



## JUNE 2012 NEWSLETTER

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### VIEWPOINT: IS IT HEATING UP???

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Yes it is heating up as we begin our trek into the summer months, but what I was referring to was

our upcoming Annual Symposium. Can you believe that we are a little over three and a half months away? Make sure you mark your calendars now for September 18<sup>th</sup> -21<sup>st</sup> and join us at the Desert Willow Conference Center (DWCC) in Phoenix. Yes, this year's symposium is shaping up to be one of the best. Our theme this year is "*Confluences 25 years of bringing, water, people and ideas together*" Ted Lehman and company are already well on their way with a great slate of workshops and field trips in store as well as some fantastic keynote speakers.

What I really want to talk about regarding this year's Symposium is the *Meet and Greet Session* that will be held the evening of September 18<sup>th</sup> at the DWCC. The Meet and Greet program will be taking place of our traditional ice breaker. The mission of AHS is to give back and be a part of the community regarding water related issues. In that vein, the difference from our traditional ice breaker is that we are looking to bring together as many folks involved in our profession as possible. This means we are reaching out to students from the University and Community Colleges as well as professionals from ADEQ, ADWR and our towns and cities. I know that funding has been a big obstacle for many to attend our functions and that is why we are not charging for this session. Did you get that, it's Free and it doesn't get much easier than free. All we ask is you come by and network with other professionals in our industry and spread the word. Even better come by and talk to the students – they are so eager to ask someone questions and get answers about what it takes and what opportunities there are in our profession.

We will be posting a flyer in the next week on our Symposium web site <http://azhydrosoc.org/2012Symposium> so please download the flyer and post it in your offices and hand it out to anyone you think would benefit from participating in our Meet and Greet session.

I would be remiss if I failed to bring some attention to those companies that are making the Symposium and the Meet and Greet possible. Freeport McMoRan our title sponsor, Montgomery & Associates, Central Arizona Project, and a number of exhibitors and break sponsors. You still have time to stop by our web site and sign up to be a sponsor. We are also looking for exhibitors, the spaces are going fast so get your space reserved while they still last.

If you have any suggestions or feedback for our Meet and Greet let me know by sending me an email.

[Mike Hulst](#)

AHS Corporate Board President

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## GOVERNMENT GOINGS-ON

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### Government Goings-On

The Arizona Legislature has gone home until next year. We are safe for a few months. But what are the Feds up to?

Recently I saw an article at <http://www.wnd.com/2012/05/existential-threat-to-western-u-s-states/> which claimed that the U.S. Government was out to seize Western water rights and overturn state control of water. The author focused on two situations in Cochise County. In Tombstone, last summer's fire led to flooding and debris flows that destroyed a century-old water pipeline (just like Flagstaff). And in Sierra Vista an application for a Designation of Adequate Water Supply has attracted adverse comment from the Bureau of Land Management.

I sense from the rhetoric that the author of this article is rabidly anti-Federal. Certainly he does not mention that the central issue is not water rights for Tombstone, but bulldozers carving a new road through a designated wilderness area in the Huachuca Mountains, not to mention that

Tombstone claims to actually own the Forest Service land. A recent judicial decision denying the special use permit appears to focus on the lack of information in Tombstone's application, not water rights, and lack of an easement. And the author seems unaware that the U.S. Forest Service is cooperating with City of Flagstaff in the rebuilding of their Inner Basin pipeline road (and pipeline), destroyed in the hydrologic aftermath of last summer's Schulz Pass Fire, and that Federal funds from FEMA are involved. I haven't heard of any question on water rights to the Inner Basin wellfield.

Meanwhile in Sierra Vista, many people are concerned about saving the San Pedro River. Several letters objecting to the proposed Designation of Adequate Water Supply for Pueblo del Sol Water Company have been received by ADWR. BLM's objection has to do with protecting surface water rights in a Natural Resources Conservation Area, which seems to me to be appropriate for any right holder—although I do see major conceptual flaws in the BLM letter.

I don't think a Federal power grab is underway. And black helicopters are not reading my mind with laser beams.

[Alan Dulaney](#)

City of Peoria

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## 2012 AHS WATER SYMPOSIUM: CONFLUENCES – 25 YEARS BRINGING WATER, PEOPLE, AND IDEAS TOGETHER

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The Symposium Planning committee is working hard framing a great symposium. We held our last planning meeting at Boulder's on Broadway in Tempe on May 31. Where were you?

Symposium Chair, Ted Lehman, has a goal to get every AHS member involved in this year's symposium in some capacity – organize a field trip, teach a workshop, moderate a session, give a talk, exhibit your firm, sponsor a student or teacher, or just show up and see what your colleagues have been up to recently!

