Regional Water Quality NEWSLETTER

DATE: Report for April 2007
Samples Collected on April 9-10, 2007
From the Phoenix, Tempe, 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. SRP is releasing nearly 75% Salt River water and 25% Verde River water now into the SRP canals.
2. Saguaro Lake Reservoir very high levels of geosmin, which could impact WTPs next month.
3. Some WTPs are already adding powder activated carbon – not for T&O control, but for controlling DBP formation.
4. THM formation is almost a perfect linear relationship with chlorine consumed, across all three water sources. Therefore, keeping track of CHLORINE CONSUMPTION (Dose minus residual) is an EXCELLENT indicator for TTHM formation. This tests clearly indicate that Salt River water has the highest DBP formation potential, even after alum coagulation.
5. Iodide occurrence may be important for utilities considering conversion from free chlorine to chloramines. A discussion is provided.
6. A turbidity spike may be coming down the CAP canal
7. The April 2007 newsletter from the Arizona Water Institute is attached.
8. Happy tax-time.

Table 1 Summary of WTP Operations

	Union Hills	24th Street WTP	N.Tempe J.G. Martinez	Deer Valley	Greenway WTP	Val Vista	South Tempe	Chandler WTP
Location	**CAP**	**Arizona Canal System**				**South Canal System**		
PAC Type and Dose	None	None		Norit 14 ppm	None	Norit 20B 8 ppm		
Copper Sulfate	None			None	None	0.25 ppm		
PreOxidation	None			None	Ozone = 1.1 mg/L	None		
Alum Dose Alkalinity pH	7.78 [1] 132/113 7.2			44.6 147/109 6.9	13 136 7.5	50 170 7.0		
Finished water DOC DOC removal[2]	2.0 mg/L 16%			2.1 mg/L 34%	2.0 mg/L 30%	2.2 mg/L 34%-39%	0.6 mg/L 16%	
WTP plant comments		Plant is OFF line	Plant is OFF line			Reports 39.5% TOC removal (TOC=4.25 and DOC = 4.28 TTHM at plant are 28 ug/L		

[1] **Ferric chloride instead of alum**

[2] Calculated based upon influent and filtered water DOC (note that DOC – not TOC – is used in this calculation)

Table 2 - Water Treatment Plants – April 9, 2007

Sample Description	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
24th Street WTP Inlet			
24th Street WTP Treated			
Deer Valley Inlet	**<2.0**	**<2.0**	**<2.0**
Deer Valley WTP Treated	**<2.0**	**<2.0**	**<2.0**
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			
Tempe North Plant Treated			
Tempe South WTP	**<2.0**	**<2.0**	**<2.0**
Tempe South Plant Treated	**<2.0**	**<2.0**	**<2.0**
Tempe South Plant Treated (Lab)			
Chandler WTP Inlet	**<2.0**	**<2.0**	**<2.0**
Chandler WTP Treated	**<2.0**	**<2.0**	**<2.0**
Greenway WTP Inlet	**<2.0**	**2.5**	**<2.0**
Greenway WTP Treated	**<2.0**	**<2.0**	**<2.0**

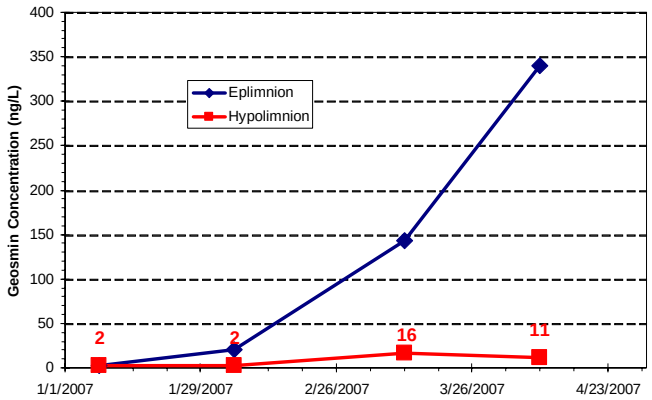
Table 3 - Canal Sampling – April 9, 2007

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
AZ Canal	Salt River @ Blue Pt Bridge	<2.0	5.4	<2.0
	Verde River @ Beeline	<2.0	<2.0	<2.0
	AZ Canal above CAP Cross-connect	<2.0	<2.0	<2.0
	AZ Canal below CAP Cross-connect	<2.0	2.9	10.7
	AZ Canal at Highway 87	<2.0	<2.0	2.2
	AZ Canal at Pima Rd.	<2.0	<2.0	<2.0
	AZ Canal at 56th St.	<2.0	<2.0	<2.0
	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			
	AZ Canal - Inlet to Greenway WTP	<2.0	2.5	<2.0
South and Tempe Canals	South Canal below CAP Cross-connect	<2.0	3.4	2.8
	South Canal at Val Vista WTP	<2.0	<2.0	<2.0
	Head of the Tempe Canal	<2.0	<2.0	<2.0
	Tempe Canal - Inlet to Tempe's South Plant	<2.0	<2.0	<2.0
	Chandler WTP – Inlet	<2.0	<2.0	<2.0

