Regional Water Quality NEWSLETTER

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Sampling conducted October 4, 2010
A Tempe, Glendale, Peoria, CAP, SRP and Phoenix – ASU Regional Water Quality Partnership

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

DISTRIBUTION: Ronald.Feathers@chandleraz.gov; ACTarvers@FTMCDOWELL.ORG; mary.reker@phoenix.gov; knghiem@csaei.com; Kandis.Knight@asu.edu; gary_moore@tempe.gov; sandra_dewittie@tempe.gov; kspooner@citlink.net; bardizzone@carollo.com; wtrask@mwdh2o.com; jnafsey@mwdh2o.com; JJWilliams@GLENDALEAZ.com; raghunatha.komaragiri@phoenix.gov; mxerxis@scottsdaleaz.gov; mnguyen@ndep.nv.gov; RussellGRhodes@MissouriState.edu; paul.kinshella@phoenix.gov; brian.fayle@phoenix.gov; paul.zelenka@phoenix.gov; patricia.puryear@phoenix.gov; Wontae.Lee@hdrinc.com; Pedram.Shafieian@asu.edu; Daisuke.Minakata@asu.edu; Billt@gilbert.az.us; Braden.Allenby@asu.edu; Rittmann@asu.edu; Jeffrey.Stuck@amwater.com; nina.miller@amwater.com; wayne.janis@asu.edu; jim.holway@asu.edu; gober@asu.edu; rscott@glendaleaz.com; safischer@fs.fed.us; aimee.conroy@phoenix.gov; alan.martindale@cityofmesa.org; allison.shepherd@phoenix.gov; antoniot@ci.gilbert.az.us; arrw716@earthlink.net; awirtz@fs.fed.us; bakerenv@earthlink.net; bardizzone@carollo.com; bhenning@cap-az.com; btalabi@scottsdaleaz.gov; bkmoorhe@srpnet.com; BobCarlson@scwater.com; bonnie.smith@phoenix.gov; Bradley_fuller@tempe.gov; brian.fayle@phoenix.gov; brian.k.watson@phoenix.gov; carl.meyer@phoenix.gov; carlos.padilla@phoenix.gov; cseidel@dswa.net; chennemann@carollo.com; chris.rounseville@phoenix.gov; christenson.kara@epa.gov; cwilson@scottsdaleaz.gov; D'Ann.O'Bannon@phoenix.gov; diwanski@goodyearaz.gov; dempster@asu.edu; dlopez@fs.fed.us; drcrosby@cap-az.com; dwalker@Ag.arizona.edu; dxprigge@srpnet.com; edna.bienz@phoenix.gov; erin.pysell@phoenix.gov; mario_esparza_soto@hotmail.com; francisco.gonzalez@phoenix.gov; frank.blanco@phoenix.gov; giloomis@fs.fed.us; GMaseeh@PIRNIE.COM; Gregg.Elliott@srpnet.com; goelliot@srpnet.com; grant_osburn@tempe.gov; Greg.Ramon@Phoenix.Gov; gtday@amwater.com; GThelin@carollo.com; guy.carpenter@hdrinc.com; huqiang@asu.edu; jdoller@carollo.com; jeffrey.van.hoy@phoenix.gov; jennifer.calles@phoenix.gov; jjwilliams@glendaleaz.com; josh_berdeaux@msn.com; kremmel@ci.glendale.az.us; laxman.devkota@phoenix.gov; lroberts@buckeyeaz.gov; luis.manriquez@phoenix.gov; Marisa.Masles@asu.edu; mark.roye@phoenix.gov; matthew.rexing@cityofmesa.org; maureen.hymel@phoenix.gov; mdehaan@dswa.net; Mdew1@mail.ci.tucson.az.us; mhelton@scottsdaleaz.gov; Michael_Bershad@tempe.gov; Milton.Sommerfeld@asu.edu; MURPHYSP@wattsind.com; nicoleta.buliga@phoenix.gov; ANUNEZ@SCOTTSDALEAZ.GOV; paul.burchfield@phoenix.gov; paulwestcott@appliedbiochemists.com; pdent@cap-az.com; pfenner@fs.fed.us; Randy.Gottler@phoenix.gov; raymond.schultz@phoenix.gov; robert_eck@ci.mesa.az.us; ron.jennings@phoenix.gov; rsgooch@srpnet.com; rscott@glendaleaz.com; rcarpenter@glendaleaz.com; sgrendahl@SCOTTSDALEAZ.GOV; shan.miller@phoenix.gov; sherman_mccutcheon@tempe.gov; SRot@ci.glendale.az.us; srottas@cap-az.com; sacquafredda@dswa.net; steven.schoen@phoenix.gov; susan.potter@phoenix.gov; tara_ford@tempe.gov; terrance.piekarz@phoenix.gov; tgilloglv@carollo.com; THockett@GLENDALEAZ.com; thomas.martin@phoenix.gov; thomasdempster@hotmail.com; tjeffer1@ci.tucson.az.us; tkacerek@cap-az.com; tom.doyle@phoenix.gov; Tom_Hartman@tempe.gov; troy.hayes@phoenix.gov; vlee@carollo.com; waerma@bv.com; walid.alsmadi@phoenix.gov; warrens@sgm-inc.com; wes.taylor@phoenix.gov; wtaylor@mwdh2o.com; William.Hughes@cityofmesa.org; swilson@scottsdaleaz.gov; yu.chu.hsu@phoenix.gov; Yongsheng.Chen@asu.edu; keli@asu.edu; jcritt@asu.edu; uiyer@glendaleaz.com; Michael.Helton@amwater.com; Keith.Greenberg@amwater.com; harry.brown@AMwater.com; mnguyen@ndep.nv.gov; bzachman@dswa.net; hdurbin@dswa.net;paul.zelenka@phoenix.gov; agrochowski@cap-az.com; bradley_fuller@tempe.gov; JBryck@PIRNIE.COM; Susanne.Neuer@asu.edu; Mohan.Seetharam@asu.edu; Chao-An.Chiu@asu.edu; tammy.perkins@phoenix.gov; ZChowdhury@PIRNIE.COM; Shari.Lange@phoenix.gov; nmegonnell@calgoncarbon-us.com; Cynthia.Bain@peoriaaz.gov; Ryan.Rhoades@CH2M.com; jim.kudlinski@srpnet.com; Gambatese.Jason@epamail.epa.gov; charolotte.jones@phoenix.gov; Graham.Symmonds@gwresources.com; scott.lee@gwresources.com; dswilliams@dswa.net; kowolf@srpnet.com; allison.shepherd@phoenix.gov; grant_osburn@tempe.gov; michael_bershad@tempe.gov; thomas.martin@phoenix.gov; carl.meyer@phoenix.gov; ben.hill@phoenix.gov; Ray.Schultz@phoenix.gov; *mdhubble@srpnet.com;* paul.zelenka@phoenix.gov; tom.doyle@phoenix.gov; bradley_fuller@tempe.gov; RScott@GLENDALEAZ.com; chris.rounseville@phoenix.gov; Norman_Clark@tempe.gov; steve.lutringer@amwater.com; kmckinne@amwater.com; anupa.jain@chandleraz.gov; chris.kincaid@chandleraz.gov; larry.duffy@chandleraz.gov; lori.mccallum@chandleraz.gov; nancy.milan@chandleraz.gov; robert.goff@chandleraz.gov; victoria.sharp@chandleraz.gov; wendy.chambers@chandleraz.gov; wes.cannon@chandleraz.gov; JJWilliams@GLENDALEAZ.com; mgross@carollo.com; JYoung@mail.maricopa.gov; kim.eberenz@gwresources.com; CHe@carollo.com; PChao@carollo.com; Tom.Sands@srpnet.com; jamohler@asu.edu; John.Woolschlager@asu.edu; Craig_Caggiano@tempe.gov; kobrickjd@cdm.com; Calkins.John@azdeq.gov; ekaupanger@mail.maricopa.gov; CMeyer@carollo.com; AnnDenise.Taylor@SRPMIC-nsn.gov; greg.robinson@phoenix.gov; lsjohnso@srpnet.com; ; gnbrusse@srpnet.com; Pierre.Herckes@asu.edu; Rolf.Halden@asu.edu; aramarui@dswa.net; macler.bruce@epa.gov; Amy.Miguel@srpmic-nsn.gov; meyerdw@bv.com; greg.ramon@phoenix.gov; yuchu.hsu@phoenix.gov; rwyatt@glendaleaz.com; pete@kroopnick.com; brooke.mayer@asu.edu; tony.mardam@hdrinc.com; Philip_Brown@Tempe.gov; paul.mally@amwater.com; michael.kennedy@mesaaz.gov; terri.baack@phoenix.gov; landrews@glendaleaz.com; cynthia.seelhammer@phoenix.gov; catherine.webster@phoenix.gov; mshapiro@cap-az.com; jperkins@scottsdaleaz.gov; melinda.jacobson@phoenix.gov; bpaulson@scottsdaleaz.gov; dhenderson@scottsdaleaz.gov; mboettcher@sottsdaleaz.gov; cwhitmer@sottsdaleaz.gov; susan.kinkade@phoenix.gov ; LPassantino@PIRNIE.COM; jshaw@pirnie.com; norman_clark@tempe.gov; kris.erickson@phoenix.gov; Gregory.Dehmlow@peoriaaz.gov; neal.megonnell@jacobi.net; Gregory.Dehmlow@peoriaaz.gov; wof@cox.net; clingerrc@cdm.com; Daniel.Candelaria@CH2M.com; bhg@azdeq.gov; Kim.Caggiano@mesaaz.gov; alan.martindale@mesaaz.gov; matthew.rexing@mesaaz.gov; mary_reker@hotmail.com; michelled@wwengineers.com; Dan.Quintanar@tucsonaz.gov; ALutringer@GLENDALEAZ.com; cbrown@usbr.gov; nicholas.silides@mesaaz.gov; brian.biesemeyer@peoriaaz.gov; Linda.Bezy-Botma@peoriaaz.gov; jamie.ashby@srpnet.com; Raymond.Schultz@peoriaaz.gov; chassert@scottsdaleaz.gov; gcarpenter@carollo.com; CharlotteSmith.us@gmail.com; aghosh@dswa.net; tyler.sawyer@asu.edu; cmitchell@scottsdaleaz.gov; hilary.hartline@phoenix.gov