**Call for Abstracts** – We need your talks! The deadline for abstracts is June 30, but why wait? Abstracts can be sent to Program Committee Chair, Summer Waters, at [SWaters@cals.arizona.edu](mailto:SWaters@cals.arizona.edu). If you have questions, shoot her an email or give her a call at 602-827-8200 ext. 349.

**Silent Auction/Raffle Items** – We need your donations! We're looking for items to include in our silent auction/raffles during the Symposium. So far we have a number of interesting items from irrigation controllers, to fossils, to historic maps and signed books. If you have some items you'd like to get rid of, uhh, I mean donate, please contact Vicki Mills, at [vmills@asu.edu](mailto:vmills@asu.edu) or Ted Lehman, at [ted@jefuller.com](mailto:ted@jefuller.com) or 480-222-5709. Donations go to the AHS Foundation (for scholarships) and as such qualify as charitable tax deductions. All proceeds from the raffles/auctions will go to the AHS Foundation.

**Sponsors & Exhibitors** - Sponsorship fundraising is in full gear. Sponsors and exhibitors are slowly rolling in, but we need more support. Thanks so far to Platinum Level Sponsor, Freeport McMoRan Copper & Gold, Gold level sponsor Montgomery & Associates, Awards lunch sponsor Central Arizona Project, Break Sponsor Zone International, Premium Exhibitor, US Bureau of Reclamation, Exhibitors Aquatic Informatics, Bill Johnson Equipment, Golder Associates, Hydrogeophysics, Intermountain Environmental, & TAM International. Please join these groups in support and participation in this year's Symposium. More information on sponsorship benefits & options are available on our website at <http://azhydrosoc.org/2012Symposium/sponsors.html>. Or give our Fundraising Chair & Society President, Mike Hulst, a call at 602-248-7702 ext, 318,

or drop him an email at [mhulst@eecphx.com](mailto:mhulst@eecphx.com). Thank you!

**Student Registration Sponsors** – This year we have started a new program to provide Symposium registration scholarships to students. The idea is to bring in more student participation to the Symposium, and make it easier for deserving students to attend. Student sponsorship donations are to the AHS Foundation and qualify as tax deductible charitable donations. David Sampson is heading up the student recruitment and review of applications for these registration scholarships.

**Teacher's Workshop Sponsors** – This year we are also looking for sponsors to support the Teacher's Workshop. Since 2003, Arizona Project WET has conducted teacher professional development workshops at the AHS Symposia. Funding has grown tight, so this year AHS Foundation is soliciting pledges of financial support for Project WET at this year's Symposium. We are looking for a minimum of \$1500 to make this year's Teacher's Workshop a reality. To encourage your support, Mogollon Environmental Services will fund a drawing for donors with a grand prize of a \$150 gift certificate to the restaurant of the winner's choice, and two second place prizes consisting of hand-thrown coffee mugs, because it is not a pledge drive without coffee mugs. So e-mail your pledge today to Jeff Trembly: [jeff@mogollonenv.com](mailto:jeff@mogollonenv.com) and get eligible for these prizes!

The next planning meeting will again be at Boulder's on June 14 at 5 pm. Email or call Mr. Lehman if you'd like to participate. Ted can be reached at [ted@jefuller.com](mailto:ted@jefuller.com) or 480-222-5709. We're looking forward to your participation.

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## PHOENIX CHAPTER NEWS

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### Phoenix Chapter's June Dinner Meeting

The next Phoenix chapter dinner meeting will be held **on Tuesday, June 12, 2012**, at SunUp Brewing Co., in midtown Phoenix (on the north side of Camelback Road, just east of Central Avenue). Please join us for a beverage, to share business cards, and talk water!

**Location:** [SunUp Brewery](#)  
322 E. Camelback Road  
Phoenix, AZ 85012

**Event:** **Scottsdale's Water Campus - Nearing Completion of the 4-year, 59 Million Dollar Advanced Water Treatment (AWT) Expansion, What has Changed and Why**  
Maurice Tatlow and Art Nunez, City of Scottsdale

**Chapter Board Meeting:** 4:30 PM – 5:30 PM

**Happy Hour & Dinner:** 5:30 PM – 7:00 PM

**Program:** 7:00 PM – 8:00 PM

**Cost:** \$15 member, \$20 non-member, \$5 student

RSVP with Kirk Creswick at [kcreswick@eecphx.com](mailto:kcreswick@eecphx.com) or 602-248-7702.

Hope to see you there!

**At the June Phoenix Chapter meeting, Art Nunez, Water Reclamation Services Director for the City of Scottsdale, & Maurice Tatlow, hydrogeologist for the City of Scottsdale's Water Resources Department, will give a presentation on "Scottsdale's Water Campus - Nearing Completion of the 4-year, 59 Million Dollar Advanced Water Treatment (AWT) Expansion, What has Changed and Why".**

Art Nunez has over 28 years of experience in the operation, maintenance and management of water and wastewater treatment facilities ranging in size from 50,000 gallons a day to 150 million gallons a day. He is currently the Water Reclamation Services Director for the City of Scottsdale where he has spent the past 20 years of his professional career. During his time with the City of Scottsdale he has been involved with all aspects of the Scottsdale Water Campus, from the original conceptual design to the current advanced water treatment plant expansion project.

Maurice Tatlow has spent the last 6 years as a hydrogeologist for the City of Scottsdale's Water Resources Department. His primary responsibility involves management of the City's groundwater resource, which involves oversight of 23 active production wells and three Underground Storage Facilities (USFs) consisting of 76 vadose zone recharge wells and 4 active aquifer storage and recovery (ASR) wells.

**Abstract:**

Art and Maurice will provide a brief history of the City of Scottsdale's Water Campus, quickly reviewing the major expansion events for both the CAP Water Treatment Plant (WTP) and the Water Reclamation Plant (WRP). The majority of the presentation will concentrate on the nearly completed, 4-year, \$59 million expansion of the Advanced Water Treatment (AWT) facility. This discussion will focus on the inclusion of several new processes/technologies (stepped chloramination, ozonation, and UV photolysis) that have been added to the AWT process flow and will provide an explanation of why these processes have been added and how they will be implemented. The presentation will end with a review of the recharge component of the Water Campus, will explain how the AWT expansion will change vadose zone recharge operations, and will provide an update on the status of the drilling and construction of eight new vadose zone wells.

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**Phoenix Chapter's May Dinner Meeting wrap-up**

The AHS Phoenix Chapter joined the AEG (Association of Environmental and Engineering Geologists - Arizona Section) for a joint meeting on **Thursday May 10, 2012 at Monti's La Casa Vieja**. The evening started with a hosted happy hour, courtesy of Accutest Laboratories and our own Beth Proffitt, and was followed by dinner of steak fajitas and a presentation by **Harry Brenton**, RG, and Principal Hydrogeologist at Matrix New World Engineering, Inc.

**Development of a Hydraulic Barrier  
Phoenix-Goodyear Airport – North Superfund Site**

The Phoenix-Goodyear Airport-North (PGA-N) project is an EPA Superfund site located in Goodyear, AZ. This remedy currently consists of 5 pump and treat groundwater remediation



systems to remove, predominately, trichloroethylene (TCE) from groundwater. The site contamination was originally deposited by a Unidynamics design and testing facility that developed electromechanical devices in the 1960's and 70's. The source site lies atop alluvial fill materials typical of those that occupy the West Salt River Valley. Over the years the contaminated groundwater plume has migrated to the north of the source area. The focus of the presentation detailed a recently installed treatment remedy involving the installation of extraction wells and injection wells to deliver treated groundwater in order to develop a hydraulic barrier to ensure protection of the drinking water supplies located northeast of the plume area.

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### Future Event Calendar (see also calendar on [www.azhydrosoc.org](http://www.azhydrosoc.org))

- Ø **July 10, 2012:** Ardeth Barnhardt, UofA - Water/Power Nexus- Nellos in Tempe.
- Ø **July 26, 2012:** Wine tasting fundraiser at Terrior Wine Pub for the Herman Bouwer Intern Scholarship. **Please note that we are looking for additional sponsors for this event – contact [Keith Ross](#) if you or your company may be interested.**
- Ø **August and September 2012:** Our summer hiatus!
- Ø **September 18-21, 2012:** The annual AHS Water Symposium hosted by the Phoenix Chapter at the Desert Willow Conference Center, 4340 East Cotton Center Boulevard Phoenix, AZ 85040.
- Ø **October and beyond** – maybe you or a colleague? Please contact [Tom Walker](#), Phoenix Chapter Vice President, if you would like to give us a presentation or if you know anyone else who could use an audience.

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### SECOND ANNUAL AHS WINE TASTING FUNDRAISER!



When: Thursday July 26, 2011  
6:00 pm to 7:30 pm  
Where: Terrior Wine Pub  
7001 N. Scottsdale Rd. #157  
Scottsdale, AZ 85253

What: Tasting five fine wines selected by the co-owner of Terrior Wine Pub (Rich Petrus, a long-time AHS member) and accompanying appetizers to help fund the Herman Bouwer Scholarship/Internship program.

Who: AHS Members, Students (must be 21 years of age) and Non-members

Cost: \$30 per person donation (additional donations will be accepted)

The event is limited to the **first 30** people who sign up!

**Raffle:** As a bonus we are having a canned food drive to help the food banks in the Metro Area. Anybody who brings nonperishable food items (cans, pasta, peanut butter etc) will receive a raffle ticket for some gifts. (one ticket per item)

**This event is currently being sponsored by Terrior Wine Pub and Accutest Labs. Thank you!**



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## TUCSON CHAPTER NEWS

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The next meeting of the Tucson Chapter will be held on June 12 at the offices of Errol Montgomery & Associates, 1550 E. Prince Road.