Table 4 - Reservoir Samples – April 9, 2007

Sample Description	Location	MIB (ng/L)	Geosmin (ng/L)	Cyclocitral (ng/L)
Lake Pleasant (April 3, 2007)	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	8.6	<2.0	<2.0
Bartlett Reservoir	Epi-near dock	9.6	<2.0	<2.0
Bartlett Reservoir	Hypolimnion	<2.0	<2.0	<2.0
Salt River @ BluePt Bridge		<2.0	5.4	<2.0
Saguaro Lake	Epilimnion	<2.0	340.4	2.1
Saguaro Lake	Epi - Duplicate	<2.0	366.8	2.3
Saguaro Lake	Epi-near doc	<2.0	312.0	5.4
Saguaro Lake	Hypolimnion	<2.0	11.4	4.3
Verde River at Tangle (March 28, 2007)		<2.0	<2.0	<2.0
Havasu (March 28, 2007)		<2.0	<2.0	<2.0

Geosmin concentrations in Saguaro Lake in the upper 10 meters of the water column (Eplimnion) and deeper parts of the water column (hypolimnion). Water from the hypolimnion is released downstream to the Salt River, SRP Canals, and then to the water treatment plants.



Geosmin levels have increased dramatically over the past month. One reason for this may be that SRP is releasing water from Canyon Lake for repairs on the dam this year. As a result, this water may be moving through Saguaro Lake with minimal mixing.

Table 5 - SRP/CAP OPERATIONS
Values in cfs, for April 9, 2007

System	SRP Diversions	CAP
Arizona Canal	441	194
South Canal	376	0
Pumping	609	0
Total	1426	194

SRP is releasing water from both Verde and Salt River Systems. Salt River release from Saguaro Lake: 492 cfs; Verde River release from Bartlett Lake: 108 cfs.

New Feature Section: For Salt Sakes

This section will periodically give updates on salinity related issues in the valley. If you have something to add, please send it along.

There was a question regarding the iodide concentration in the source water, because iodide can affect disinfection byproduct formation (see later in this Newsletter). Even low concentrations of iodide can be important. To our knowledge there is NOT good iodide concentration data in the SRP or CAP system. There are 2 basic approaches to measuring. The first and most accurate is ICP/MS/MS for total iodine (Reference: Germanium dioxide as internal standard for simplified trace determination of bromate, bromide, iodate and iodide by on-line coupling ion chromatography-inductively coupled plasma mass spectrometry, JOURNAL OF CHROMATOGRAPHY A 1050 (1): 103-109 SEP 24 2004). Some iodine may be tied up in organic matrices though, but this give a good overall number. We used this on a recent AwwaRF project for wastewaters. The second is a high sensitivity Ion Chromatography method where Iodide and iodate can be determined by two new methods using anion-exchange chromatography with postcolumn reaction and UV/visible detection. Iodide is determined as IBr2 - at 249 nm. The detection limits for iodide and iodate are 0.1 *í*g/L (reference: Determination of Iodide and Iodate by Ion Chromatography with Postcolumn Reaction and UV/Visible Detection, Yves Bichsel and Urs von Gunten, Anal. Chem. 1999, 71, 34-38)

Total iodine concentrations in water resources are usually in the range of 0.5-20 *m*g/L but can exceed 50 *m*g/L in certain groundwaters. Here is an ongoing project sponsored by AwwaRF:

> **Project Snapshot** : Iodinated Acids and Iodide in Drinking Water Supplies: Method Development for Nanogram-per-Liter Levels of Detection Relevant for Application in Occurrence Surveys #3175
> **Project Summary**: Will develop robust analytical methods for iodide at sub microgram-per-liter levels and iodinated acids at nanogram-per-liter levels that can be used to determine occurrence levels in the U.S. drinking water supply.
> **Contractor**: University of North Carolina at Chapel Hill
> **Project Manager**: Djanette Khiari
> **Funded**: 2005 **Completion Date**: 12/1/2009 **Funding Amount**: $208,000.00