SUMMARY: EVALUATION AND RECOMMENDATIONS

1. Slides from our September 17, 2010 workshop are available online (Thanks for making the workshop a success): ***http://enpub.fulton.asu.edu/pwest/tasteandodor.htm***
2. Our project is continuing, but we are looking for new partners. Over the last 6 months we have discussed with each partner the impacts of budget cuts at their facilities on their ability to continue financial support at the current levels as in the past. The economic situation has caused them to reduce their funding for the regional project. This is understandable, and we have decided to keep key elements of the project going but with reduced analytical intensity. Over the past several years several potential groups (Chandler, Arizona American, Scottsdale, Mesa) have expressed interest in financially contributing – **perhaps now is the time to add your facilities and contribute to the regional effort**. Please contact Paul Westerhoff for details. We plan to continue monthly sampling at key points in the system and have newsletters.
3. 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 in the canals, but are high in the reservoirs. Saguaro Lake has 70-90 ng/L of MIB and Bartlett has 20-30 ng/L. As these reservoirs continue to destratify – **expect high levels of MIB in the next 2-3 weeks at your WTPs**.
4. WTPs that have activated carbon (PAC or GAC) are removing Taste and Odor compounds, while those without activated carbon are not removing MIB.
5. A long-term trend of increasing DOC in Saguaro Lake is quite apparent. This is the major water supply for the SRP canals. These high levels of DOC will continue for 2-3 years in Saguaro Lake is our prediction.
6. Based upon the outcome from the workshop, a major focus this year will be on organic matter characterization – specifically size distributions in source water and during treatment. We will also conduct some analyses to understand historic climate variability on DOC in the reservoirs.

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

System	SRP Diversions	CAP
Arizona Canal	642	0
South Canal	512	0
Pumping	29	0
Total	1183	0

- **SRP is releasing water from both Verde and Salt River Systems**. Salt River release from Saguaro Lake: 1008 cfs; Verde River release from Bartlett Lake: 250 cfs.
- **SRP reservoirs are 87% full.**
- **After this weeks rains, flows from the reservoirs were reduced**

