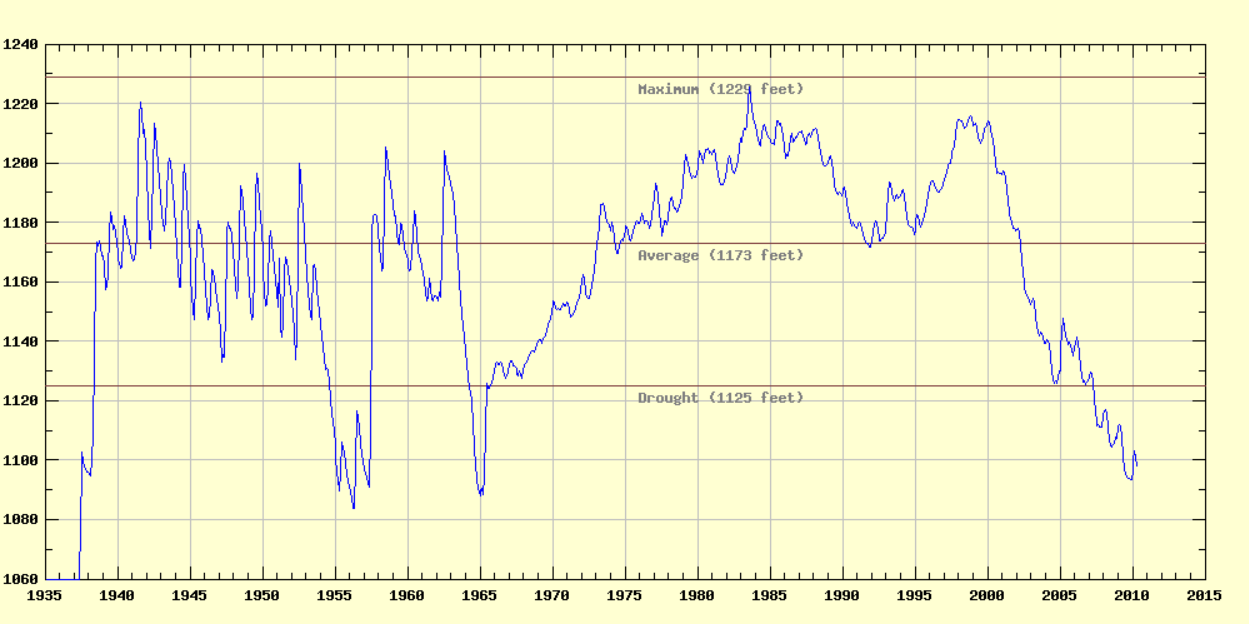
1. MIB plus geosmin levels above 10 ng/L in finished water lead to noticeable earthy-musty odors by customers. Currently MIB+geosmin levels are below 10 ng/L.
2. Dissolved organic carbon (DOC) concentrations in the reservoirs are ~ 4 mg/L (Lake Pleasant) and slightly higher 5.0 to 5.5 mg/L in the Salt River (Saguaro Lake). The CAP canal has only 3 mg/L of DOC. The Verde River DOC of between 5.5 and 6.0 mg/L. DOC is important because it reacts with chlorine to form regulated trihalomethanes. As the water warms up over the next month THM formation will increase.
3. While SRP reservoirs are full, reservoirs on the Colorado River continue to decline
4. In April, WTPs on the CAP canal noticed a 3x increase in chemical treatment costs. This is unusual because water quality is normally very consistent in the CAP system. Heavy and persistent rains this winter affected CAP water quality.
5. A survey on chlorine dioxide use in the valley is included – please participate.
6. Organic colloids in our water supplies may be affecting DBP formation or membrane fouling.
7. An update on the Arizona Blue Ribbon Panel on Water Sustainability is included.