Table 6 - Water Treatment Plants – March 9, 2007

Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA	TDN
24th Street WTP Inlet				
24th Street WTP Treated				
Deer Valley Inlet	**3.17**	**0.062**	**2.0**	**1.016**
Deer Valley WTP Treated	**2.08**	**0.029**	**1.4**	**0.881**
Val Vista Inlet	**3.54**	**0.0805**	**2.28**	**0.309**
Val Vista WTP Treated –East	**2.33**	**0.0462**	**1.99**	**0.264**
Val Vista WTP Treated -West	**2.17**	**0.0341**	**1.57**	**0.241**
Union Hills Inlet	**2.41**	**0.037**	**1.53**	**0.600**
Union Hills Treated	**2.01**	**0.019**	**0.94**	**0.579**
Tempe North Inlet				
Tempe North Plant Treated				
Tempe South WTP	**0.72**	**0.0141**	**1.97**	**2.818**
Tempe South Plant Treated	**0.60**	**0.0094**	**1.57**	**2.561**
Chandler WTP Inlet				
Chandler WTP Treated				
Greenway WTP Inlet	**2.78**	**0.058**	**2.1**	**1.822**
Greenway WTP Treated	**1.96**	**0.021**	**1.1**	**1.266**

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)

Tempe south plant has high TDN and low DOC/UVA, I did notice quite a bit of algal growth in the sedimentation basins. The ammonia concentrations are low (<0.02 NH3-N), and this TDN is mostly nitrate from the groundwater wells. The MCL for nitrate is 10 mg-NO3-N/L. Groundwater contains low DOC, and is unlikely to form substantial levels of DBPs.

Table 7 - Canal Sampling – March 9, 2007

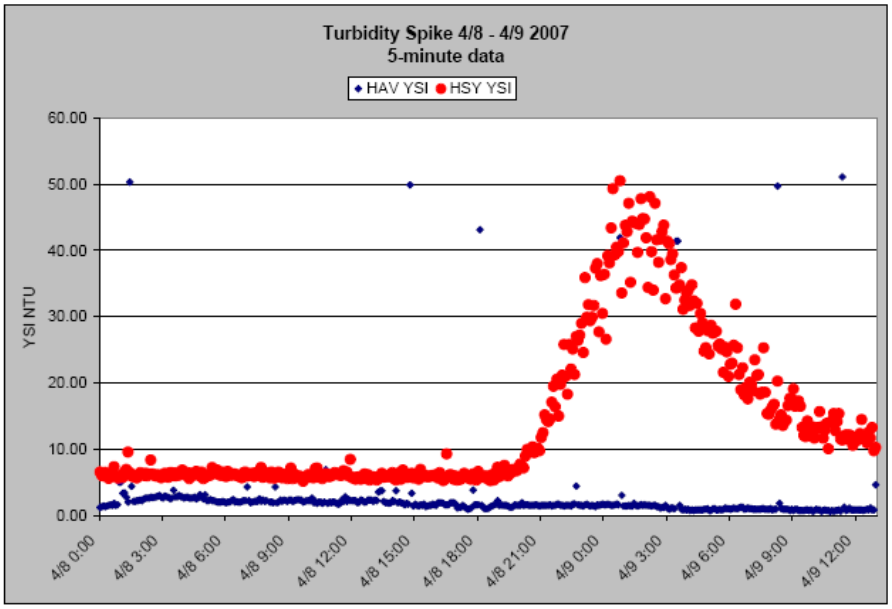
System	Sample Description	DOC (mg/L)	UV254 (1/cm)	SUVA	TDN
CAP	Waddell Canal	2.53	0.0381	1.51	0.070
	Union Hills Inlet	2.41	0.0367	1.53	0.600
	CAP Canal at Cross-connect	2.41	0.0373	1.55	0.611
AZ Canal	Salt River @ Blue Pt Bridge	4.21	0.1008	2.39	0.303
	Verde River @ Beeline	1.54	0.0466	3.04	0.314
	AZ Canal above CAP Cross-connect	3.83	0.0883	2.31	0.273
	AZ Canal below CAP Cross-connect	3.14	0.0625	1.99	0.451
	AZ Canal at Highway 87	3.38	0.0661	1.96	0.421
	AZ Canal at Pima Rd.	3.40	0.0669	1.97	0.426
	AZ Canal at 56th St.	3.30	0.0668	2.03	0.475
	AZ Canal - Inlet to 24th Street WTP				
	AZ Canal - Central Avenue	3.23	0.0666	2.06	0.580
	AZ Canal - Inlet to Deer Valley WTP	3.17	0.0620	1.96	1.016
	AZ Canal - Inlet to Greenway WTP	2.78	0.0583	2.10	1.822
South and Tempe Canals	South Canal below CAP Cross-connect	3.71	0.0897	2.41	0.290
	South Canal at Val Vista WTP	3.54	0.0805	2.28	0.309
	Head of the Tempe Canal	1.47	0.0285	1.94	1.283
	Tempe Canal - Inlet to Tempe's South Plant	0.72	0.0141	1.97	2.818
	Chandler WTP – Inlet				