A social half hour will begin at 6:00 PM, followed by the regular meeting at 6:30 PM.

At the June meeting, Bill Ellett, manager of the Superfund Programs Unit for ADEQ's Southern Regional Office, will provide an update on the status of State and Federal Superfund sites in the Tucson area including some new technical challenges, recent site milestones, and the outlook for funding for these programs.

Mr. Ellett is an Arizona Registered Geologist. He has a BS degree in Geophysics from the University of California at Riverside, and an MS degree in Hydrology from the University of Arizona. Before joining ADEQ in 1998, Bill worked in environmental consulting for three years and in geophysical exploration with Mobil Oil for twelve years.

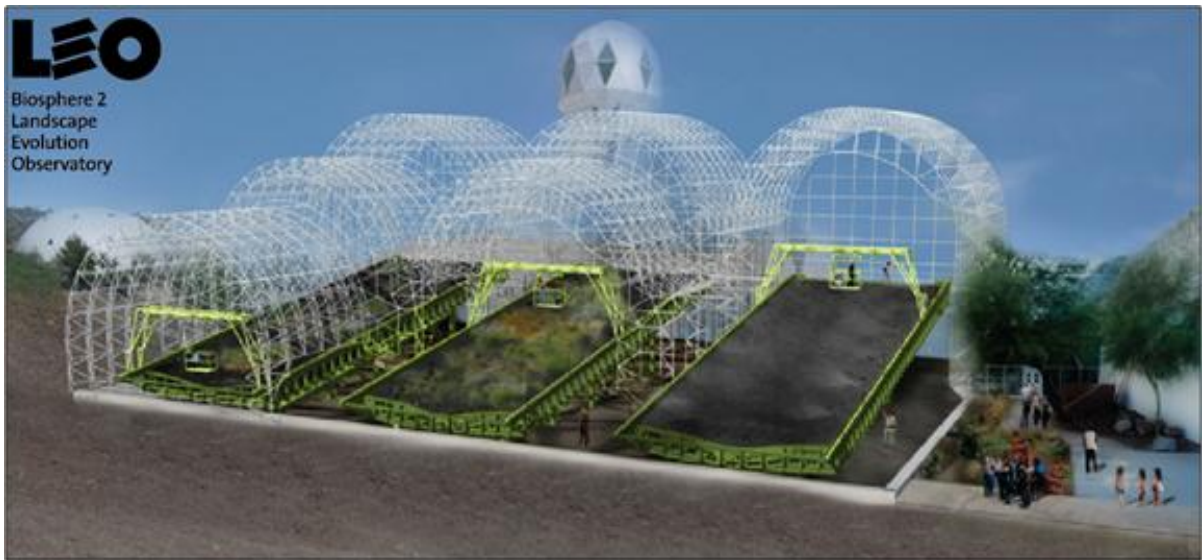
### **UNIVERSITY OF ARIZONA BIOSPHERE 2 LANDSCAPE EVOLUTION OBSERVATORY (LEO) POTENTIAL TOUR – FEED BACK NEEDED!**

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The Tucson Chapter has a great opportunity to have a personal tour of the new University of Arizona Biosphere 2 Landscape Evolution Observatory (LEO). The B2 Science Director, Peter Troch, would like to give a lecture about the project and then give a tour of the site. Many scientists and engineers have collected their efforts in creating diversified projects within LEO. The primary scientific objectives of LEO are to quantify hydrologic partitioning, investigate emergent heterogeneity and development of landscape structure, and to investigate coupling among Earth system processes (e.g. hydrology, geomorphology, geochemistry, biology, ecology, atmospheric science) by rapidly iterating dense experimental measurement with development and validation of couple computational models of Earth system behavior in order to test hypotheses related to the effects of climate change on Earth systems. Dr. Peter Troch noted that those society members involved in water issues related to mine tailings may be "especially" interested in attending and visiting the site.

The Tucson Chapter is looking to schedule this lecture and tour, located at B2, for its August monthly meeting and we would like to determine if there is interest. Please contact [Damian Gosch](#) or any of the chapter officers if you would like to attend such a tour. Thanks!

Contact: Damian Gosch  
AHS Tucson Chapter President  
[dgosch@hargis.com](mailto:dgosch@hargis.com)



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## FLAGSTAFF CHAPTER NEWS

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### SWISS CHEESE, ARIZONA TROUT AND OTHER TERTIARY ENIGMAS

A group of 18 lucky participants spent the day with Paul Lindberg as part of the AHS Flagstaff May 19 Sedona Sinkholes Field Trip. Paul has studied sinkhole collapse danger and the potential for surface-groundwater communication. The sinkholes are believed to have developed from the collapse of interstratal water-filled cave openings in the subsurface Mississippian Redwall Limestone, which have broken through to the Permian Hermit formation and Schnebly Hill Sandstone surface. Paul predicts there are likely many more subsurface caverns and collapse features throughout the Sedona area that are either masked by alluvial materials or which have not broken through to outcrop yet.