Table 1 - SRP/CAP OPERATIONS - Values in cfs, for May 4, 2010

System	SRP Diversions	CAP
Arizona Canal	939	0
South Canal	734	0
Pumping	62	0
Total	1735	0

- **SRP is releasing water from both Verde and Salt River Systems**. Salt River release from Saguaro Lake: 2150 cfs; Verde River release from Bartlett Lake: 140 cfs.
- **Water is being released over Granite Reef Dam at 400 cfs because the SRP reservoirs are at full capacity. Diversion flows over Granite Reef Dam and into the Salt River channel have dropped by over 90% from last month.**

While Arizona was wet this winter, Lake Mead on the Colorado River continues to be drawn down



In the Upper Colorado River Basin during water year 2009, the overall precipitation accumulated through September 30, 2009 was spproximately 95 percent of average based on the 30 year average for the period from 1971 through 2000. For water year 2010 the dry conditions have persisted. Estimated percentages of average precipitation for the months thus far in water year 2010 are as follows: October 85 percent, November 40 percent, December 130 percent, January 100 percent, February 100 percent, and March 85 percent (http://www.usbr.gov/uc/feature/drought.html)

Rivers feeding Lake Powell are running at 59.26% of the May 20th avg. (http://lakepowell.water-data.com/)

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.

Table 2 - Water Treatment Plants – May 3, 2010

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
24th Street WTP Inlet	<2.0	<2.0	7.2
24th Street WTP Treated	<2.0	<2.0	<2.0
Deer Valley Inlet	<2.0	<2.0	<2.0
Deer Valley WTP Treated			
Val Vista Inlet	<2.0	<2.0	<2.0
Val Vista WTP Treated –East	<2.0	<2.0	<2.0
Val Vista WTP Treated -West	<2.0	<2.0	<2.0
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	4.8
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	7.8
Greenway WTP Inlet	<2.0	<2.0	<2.0
Greenway WTP Treated	<2.0	<2.0	2.7
Glendale WTP Inlet	<2.0	<2.0	<2.0
Glendale WTP Treated	<2.0	<2.0	<2.0

Table 3 - Canal Sampling – May 3, 2010

System	Sample Description			
CAP	Waddell Canal	<2.0	<2.0	<2.0
	Union Hills Inlet	<2.0	<2.0	<2.0
	CAP Canal at Cross-connect			
	Salt River @ Blue Pt Bridge	<2.0	<2.0	<2.0
	Verde River @ Beeline			
AZ	AZ Canal above CAP Cross-connect	<2.0	<2.0	<2.0
Canal	AZ Canal below CAP Cross-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	2.6
	AZ Canal - Inlet to 24th Street WTP	<2.0	<2.0	<2.0
	AZ Canal - Central Avenue	<2.0	<2.0	<2.0
	AZ Canal - Inlet to Deer Valley WTP	<2.0	<2.0	7.2
	AZ Canal - Inlet to Glendale WTP	<2.0	<2.0	<2.0
South	South Canal below CAP Cross-connect	<2.0	<2.0	<2.0
and	South Canal at Val Vista WTP	<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

Table 4 - Reservoir Samples – May 4, 2010

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant (April10)	Eplimnion	**<2.0**	**<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**	**2.8**
Bartlett Reservoir	Epi-near dock	**<2.0**	**<2.0**	**<2.0**
Bartlett Reservoir	Hypolimnion	**<2.0**	**<2.0**	**3.1**
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 (April10)		**<2.0**	**<2.0**	**<2.0**
Verde River at Tangle Creek (March10)		**<2.0**	**<2.0**	**<2.0**

Organic Matter in Water Treatment Plants

Table 2 - Water Treatment Plants – May 03, 2010

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN		DOC removal (%)
24th Street WTP Inlet	4.76	0.117	2.46	0.25		
24th Street WTP Treated	2.78	0.045	1.62	0.17		42
Deer Valley Inlet	4.77	0.119	2.48	0.25		
Deer Valley WTP Treated						
Val Vista Inlet	4.81	0.117	2.43	0.27		
Val Vista WTP Treated –East	2.59	0.039	1.49	0.21		
Val Vista WTP Treated -West	2.30	0.034	1.46	0.25		52
Union Hills Inlet	2.80	0.044	1.57	0.40		
Union Hills Treated	2.13	0.021	0.98	0.35		24
Tempe North Inlet	4.80	0.117	2.44	0.26		
Tempe North Plant Treated	3.77	0.070	1.86	0.28		22
Tempe South WTP	4.69	0.117	2.50	0.26		
Tempe South Plant Treated	3.32	0.060	1.82	0.23		29
Greenway WTP Inlet	4.85	0.118	2.43	0.52		
Greenway WTP Treated	3.64	0.039	1.07	0.46		25
Glendale WTP Inlet	4.80	0.116	2.42	0.44		
Glendale WTP Treated	2.84	0.045	1.58	0.20		41