Table 8 - Reservoir Samples – March 9, 2007

Sample Description	Location	DOC (mg/L)	UV254 (1/cm)	SUVA	TDN
Lake Pleasant	Eplimnion	2.90	0.0442	1.53	0.372
Lake Pleasant	Hypolimnio	2.87	0.0444	1.55	0.388
Verde River @ Beeline		1.54	0.0466	3.03	0.314
Bartlett Reservoir	Epilimnion	1.74	0.0384	2.20	0.191
Bartlett Reservoir	Epi-near dock				
Bartlett Reservoir	Hypolimnio	1.80	0.0439	2.44	0.201
Salt River @ BluePt Bridge		4.21	0.1008	2.39	0.303
Saguaro Lake	Epilimnion	5.13	0.1035	2.01	0.372
Saguaro Lake	Epi - Duplicate	4.99	0.1010	2.02	0.333
Saguaro Lake	Epi-near doc				
Saguaro Lake	Hypolimnio	5.01	0.1054	2.10	0.487
Verde River at Tangle		1.06	0.0296	2.78	0.137
Havasu		2.46	0.0385	1.57	0.645

Data from Central Arizona Project

Data for Lake Havasu indicate a turbidity spike that will affect water quality in the CAP Canal



Prepared by Patrick Dent 4/9/2007

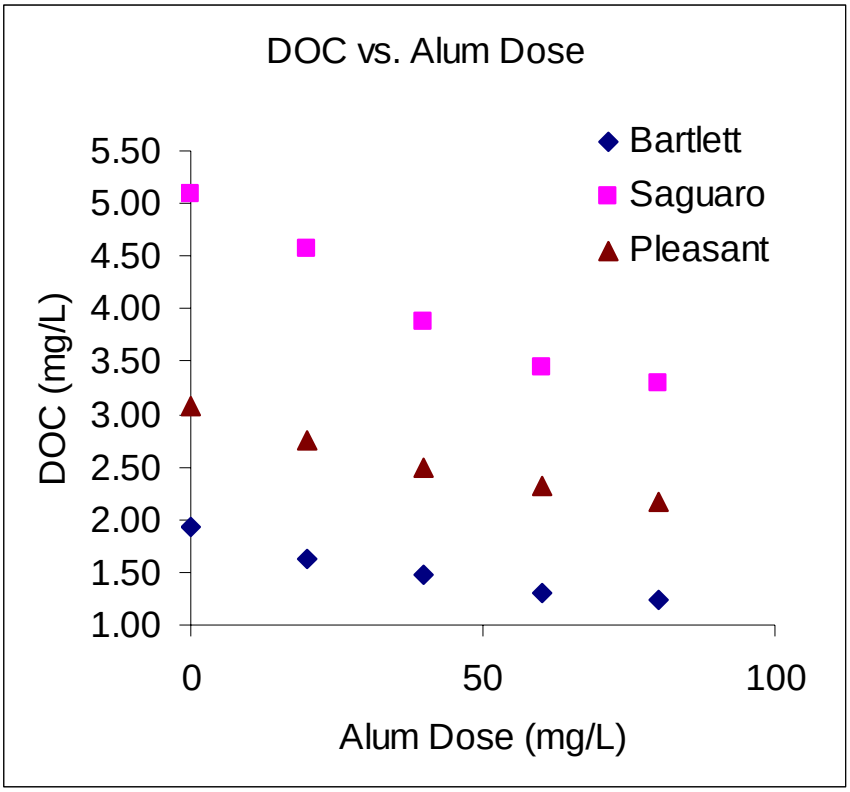
Disinfection By-Products

1. Iodinated DBPs

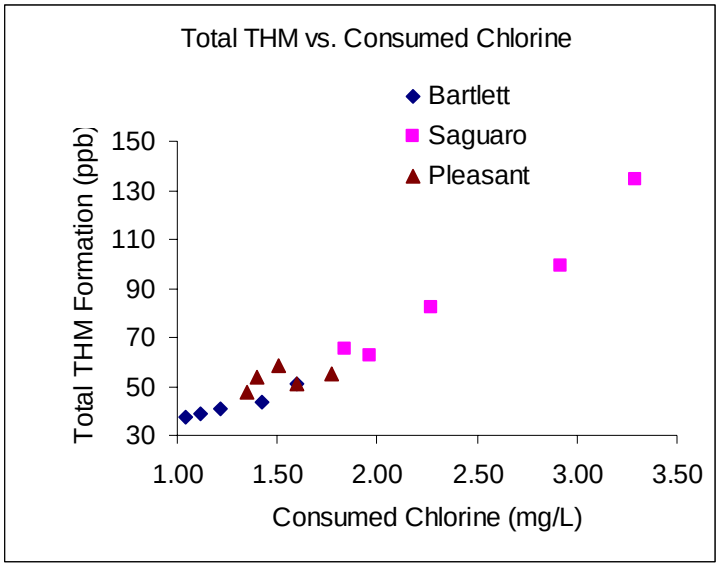
Iodide can form iodinated disinfection byproducts which have odor (e.g., iodoform, CHI3) or pose potential toxic response to human cells. During chlorination iodide is rapidly oxidized to iodine (HOI/OI-) and then to iodate (IO3-). However, during chloramination, monochloramine (NH2Cl) forms iodine, but not iodate. So iodine, like chlorine or bromine, can react with natural organic matter present in water to form iodinated-DBPs.