Viewing the gaping maw and surrounding incipient rock fractures created by Devils



Kitchen Sinkhole, located near Soldier Pass Trailhead.



An early pioneer family heard the collapse of the Devils Kitchen Sinkhole in the 1880s. An enormous block (seen in the photo above) detached in the fall of 1989 and another rockfall occurred in 1995. Visible arcuate fractures surrounding the sinkhole indicate areas of rock separation, soon to be part of the sinkhole. A residential area is located approximately 0.25 mile from this sinkhole.

The group then departed the land of vortices and headed west into the Verde Graben. First stop was at an outcrop located along Highway 89A, that provided one of the keys which unlocked the puzzles of 1.) the timing and source of gravels distributed across much of the Mogollon Rim, 2.) the distribution and temporal relationship of eruption of House Mountain basalts and regional uplift, 3.) effects of Tertiary extension with basin and range style block faulting, and 4.) surface water drainage reversal towards the Verde Valley. Timing and location of relatively new fault grabens indicates extensional processes are migrating northeast .....get your ski passes soon, because Flagstaff will soon be part of a down-dropped block at much lower elevation.



The group then traveled to the Page Springs Fish Hatchery, where very healthy trout flourish in the cool clear spring water (many of us were tempted to join them after a hot day in the sun). Paul explained the source of the springs originates high on the Colorado Plateau at elevations over 6,800 feet which passes beneath the Sedona area through limestone solution cavities before discharging as artesian flow at the interface of caves with buried Verde Graben faults. Fifteen million gallons of water each day coalesce at Spring Creek, Lolomai, Bubbling and Page Springs artesian springs. (Flagstaff attendees discussed the possibility of charging SRP for this northern Arizona surface water that goes missing soon after precipitation!)



The trip culminated with an afternoon of wine tasting at the new Oak Creek winery in Page

Springs, which is part of an up and coming Verde Valley industry. It was a perfect ending to a perfect day.

The AHS Flagstaff Chapter would like to thank Paul Lindberg for leading this incredibly interesting and fun field trip. Paul has offered to lead a Laramide geology field trip sometime soon – stay tuned - this is a trip not to be missed!!

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## **2012 CHARLES C. AVERY INTERN SCHOLARSHIP AWARDED**

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Congratulations to Mariah A. Giardina, winner of the 2012 Charles C. Avery Intern Scholarship!



### **Bio:**

Growing up in the arid Southwest, I have always had a fascination with water. I received a B.A. degree in Political Science with a minor in Environmental Studies from Northern Arizona University (NAU) and took every chance I could to learn more about the complex water policies of the West, the colorful history of water development, and the highly charged political arena of water allocation and use in the West.

The more I studied water policy, the more I became intrigued with the interface between science and policy as it affects water resource management decisions. I chose to pursue a Master of Science degree in Environmental Sciences and Policy at NAU because it enabled me to gain scientific literacy and take a multidisciplinary approach in developing my passion into a viable profession. My thesis research was focused on springs ecosystem management in Arizona and has many implications toward sustainable and effective management of threatened and degraded water resources and their supported ecosystems in arid regions. During my graduate career, I volunteered for many organizations in and around Flagstaff to gain relevant experience and become more informed and involved in local water issues.

I received my Master's degree in May 2012 and I am looking forward to applying the knowledge and skills I have gained towards a career in water resources. My most immediate career goals are to continue to strengthen my scientific skills in hydrology and aquatic ecology. My long-term career goal is to work on a spectrum of water-related issues in this region with the ability to successfully navigate both science and policy and serve as an intermediary between the two disciplines.

I am very grateful and enthusiastic about receiving the 2012 Charles C. Avery Intern Scholarship. This is a great chance to further explore career options and gain valuable experience in a variety of water-related careers and I look forward to making the most of this opportunity.

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## **HYDRO-NEWS**

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### **ARIZONA GEOLOGICAL SOCIETY MEETINGS**

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#### **Diversity of intense acid (advanced argillic) alteration**

**Doug Kreiner, Senior Exploration Geologist, Bronco Creek Exploration, Tucson, AZ**

Sheraton Four Points Hotel Wildcat Room



1900 East Speedway (SE corner of Campbell and Speedway)  
Tucson

**Lecture at 8:00 PM**  
**Tuesday, June 5, 2012**

[Reservations are required for the dinner](#). Admission to the talk only is free. Please also note that although there is limited surface parking around the hotel, there is ample parking in the garage beneath the hotel.