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
Waddell Canal	**2.98**	**0.043**	**1.44**	**0.46**
Union Hills Inlet	**2.80**	**0.044**	**1.57**	**0.40**
CAP Canal at Cross-connect				
Salt River @ Blue Pt Bridge	**4.72**	**0.118**	**2.49**	**0.37**
Verde River @ Beeline				
AZ Canal above CAP Cross-connect	**4.73**	**0.118**	**2.48**	**0.28**
AZ Canal below CAP Cross-connect	**4.78**	**0.117**	**2.46**	**0.27**
AZ Canal at Highway 87	**4.92**	**0.117**	**2.38**	**0.30**
AZ Canal at Pima Rd.	**4.87**	**0.119**	**2.44**	**0.28**
AZ Canal at 56th St.	**4.79**	**0.118**	**2.45**	**0.33**
AZ Canal - Inlet to 24th Street WTP	**4.76**	**0.117**	**2.46**	**0.25**
AZ Canal - Central Avenue	**4.83**	**0.119**	**2.46**	**0.24**
AZ Canal - Inlet to Deer Valley WTP	**4.77**	**0.119**	**2.48**	**0.25**
AZ Canal - Inlet to Glendale WTP	**4.80**	**0.116**	**2.42**	**0.44**
AZ Canal - Inlet to Greenway WTP	**4.85**	**0.118**	**2.43**	**0.52**
South Canal below CAP Cross-connect	**4.91**	**0.118**	**2.39**	**0.31**
South Canal at Val Vista WTP	**4.81**	**0.117**	**2.43**	**0.27**
Head of the Tempe Canal	**4.82**	**0.118**	**2.45**	**0.33**
Tempe Canal - Inlet to Tempe's South Plant	**4.69**	**0.117**	**2.50**	**0.26**
Chandler WTP – Inlet				

Organics in Lakes

Table 4 - Reservoir Samples – May 03, 2010

Reservoir sampling will be conducted only monthly. CAP is sampling Lake Pleasant on slightly different days than the other reservoirs.

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN	
Lake Pleasant	Eplimnion	**3.73**	**0.08**	**2.10**	**0.55**	Apr-10
Lake Pleasant	Hypolimnion	**3.82**	**0.08**	**2.05**	**0.57**	Apr-10
Verde River @ Beeline						
Bartlett Reservoir	Epilimnion	**5.40**	**0.16**	**2.89**	**0.29**	
Bartlett Reservoir	Hypolimnion	**6.03**	**0.17**	**2.75**	**0.47**	
Salt River @ BluePt Bridge		**4.72**	**0.12**	**2.49**	**0.37**	
Saguaro Lake	Epilimnion	**5.65**	**0.12**	**2.15**	**0.38**	
Saguaro Lake	Epi - Duplicate	**5.30**	**0.12**	**2.27**	**0.34**	
Saguaro Lake	Hypolimnion	**5.45**	**0.12**	**2.24**	**0.55**	
Verde River at Tangle	Mar-10	**3.68**	**0.12**	**3.35**	**0.17**	
Havasu	Apr-10	**3.25**	**0.06**	**1.98**	**0.51**	

CAP water Challenging to Treat this year – Costs to Treat water Triple

Here is a note I received from a WTP in early April after our last Newsletter:

> The CAP source water has been very challenging from a water treatment perspective to say the least. At the Mesa Brown Rd. WTP, we have seen increases in TOC from ~2.6mg/l to 7.5mg/l. Additionally, turbidity has increased to as high as the 25-30 ntu range. Raw water alkalinity increased from a normal 130mg/l to as much as 175mg/l, thus making it very difficult in respect to the coagulation process for color and solids removal by conventional treatment methods.
>
> From a cost perspective, one month ago on 5March2010, raw water turbidity averaged 1.91ntu, alkalinity 134mg/l, and TOC 2.46mg/l. The plant was feeding a alum dose of 9.52mg/l, coag. Polymer at 0.73mg/l, no PAC. Our daily chemical cost for that day was $52.86/MG.
>
> Presently on this date, the plant is feeding alum at 37mg/l, coag. Polymer at 1.5mg/l, PAC at 15mg/l, and 5.0mg/l chlorine total. Our daily chemical cost now is ~$166.04/MG. This represents a little over a three-fold increase in our treatment costs.
>
> Source water quality as far as turbidity, alkalinity, and TOC have been variable from day to day, synonymous to a roller coaster ride. Based on your information and that of Alamo Lake releases, we anticipate these challenging water quality and treatment conditions for another 2-3 weeks.