2. DBP formation in jar tests – part of ongoing SRP project to develop models that predict the "treatability" of water in its reservoirs. Data presented here is from the March 2007 sampling

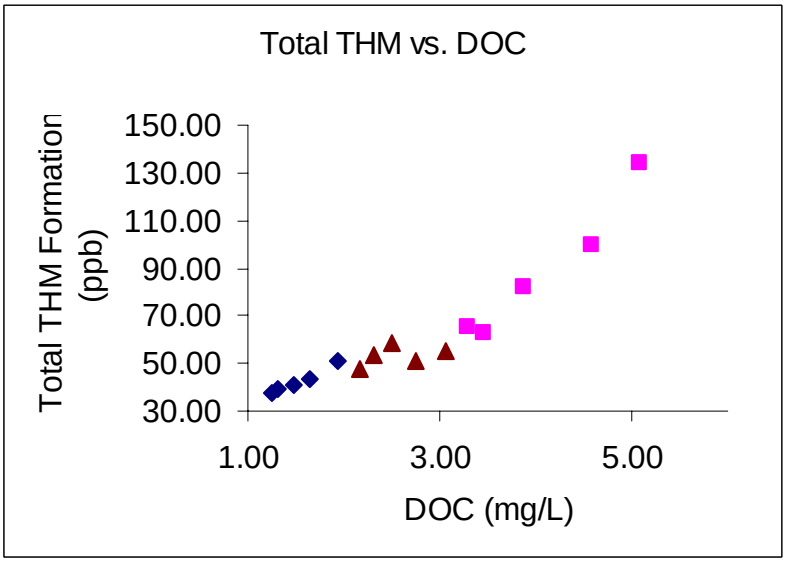
Increasing alum dosages remove DOC. Separate studies also used some H2SO4 acid addition prior to alum addition (not shown).



THM formation is almost a perfect linear relationship with chlorine consumed, across all three water sources. Therefore, keeping track of CHLORINE CONSUMPTION (Dose minus residual) is an EXCELLENT indicator for TTHM formation.



Chlorine consumption is a better indicator of TTHM formation than just DOC concentration alone:

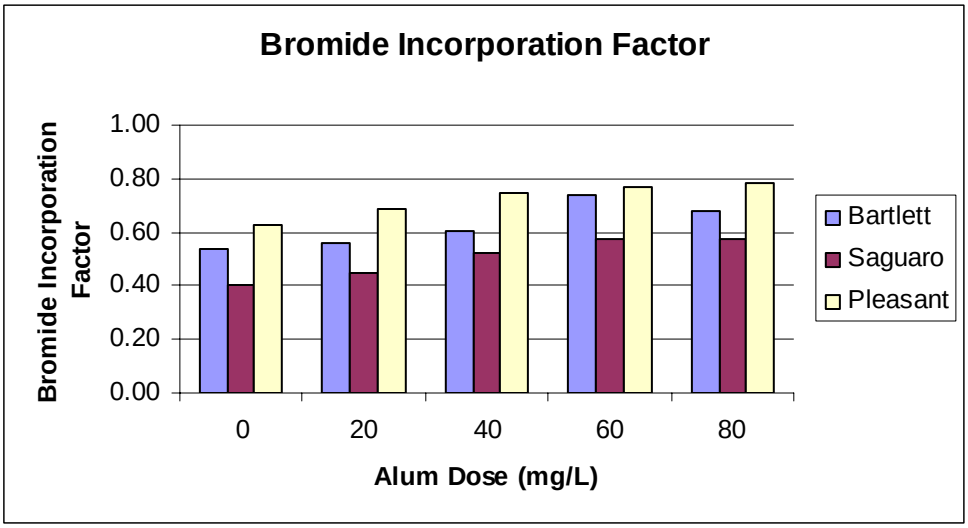


This tests clearly indicate that Salt River water has the highest DBP formation potential, even after alum coagulation.