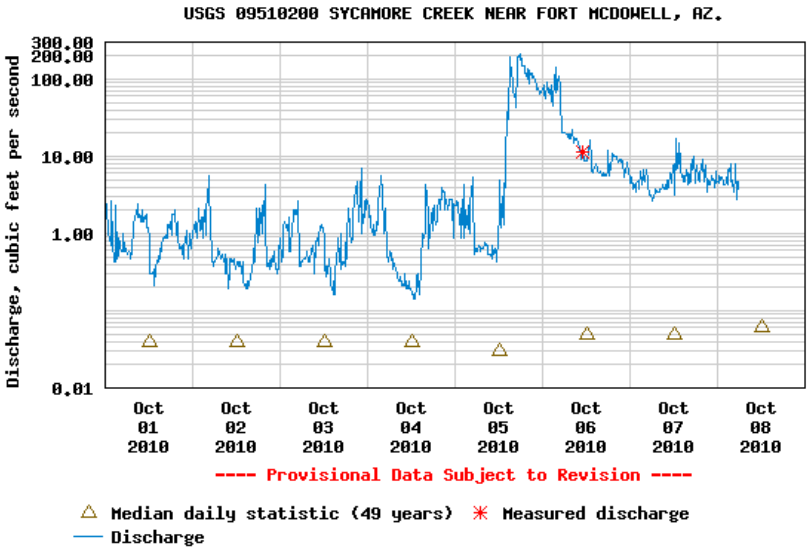
CAP Operations of Lake Pleasant

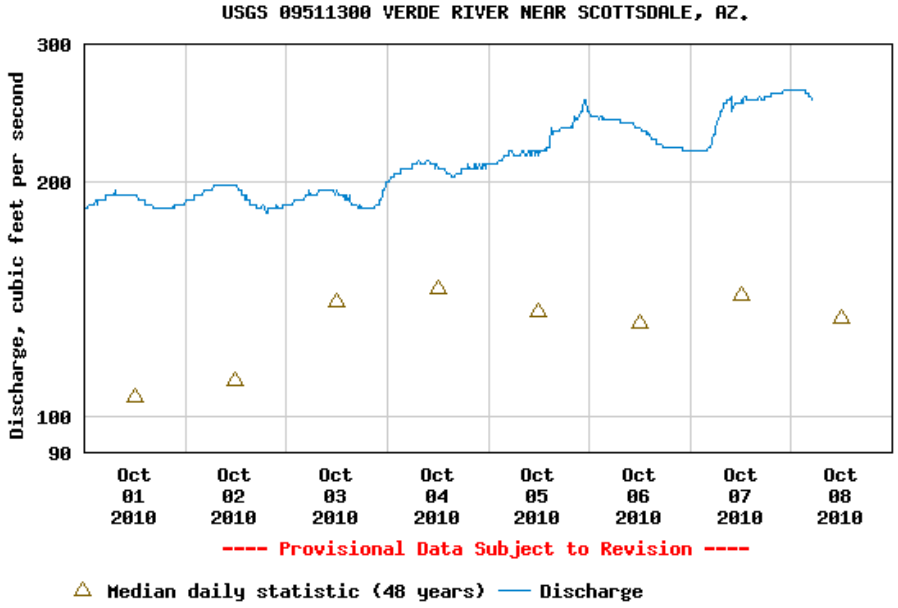
Water is being released from Lake Pleasant into the CAP canal and mixing with water being pumped from the Colorado River.

Flow from Colorado River:	3615 cfs (Hassayampa pump station)
Flow from Lake Pleasant into CAP canal:	1142 cfs INTO Lake Pleasant
Lake Pleasant Capacity	54% full

CAP plans to stopped releases from Lake Pleasant in early September 2010 and is using 100% Colorado River Water in the CAP canal. This is being done to minimize the risk of elevated T&O levels which seasonally occur in Lake Pleasant from being released into the CAP canal and WTPs located along the canal.

Previously we have shown that Sycamore Creek contributes much of the turbidity into the SRP canal system, as it flows into the Verde River near FOunatain Hills and then into the Salt River above Granite Reef Dam. Here are the flows in Sycamore Creek and the Verde River below the creek from this weeks rains.





Taste and Odor Data

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 in the canals, but levels are rapidly increasing in the reservoirs.

Table 2 - Water Treatment Plants – October 4, 2010

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Union Hills Inlet	5.7	5.2	<2.0
Union Hills Treated	5.3	3.0	<2.0
Tempe North Inlet	7.5	9.0	4.0
Tempe North Plant Treated	3.1	<2.0	<2.0
Tempe South WTP	2.9	2.1	<2.0
Tempe South Plant Treated	2.8	<2.0	<2.0
Greenway WTP Inlet	2.8	3.4	<2.0
Greenway WTP Treated	<2.0	2.7	<2.0
Glendale WTP Inlet	5.7	6.5	2.7
Glendale WTP Treated	<2.0	<2.0	<2.0

WTPs that have activated carbon (PAC or GAC) are removing Taste and Odor compounds, while those without activated carbon are not removing MIB.