**Special Meal Deal for Students! Dinner is *FREE* for students who make a reservation online at the website below. Please bring a student ID with you.**

**SCHEDULE: CASH BAR @ 6:00 PM, DINNER @ 7.00 PM, TALK @ 8:00 PM. WITH RESERVATION: MEMBER = \$24.00, GUEST = \$27.00.** If you do not have a reservation, an extra \$3.00 will be charged. Also, without reservations you may not get dinner. To make dinner reservations please call the AGS answering machine at (520) 663-5295 or reserve online at <http://www.arizonageologicalsoc.org/meeting-information/dinner-reservations> by 5:00 P.M. on the Friday before the meeting. Leave name, number of attendees, and whether a vegetarian or low-salt meal is required. This number can also be used for field-trip reservations and leaving messages for Society officers. Please cancel your reservation via the answering machine if you find that you will be unable to attend.

A reminder of a new AGS policy: You will be invoiced for the cost of the dinner if you make reservations for the dinner meetings and do not show up. Dinner reservations must be cancelled by phone or email by the Friday prior to the dinner meeting. If you are unable to attend because of illness or a true emergency, we will consider waiving the dinner cost on a case-by-case basis. We will continue to try to accommodate walk-ins whenever possible.

### **Abstract**

Advanced argillic alteration (AAA; leaching of bases by acidic fluids, local Al mobility) occurs in many hydrothermal systems and exhibits considerable variation in mineralogy, geometry, and associated elements. Most study has emphasized AAA in high-sulfidation epithermal/porphyry systems where S-rich magmatic gases play a key role, and in near-surface settings related to oxidation of H<sub>2</sub>S in gases, or pre-existing sulfides to form acid groundwaters. Although these types are most common, our work on Fe-oxide(-Cu-Au) [=IOCG] systems, comparative study of western US deposits, and a literature review show that AAA exhibits widely varying metal ratios, sulfur contents, and styles – features that reflect contrasting origins and have exploration and environmental significance.

AAA is typically silica-saturated and ranges from low-T (25-250°C) kaolinite-stable to high-T (400-600°C) andalusite-stable assemblages; these features and accessory phases vary with setting. AAA varies markedly in oxidation state, sulfidation state and sulfide contents ranging from: (1) high-sulfidation, S-rich (5-20% pyrite) in porphyry and epithermal systems, to (2) lower sulfidation S-poor (0-2% pyrite, common hypogene Fe oxides) in several settings including IOCG systems, to (3) to sulfate-bearing (typ. alunite) sulfide-poor, oxidized assemblages in near surface systems. Bulk metal contents and ratios vary widely (e.g., Ag:Cu in high sulfidation AAA varies from <1 to >100; high to absent As, Hg); in some cases metals are leached or absent (e.g., IOCGs, some pyrophyllite deposits). These characteristics require different fluids and processes – including but not limited to the familiar SO<sub>2</sub>-driven (porphyry, epithermal), steam-heated (geothermal), and weathering-related mechanisms.

As is well established, SO<sub>2</sub>-rich hydrothermal fluids of magmatic derivation are most common; yet even they exhibit large differences in element enrichments requiring that other factors be important, including differences in magmatic compositions and vapor vs. brine transport. Low sulfur systems require other acid sources, in IOCG and perhaps other settings, this is likely HCl and metal chlorides, factors that in turn will govern distinctive element enrichments. This work was supported by grants from the NSF and USGS MRERP programs.

**Dr. Kreiner can be reached at [dan@DKreiner@BroncoCreek.com](mailto:dan@DKreiner@BroncoCreek.com)**

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## SUPPLEMENTAL SUB-BASIN WATER LEVEL CHANGE MAP BOOK ARE NOW AVAILABLE

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The final versions of ADWR's new - [Statewide Hydrologic Monitoring Report](#) – and [Supplemental Sub-basin Water Level Change Map Book](#) are now available to download. The report provides data and analysis of Arizona's groundwater conditions over the last two decades. The period analyzed includes a time of significant variability in groundwater use trends, both inside and outside Arizona's Active Management Areas (AMAs), and covers the first 20 years of Central Arizona Project (CAP) water deliveries for direct use and recharge in central Arizona. The last 20 years also includes an extended drought period that has affected groundwater and surface water resources throughout the state.

The report provides insight into the effectiveness of major water management strategies and programs, and also into the impacts of extended groundwater overdraft. The analysis presented also attempts, where possible, to identify the effects of drought on local groundwater conditions. The report appendix contains information on ADWR's hydrologic data collection program and a discussion of current and future directions in ADWR's data collection activities.

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## WRRC 2011 ANNUAL REPORT

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The WRRC has just released its ***Annual Report for the calendar year 2011***. The report showcases the accomplishments of the WRRC, its faculty, professional personnel and students. A series of regular reports is planned to inform the water community about WRRC activities.