The bromide ion concentration are similar for the three reservoirs:

Source	Bromide Conc (ppb)
Bartlett	76
Pleasant	105
Saguaro	100

These bromide concentrations affect the Bromide Incorporation Factor (BIF) of THMs. BIF of 1 means all the THMs are bromoform and a value of zero indicates the are all chloroform. This is a simple way to assess how much of the THMs include bromide. The BIF increases as a function of alum dose. Why? Because the Br/DOC ratio increases with alum addition. Alum addition removes DOC but not bromide, causing the Br/DOC ratio to increase.



3. AWI Newsletter The following pages describe projects sponsored by the Arizona Water Institute – a collaboration of state agencies and the three state universities. It is the April 2007 newsletter.

ARIZONA WATER INSTITUTE NEWS

A consortium of Arizona's three universities focused on water sustainability through research, technical assistance, education and technology development

April 12, 2007 Volume 2, Issue 3

The Arizona Water Institute (AWI) sends e-newsletters on a monthly basis. Please pass this on to someone who may want to be on our mailing list. To be added to or subtracted from the listserv, contact Tonya Haymore at thaymore@azwaterinstitute.org

NEWS UPDATE

Climate/Water Issues on the Front Page

In the past two months, a series of reports have focused national and international attention on issues of climate change, drought and water supply:

- On February 2, Working Group I of the International Panel on Climate Change (IPCC), the Physical Science Basis Report for Policymakers was released. This is a consensus-based summary of climate change research developed by 600 authors from 40 countries. See report specifics at: *http://www.ipcc.ch/about/about.htm*
- On February 21, The National Research Council (NRC) distributed the prepublication version of a report, *"Colorado River Basin Management: Evaluating and Adjusting to Hydroclimatic Variability"*. See report specifics at: *http://dels.nas.edu/dels/rpt_briefs/colorado_river_management_final.pdf*
- On February 28, the US Bureau of Reclamation (Reclamation) released its draft EIS on shortage sharing and coordinated operations of Lakes Mead and Powell on February 28. See report specifics at: *http://www.usbr.gov/lc/region/programs/strategies/draftEIS/index.html*
- Last week (April 13), the draft Summary for Policymakers of the IPCC Working Group II: Impacts, Adaptation and Vulnerability was distributed. See report specifics at: *http://www.ipcc.ch/about/about.htm*

All of these items made front page news across the west, where the implications of climate change for water management are a key take home story.

Key findings of the IPCC reports include: 1) the model outputs related to precipitation are now more consistent than they were in the previous IPCC reports, and the Southwest and other subtropical regions are now shown as areas likely to have declining precipitation; 2) runoff is projected to decline by up to 30% in the Colorado basin; 3) more intense rainfall events have been observed and are expected worldwide in the future, meaning that even in the context of long-term drought projections, we need to be prepared for major flooding episodes; 4) other observations noted in the IPCC reports include rising sea levels, reductions in snow pack, glaciers and ice sheets, impacts on agriculture, forestry, coastal zones, human health and numerous impacts on natural systems, including an increase in the rate of species extinction.

The combined implications of increased temperatures and the potential for decreased precipitation do not paint a pretty picture for the interior west and southwest of the US or for other arid regions in subtropical areas worldwide.

The NRC report comes to a similar conclusion, focusing on tree-ring based reconstructions of the Colorado River's flow over hundreds of years, finding that average annual flows varied more than previously assumed and that future droughts may be longer and more severe because of the warming trend. The report also states that a preponderance of evidence suggests that rising temperatures will reduce the river's flow and water supplies.

AWI Participation in Climate/Water Issues

AWI is currently engaged in a project funded by Reclamation, the U of A Sustainability Program and the UA Water Resources Research Center (WRRC) that is focused on improving the use of climate information at various time scales for managing the Colorado River. This interdisciplinary project, now in its third year, is called "Enhancing Water Supply Reliability through Enhanced Use of Climate Predictions."

The questions that are posed by the research in this project were derived from interviewing Central Arizona Project stakeholders who are impacted by Colorado River water availability. Key research questions include 1) developing increased water supply forecasting skill over a one-to three-year time horizon; 2) providing increased temporal and spatial resolution of streamflow records in the Upper and Lower Basins through tree-ring reconstructions; and 3) evaluation of economic and management strategies to enhance dry-year water supply reliability.

AWI Sponsors Decadal Prediction Workshop

On March 23 AWI co-sponsored a workshop on decadal climate prediction in cooperation with the US Climate Variability and Predictability (CLIVAR) program, working towards developing a research agenda for using our improving understanding of longer time scale ocean-atmosphere interactions (such as the Pacific Decadal Oscillation) to project likely future climate conditions in the one-to-three year time frame. Although this information will not yield actual predictions of specific climate conditions at specific time frames in the future, if we understand the underlying drivers of the changes in "phase" of these oscillations, we will have a better idea whether the climate conditions are likely to switch from one phase to another, which could be important when facing declining reservoirs and the potential to hit key trigger elevations in the system.