Table 3 - Canal Sampling – October 4, 2010

System	Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
CAP	Waddell Canal	3.7	3.3	<2.0
	Union Hills Inlet	5.7	2.5	<2.0
	CAP Canal at Cross-connect			
	Salt River @ Blue Pt Bridge	12.3	2.7	5.0
	Verde River @ Beeline	4.9	6.3	5.7
AZ	AZ Canal above CAP Cross-connect	7.7	3.1	2.3
Canal	AZ Canal below CAP Cross-connect	7.6	3.8	<2.0
	AZ Canal at Highway 87	7.0	6.8	3.6
	AZ Canal at 56th St.	8.0	9.0	3.7
	AZ Canal - Central Avenue	7.0	12.6	3.6
	AZ Canal - Inlet to Glendale WTP	5.7	6.5	2.7
South	South Canal below CAP Cross-connect	9.1	3.9	3.3
Tempe	Head of the Tempe Canal	4.7	3.6	<2.0
Canals	Tempe Canal - Inlet to Tempe's South Plant	2.9	2.1	<2.0

Table 4 - Reservoir Samples – October 5, 2010

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant (Sep10)	Eplimnion	2.4	3.6	3.0
Lake Pleasant (Sep10)	Hypolimnion	2.5	<2.0	<2.0
Verde River @ Beeline		4.9	6.3	5.7
Bartlett Reservoir	Epilimnion	30.5	<2.0	<2.0
Bartlett Reservoir	Epi-near dock	24.7	<2.0	<2.0
Bartlett Reservoir	Hypolimnion	25.2	<2.0	<2.0
Salt River @ BluePt Bridge		12.3	2.7	5.0
Saguaro Lake	Epilimnion	73.5	7.0	<2.0
Saguaro Lake	Epi - Duplicate	76.8	6.8	<2.0
Saguaro Lake	Epi-near dock	85.0	8.5	2.1
Saguaro Lake	Hypolimnion	12.6	2.8	<2.0
Lake Havasu (Sep10)		6.2	3.4	<2.0
Verde River at Tangle Creek (Aug10)		<2.0	2.4	<2.0

Saguaro Lake releases water from deep in the lake (i.e., hypolimnion). Algae that produce T&O tend to live in the sunlight-impacted upper layers (epilimnion). Levels of MIB were also high last month. Right now SRP is blending Salt and Verde River water – if this were to change then considerably higher levels of MIB would be in the SRP canal system.

Organic Matter in Water Treatment Plants

Table 2 - Water Treatment Plants – October 04, 2010

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN		DOC removal (%)
Union Hills Inlet	2.80	0.041	1.47	0.48		
Union Hills Treated	2.30	0.024	1.03	0.41		18
Tempe North Inlet	4.42	0.098	2.22	0.39		
Tempe North Plant Treated	2.41	0.034	1.41	0.68		45
Tempe South WTP	3.82	0.086	2.26	0.40		
Tempe South Plant Treated	2.63	0.038	1.43	0.32		31
Greenway WTP Inlet	4.17	0.096	2.29	0.49		
Greenway WTP Treated	3.60	0.036	1.00	0.46		13
Glendale WTP Inlet	4.38	0.098	2.25	0.41		
Glendale WTP Treated	2.92	0.037	1.27	0.32		33

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)

Union hills WTP was experiencing issues with their presedimentation basins and samples were not collected.

Organics in Canals

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Waddell Canal	2.77	0.042	1.53	0.48
Union Hills Inlet	2.80	0.041	1.47	0.48
CAP Canal at Cross-connect				
Salt River @ Blue Pt Bridge	4.54	0.103	2.28	0.35
Verde River @ Beeline	2.86	0.077	2.70	0.38
AZ Canal above CAP Cross-connect	4.25	0.097	2.27	0.38
AZ Canal below CAP Cross-connect	4.16	0.099	2.37	0.39
AZ Canal at Highway 87	4.33	0.095	2.20	0.39
AZ Canal at 56th St.	4.34	0.097	2.23	0.37
AZ Canal - Central Avenue	4.33	0.096	2.22	0.38
AZ Canal - Inlet to Glendale WTP	4.38	0.098	2.25	0.41
AZ Canal - Inlet to Greenway WTP	4.17	0.096	2.29	0.49
South Canal below CAP Cross-connect	4.27	0.098	2.29	0.51
Head of the Tempe Canal	3.65	0.082	2.26	0.43
Tempe Canal - Inlet to Tempe's South Plant	3.82	0.086	2.26	0.40
Chandler WTP – Inlet				

Organics in Lakes

Table 4 - Reservoir Samples – October 04, 2010

Reservoir sampling will be conducted only monthly.

CAP is sampling Lake Pleasant on slightly different days than the other reservoirs.