A PDF copy of the Annual Report can be downloaded at no charge from the WRRC's website at: [http://wrrc.arizona.edu/sites/wrrc.arizona.edu/files/WRRC-Annual-Report-2011\\_1.pdf](http://wrrc.arizona.edu/sites/wrrc.arizona.edu/files/WRRC-Annual-Report-2011_1.pdf)

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## WATER USE BY SINGLE-FAMILY RESIDENCES IN THE TUCSON WATER SERVICE AREA IN 2009 & 2010

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Residential water use study by Akitsu Kimoto, Evan Canfield, and Tom Arnold from Tucson Water as baseline information for demand management for the City/County Water Study has been released. The study looked at water use for 70,000 residences in the Tucson Water service area using monthly water use data from 2009 & 2010, as well as data on the parcels from the Pima County Assessor's office and occupancy from the 2010 census.

<http://tucsonpimawaterstudy.com/>

[Click here](#) for full report.

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## CLIMATE SCIENTISTS SAY THEY HAVE SOLVED RIDDLE OF RISING SEA

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AFP – Sun, May 20, 2012 – Yahoo News

Massive extraction of groundwater can resolve a puzzle over a rise in [sea levels](#) in past decades, scientists in Japan said on Sunday.

Global sea levels rose by an average of 1.8 millimetres (0.07 inches) per year from 1961-2003, according to data from tide gauges.

But the big question is how much of this can be pinned to [global warming](#).

In its landmark 2007 report, the UN's Nobel-winning [Intergovernmental Panel on Climate Change \(IPCC\)](#) ascribed 1.1mm (0.04 inches) per year to thermal expansion of the oceans -- water expands when it is heated -- and to meltwater from glaciers, icecaps and the [Greenland](#) and Antarctica icecaps.



That left 0.7mm (0.03 inches) per year unaccounted for, a mystery that left many scientists wondering if the data were correct or if there were some source that had eluded everyone.

In a study published in the journal *Nature Geoscience*, a team led by [Yadu Pokhrel](#) of the [University of Tokyo](#) says the answer lies in water that is extracted from underground aquifers, rivers and lakes for human development but is never replenished.

The water eventually makes it to the ocean through rivers and evaporation in the soil, they note.

[Groundwater extraction](#) is the main component of additions that account for the mystery gap, according to their paper, which is based on computer modeling.

"Together, unsustainable groundwater use, artificial reservoir water impoundment, climate-driven change in terrestrial water storage and the loss of water from closed basins have contributed a sea-level rise of 0.77mm (0.031 inches) per year between 1961 and 2003, about 42 percent of the observed sea-level rise," it says.

The probe seeks to fill one of the knowledge gaps in the complex science of climate change.

Researchers admit to many unknowns about how the oceans respond to warming, and one of them is sea-level rise, an important question for hundreds of millions of coastal dwellers.

Just a tiny rise, if repeated year on year, can eventually have a dramatic impact in locations that are vulnerable to storm surges or the influx of saltwater into aquifers or coastal fields.

In its 2007 Fourth Assessment Report, the IPCC said the oceans would rise by between 18 and 59 centimetres (seven to 23 inches) by the century's end.

But this estimate did not factor in meltwater from the mighty Greenland and Antarctic ice sheets.

A study published last year by the Oslo-based Arctic Monitoring and Assessment Project (AMAP) said sea levels would rise, on current melting trends, by 90 cms to 1.6 metres (3.0 to 5.3 feet) by 2100.

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## **[FOUNTAIN HILLS GOLF COURSES FEAR WATER SHORTAGE](#)**

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*by Edward Gately - May. 28, 2012 08:51 AM*

*The Republic | [azcentral.com](#)*

Three of Fountain Hills' four golf courses are bracing for [financial](#) hard times this summer because of a possible shortage of reclaimed or effluent water used for irrigation.

The Fountain Hills Sanitary District, a separate entity from the town of Fountain Hills, collects, treats and disposes of wastewater and its byproducts. Once treated, it is designated as reclaimed or effluent water.

The district provides reclaimed water free of charge to the town for three parks, and has contracts to sell the water to SunRidge Canyon Golf Club, Eagle Mountain Golf Club and FireRock Country Club for irrigation. Desert Canyon Golf Club has its own well.

In years past, the district had an overabundance of reclaimed water, but that has changed, because of increased demand by Eagle Mountain, drought conditions and poor economic conditions since the end of 2008, said Ron Huber, the sanitary district's manager.

Foreclosures and a lack of construction have reduced the amount of wastewater available for treatment. Although the district is not required to find an alternate source for the golf courses and town, Huber said he is focused on finding a solution before July 1, when the district could run out of stored reclaimed water.