Use of Chlorine Dioxide in the Valley

Name of Utility: _____

Is your utility using chlorine dioxide now?

Yes – what dosage?
No

Are you planning to use chlorine dioxide in the near future?

Yes – full scale installation is under way
Yes – system is currently under design
Yes – target dosage will be _____ mg/L
No

What is the primary motivation for using chlorine dioxide? THM reduction?

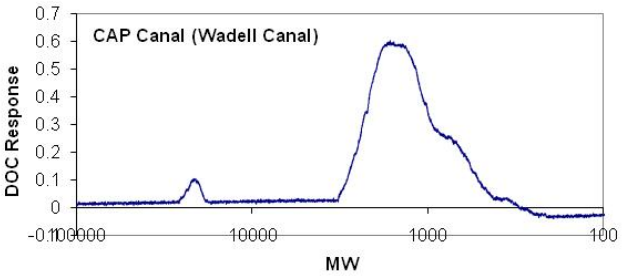
Most utilities around the USA use < 2mg/L of chlorine dioxide because of concern over chlorite (and chlorate). At chlorine dioxide dosages up to 2 mg/L utilities see less than 15% to 20% reduction in THM formation.

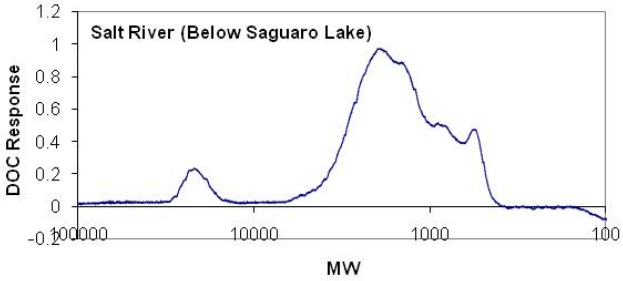
The use of chlorine dioxide can affect the ratio of brominated to chlorinated THM specie formation (i.e., CHCl3 compared with CHCl2Br, etc).

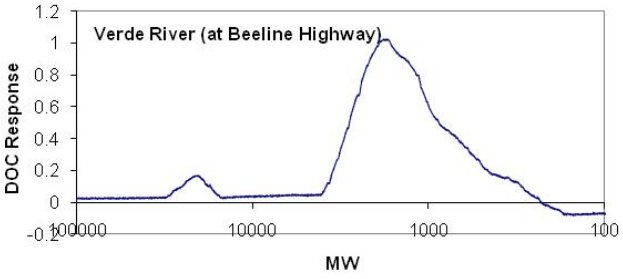
What information do you want to know about chlorine dioxide?

Organic Colloids (natural "nano"materials) in our drinking waters

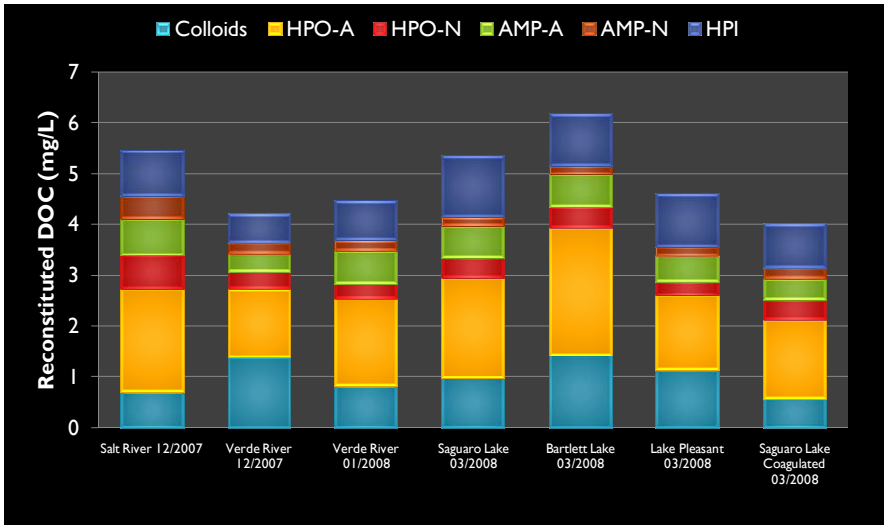
Below are size exclusion chromatograms for TOC from our three surface water sources. The x-axis is the molecular weight and the y-axis is the amount of carbon. The CAP water had a DOC of 3.3 mg/L, and the Salt River and Verde River samples had DOC values of 4.6 mg/L and 5.0 mg/L, respectively. SUVA values were 2.2, 2.7, and 3.7 $(mg/L)^{-1}m^{-1}$. Each sample has "colloids" which are larger in size (> 10,000 Dalton). The three water sources contain 5% to10% of the organics as colloids.