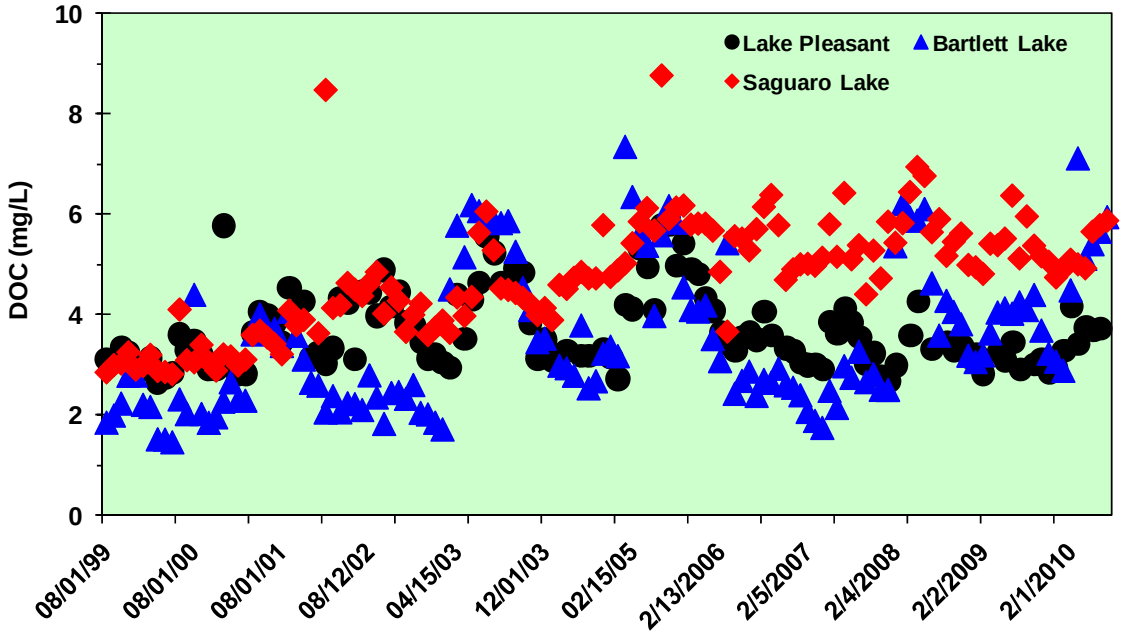
Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA (L/mg-m)	TDN
Lake Pleasant (sept 2010)	Eplimnion	3.12	0.06	1.83	0.61
Lake Pleasant (sept 2010)	Hypolimnion	4.13	0.06	1.53	0.33
Verde River @ Beeline		2.86	0.077	2.70	0.38
Bartlett Reservoir	Epilimnion	4.26	0.096	2.26	0.29
Bartlett Reservoir	Epi-near dock				
Bartlett Reservoir	Hypolimnion	4.46	0.098	2.19	0.35
Salt River @ BluePt Bridge		4.54	0.103	2.28	0.35
Saguaro Lake	Epilimnion	5.13	0.102	1.99	0.40
Saguaro Lake	Epi - Duplicate	5.16	0.102	1.97	0.46
Saguaro Lake	Epi-near doc				
Saguaro Lake	Hypolimnion	5.12	0.106	2.07	0.54
Verde River at Tangle	Aug-10	1.59	0.048	3.03	0.15
Havasu	Sep-10	2.78	0.04	1.56	0.60

Use of Size Exclusion Chromatography for Characterizing DOC Effeciency of Water Treatment Plant Processes

The ASU team presented data from several treatment facilities on SEC-DOC results at the workshop (see our slides). We have been approached by several partners who want to do more of this analysis to help in process optimization for DOC removal, and data should be forthcoming next month.

SEC-DOC can provide information on the following to help in process optimization:

1. Distribution of high, medium and low molecular weight organics in raw, through each process, and finished water. We would like to include a few DISTRIBUTION system samples too.
2. Coagulation usually removes higher molecular weight organics.
3. Activated carbon can remove medium molecular weight organics
4. Low molecular weight organics are difficult to remove, yet still form DBPs.
5. SEC-DOC data from source waters can provide useful insight into the future treatability of DOC.

Long-Term DOC trends in source waters

At the workshop there was interest in the long-term trends of DOC in the reservoirs. We extended the timeframe of the plot we presented, and the complete dataset is shown below. A long-term trend of increasing DOC in Saguaro Lake is quite apparent. This is the major water supply for the SRP canals. These high levels of DOC will continue for 2-3 years in Saguaro Lake is our prediction.