Given that inflow projections on the Colorado for this year are in the vicinity of 50% of normal the first shortage condition could be experienced as early as 2009, much

earlier than previously assumed. For more on this topic, please check the website of this project at *http://ag.arizona.edu/AZWATER/EWSR/* The latest news from the project team will be available within the next week or two, if you would like to receive this newsletter please contact Dustin Garrick at dustingarrick@gmail.com.

News from the Arizona Department of Commerce

Bennett Curry, the AWI Associate Director at the Department of Commerce, has developed a strategic plan for his activities related to commercializing water-related university innovations that will create jobs and economic development opportunities in Arizona. He has also identified several sources of funding for university researchers who are interested in technology transfer:

The Small Business Innovation Research Program (SBIR) and the Small Business Technology Transfer Program (STTR) award competitive grants to explore the validity of a concept. The US Small Business Administration (SBA) website has complete information. http://www.sba.gov/sbir/indexsbir-sttr.html

In addition, three workshops may be of interest.

1. SBIR/STTR Phase 1 – ASU Technopolis will hold a workshop on May 11 to help write more competitive SBIR/STTR Phase I proposals. This link has details: *http://www.asutechnopolis.org/programs_details.cfm?program_id=43*

2. Arizona Center for Innovation – A Tech transfer luncheon on April 19 will be held at the Student Union Memorial Center. Technical assistance providers will present. Contact Anita Bell (520) 382-3260 or annitab@azinnovation.com

3. Commercialization Workshop in Tucson – April 27. Half day at the Pima Community College Small Business Development Center. (520) 206-6404 or sbdc@pima.edu

If you have other ideas to share, please contact Bennett at bennetc@azcommerce.gov.

AWI Fundraising News

AWI is expected to generate significant portions of its funding from external sources, including private donors, corporations, federal grants, contracts for services and foundation support. AWI has received several major donations and pledges of support from cities, counties, utilities and individuals, but we have a significant challenge ahead in meeting our needs for funding. In our next newsletter we will highlight some components of our fundraising activities to date.

UPDATE ON AWI FUNDED PROJECTS

In our November & December newsletters, we described 17 proposals that were selected for funding through the collaborative Request for Proposals across the three universities. We will be providing updates on these projects in our newsletters; progress on two of the projects follows:

"Electrocoagulation Technology in Semiconductor Manufacturing: Treatment of Cooling Water Towers" Investigators: Jim Baygents (UA Chemical and Environmental Engineering), John Crittenden (ASU Civil and Environmental Engineering).

For many high-tech manufacturers, improving water treatment and boosting water conservation are vital goals. In this project, UA and ASU are collaborating with Intel Corporation to study electrochemical processes occurring in a treatment technology called electrocoagulation. This treatment technology is being tested on experimental equipment provided by Intel at one of their facilities to remove contaminants from cooling tower blowdown water and increase the number of reuse cycles of the water. The results of this research will likely have broad relevance to municipal, commercial, and industrial applications. Intel has provided funding and hired two student interns for the summer)one each from UA and ASU) to perform the research under the direction of the principal investigators. These students will have the opportunity to work on-site at an Intel facility.

"Comparison of Estrogenic Compound Removal Efficiency from POTWs Across Arizona"

Investigators: Catherine Propper (NAU Biological Sciences), Timothy Vail (NAU Chemistry and Biochemistry), Jani Ingram (NAU Chemistry and Biochemistry), Eduardo Sáez (UA Chemical and Environmental Engineering). Paul Westerhoff (ASU Civil & Environmental Engineering), Martin Karpiscak (UA Arid Lands Studies), Patricia Adler (Arizona Department of Health Sciences).

Treated wastewater discharged from sewage treatment plants contains traces of chemicals that impact endocrine (hormonal) activity in organisms living or coming into contact with the wastewater. These chemicals include excreted and discarded pharmaceuticals, personal care products, and industrial and agricultural compounds. Although aquatic organisms may be particularly susceptible to exposure to these compounds, the human health effects remain undefined. Because of the potential for biological impact from exposure to these compounds, it is important to determine which wastewater treatment processes produce the best chemical removal efficiency. To accomplish the goal of this study, influent, effluent, and biosolids (sewage sludge) from six Arizona modern, high-performance, tertiary sewage treatment plants of varying system design will be evaluated to determine overall removal efficiencies of two common wastewater compounds. The study will also evaluate the removal efficiency of the overall endocrine activity in terms of estrogen-like effects from the tested facilities. Results from this study will help determine the treatment processes most effective at removal of some compounds associated with estrogen-like hormonal ctivity. Sampling will occur in April and May. This project also includes the development and refinement of better test methods for some of these chemicals. Because much of the wastewater in the Southwest is designated for potential reuse, it is critical to find water treatment procedures that lead to limiting water contaminant output.