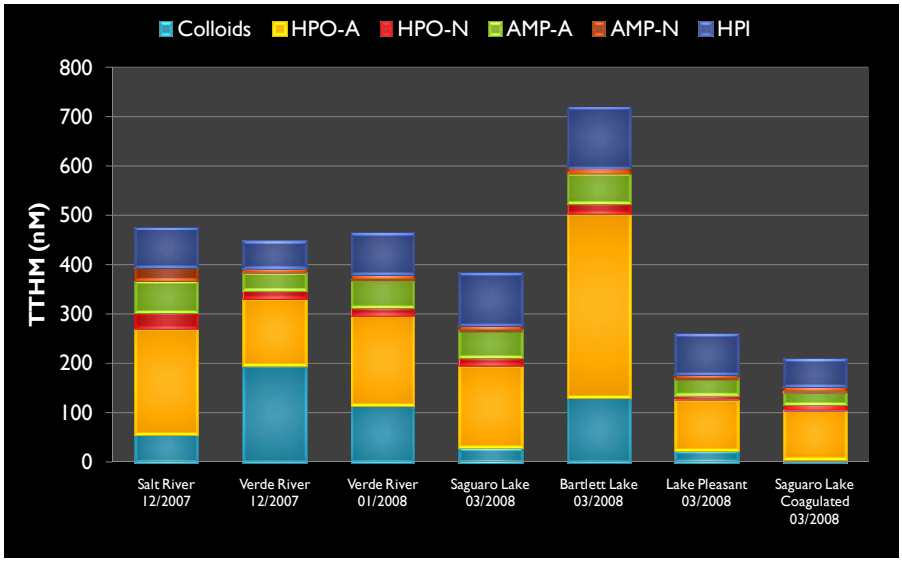




Why are colloids important?
They compose a significant fraction of the DOC.



Do colloids produce THMs upon chlorination?
Yes



State of Arizona Blue Ribbon Panel on Water Sustainability

Learn more at: http://www.azwater.gov/AzDWR/waterManagement/BlueRibbonPanel.htm

Purpose: "To advance statewide sustainability of water by increasing the reuse, recycling and conservation of water to support continued economic development in the State of Arizona while protecting Arizona's water supplies and natural environment."

Panel Composition:

40 appointed panelists from:

- Legislature
- Municipalities
- Federal Government
- Tribes
- Universities
- Private Utilities
- Industry & Environmental associations and organizations

Goals:

1. Increase the volume of reclaimed water reused for beneficial purposes in place of raw or potable water.
2. Advance water conservation, increase the efficiency of water use by existing users, and increase the use of recycled water for beneficial purposes in place of raw or potable water.
3. Reduce the amount of energy needed to produce, deliver, treat, reclaim and recycle water by the municipal, industrial, and agricultural sectors.
4. Reduce the amount of water required to produce and provide energy by Arizona power generators.
5. Increase public awareness and acceptance of reclaimed and recycled water uses and the need to work toward water sustainability.

Schedule and Products:

- **Phase I – Organization & Education**: (Jan – Mar 2010)
- **Phase II – Issue Identification** (Feb – May 2010)
- **Phase III – Concept Development** (May 2010 – July 2010)
  - ***Interim Report*** to Panel at June 2010 meeting
    - *Issues identified*
    - *Priorities*
    - *Potential solutions*
- **Phase IV – Resolution Development** (July 2010 – Nov 2010)
  - Detailed resolution of priority issues
  - Recommendations for legislation, rules, policy, as appropriate
  - ***Final Report*** issued by Panel November 2010

Thanks to Chuck Graf / ADEQ for summarizing the panel update (from AZ Water Conference last week).