UA Finalizes Two AWI Faculty Incentive Awards

The University of Arizona (UA) has awarded faculty

research grants to two projects. These awards are for researchers to use in preparation of larger grant applications to federal or other agencies such as NSF. These two projects address major issues facing Arizona and the border region. This background work will provide the focused arguments for researchers to seek larger investments to investigate alternative sources of water and the interface of energy and water – two critical areas of water management. 2007 Faculty Incentive recipients are:

Stephanie Buechler (Bureau of Applied Research in Anthropology - BARA), Terry Sprouse (WRRC), Diane Austin (BARA), and Jim Riley (Soil, Water & Environmental Sciences) – *Creating a Successful Rainwater Harvesting and Greywater Reuse Program: Combining Community Participation, Technology and Design to Enhance Urban Water Sustainability.* This research will focus on how to increase the use of rainwater harvesting and greywater systems in a broad range of socio-economic groups in Tucson. Problems related to stormwater management as well as drought can be ameliorated with the use of these two systems; if properly incorporated into urban planning and policymaking, such strategies can be an important part of current and future water management in the Southwest, particularly in light of climate projections that indicate we will experience more extreme climate events, both floods and droughts. With the projected increase in costs of infrastructure and water use fees, the incentive for residential water savings via these and other methods will increase. The proposed project will include collaborations with local NGO's and government agencies.

Christopher Scott and Robert Varady (Udall Center) – *Coupled Water and Energy Demand in the Arizona-Sonora Border Region.* The goal of this effort is to inform and support domestic (state and federal) and bi-national policies that couple the anticipated needs for both water and energy. This effort addresses the AWI priority area of international applications and research and aquifer management and sustainability, in addition to the energy-water nexus. The water management implications of energy generation are considerable, and the energy implications of water delivery have historically not received much scrutiny. For example, few are aware that 30% of the total energy use in the State of California is for pumping water. This work will develop background data and conduct a needs assessment to focus future work on the US-Mexico border region, where such issues are of increasing concern. The research will include UA and Sonoras colleagues as well as agency representatives.

Upcoming Events

AWI and the Arizona Department of Environmental Quality are co-sponsors of the Water Resources Research Center's conference June 5, 2007, "*The 20th Anniversary of the Environmental Quality Act and ADEQ: Assessing and Protecting Arizona's Water Quality*" at the Hyatt Regency, Phoenix at Civic Plaza.

The day will include panels on the History of the Environmental Quality Act and ADEQ, the Water Quality Assurance Revolving Fund (WQARF), Emerged and Emerging Contaminants, Emerging Policy Challenges, and the Future of ADEQ. Director Steve Owens will deliver the State of ADEQ address at the luncheon. Governor Napolitano has been invited to kick-off the program, and the day will end with a celebratory reception. Please join us!

The agenda can be found, along with registration and hotel information, on our web site at *http://ag.arizona.edu/AZWATER/conf2007/index.html* Early Bird Registration (before May 1st) is $115. Beginning May 1, registration will be $135. Reduced rates are available for students.

For more information on these and other events that AWI will be engaged with, please see our website at www.azwaterinsitute.org.

- April 18 - Earth Day at Boeing
- April 23 - Investor Owned Water Utilities Association Water Summit, Phoenix
- April 24-27 - Congressional testimory with USGS on climate change, Washington DC
- May 2-4 - AZ Water & Pollution COntrol Association - "80th Annual AWPCA Conference & Exhibition", Phoenix
- May 10-11 - AZ Municipal Utilities Leadership Institute, Payson
- May 16-18 - Western States Water Council & Western Governor's Association - "Climate Change Workshop", Irvine CA
- June 5 - Water Resources Research Center's Annual Conference, "The 20th Anniversary of the Environmental Quality Act and ADEQ: Assessing, Protecting, and Remediating the State's Water Quality, What Future Challenges?", Phoenix
- August 29-September 1 - Southwest Hydrology & Arizona Hydrological Society 2007 Water Symposium - "Sustainable Water, Unlimited Water, Quality of Life - Can We Have It All?", Tucson
- September 19-21 - Water Education Foundation, Colorado River Project - "6th Biennial CO River Symposium", Santa Fe NM
- September 26 -27 - Rice University, james A. Baker III Institute for Public Policy conference "Beyond Science: The Politics and Economics of Responding to Climate Change", Houston TX

For comments and suggestions or additional information on the Arizona Water Institute, please contact us:

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