Read more: <http://www.azcentral.com/news/articles/2012/05/23/20120523fountain-hills-golf-courses-fear->

## ARIZONA NAVAJO, HOPI WATER DEAL REVISION STIRS CONTROVERSY

by **Shaun McKinnon** - May. 13, 2012 08:29 AM  
The Republic | [azcentral.com](#)

MISHONGNOVI - As a member of the Hopi tribal council, Marilyn Tewa supported a plan two years ago that would have delivered water from the Colorado and Little Colorado rivers to her people and to Navajos on their northern Arizona reservations, where tens of thousands of people live without running water.

The plan would have secured the rights to billions of gallons from the two rivers and authorized a federally funded distribution system of pipelines and reservoirs, satisfying claims that the tribes were put on the arid reservations without adequate resources. With the water, the tribes could supply homes and businesses and rebuild ties to rivers with deep cultural import.



**Dan George Benally fills his barrels at the Black Mesa water station. Benally gets water 3 or 4 times a week.**

On a recent April morning in her home atop Second Mesa on the Hopi Reservation, Tewa flipped through the remnants of that deal with disgust. She no longer sits on the council, but if she did, she said, she would vote against what, in her view, has become a very different settlement, one introduced by U.S. Sen. Jon Kyl in February.

"They want us to sign away our rights to the river and negotiate for our own groundwater," said Tewa, who now works with advocacy groups that oppose the measure. "They look at us like we don't know what we're doing. But we do know. We do know what we have. We're fighting for our children so they'll have something left."

The revised agreement represents the new realities of Washington, where money no longer flows like water downhill. The deal still allots the tribes all the unclaimed water in the Little Colorado River, but it includes no money to deliver it beyond farms and homes along the river. It postpones a long-sought settlement of claims to the Colorado, which would require long, expensive pipelines. And the promised infrastructure has been pared down to three groundwater systems, providing a delivery system for the same pool of water already available.

Read more: <http://www.azcentral.com/news/articles/2012/05/13/20120513arizona-water-navajo-hopi-controversy-part1.html#ixzz1wWODwo4o>

## NAVAJOS CONCERNED OVER WATER DEAL WITH FEDS

by **Shaun McKinnon** - May. 13, 2012 11:37 PM  
The Republic | [azcentral.com](#)

PAGE - The house where Dixie Ellis lives with her mother is perched on a mesa above town. It is a steep hike up the hill from Lake Powell, the second-largest man-made reservoir on the continent, and an easier walk up Arizona 98 from the Navajo Generating Station, one of the country's largest coal-fired power plants.

"Tourists ask me about it," Ellis said, nodding at the three 774-foot smokestacks that rise into the northern sky from the power plant less than 3 miles down the hill. "I tell them we don't even have running water or



electricity. They can't believe it."

Ellis' mother, 96-year-old Sally Young, signed over part

**Dixie Ellis carries a water bucket at her home located next to the Navajo Generating Station.**

of her

grazing lease to allow construction of the plant more than 40 years ago, one of hundreds of families that gave up land for a promise of jobs and a stronger economy. Her family said she was also promised water and power, promises that apparently never made it on paper.

"Other people are benefiting from it, but we're not getting anything," said Pearl Begay, Ellis' daughter. "No lights, no running water, just the smokestacks."

The power plant has emerged as an issue in a proposed water agreement between the federal government and the Navajo and Hopi tribes. The government has offered the Navajos an extra allotment of water if they will ensure that leases are renewed for the plant site and for a mine near Kayenta that supplies coal to generate electricity.

Read more: <http://www.azcentral.com/arizonarepublic/news/articles/2012/05/13/20120513navajo-water-deal-government.html#ixzz1wfmnto4L>

See "**Navajo power station is an economic engine**" by John Sullivan, SRP, for an industry view point.

Read more: <http://www.azcentral.com/arizonarepublic/opinions/articles/2012/05/24/20120524sullivan-navajo-power-station-an-economic-engine.html#ixzz1wfnxVGgG>

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## **ARIZONA SUES OVER MEXICO WASTE FLOWING INTO U.S.**

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*May. 27, 2012 08:32 AM  
Associated Press*

NOGALES, Ariz. -- Arizona officials say the state is suing the U.S. International Boundary and Water Commission for state permit and Clean Water Act violations caused by allowing untreated industrial wastewater to cross the U.S. border from Mexico at Nogales.

The Nogales International reports (<http://bit.ly/KDnT94>) that the lawsuit, filed Friday in Maricopa County Superior Court, alleges that the IBWC has failed to implement a program to keep industrial waste from entering domestic sewage, which has resulted in illegal levels of cadmium, cyanide and ammonia nitrogen entering Arizona.

Read more: <http://www.azcentral.com/news/articles/2012/05/27/20120527arizona-sues-mexico-waste-flowing.html#ixzz1wWQudEv4>

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## **WATERBLOGGED BY SHAUN MCKINNON, ARIZONA REPUBLIC**

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For associated links and other timely water and environmental blogs on Shaun McKinnon's Arizona Republic site – **Waterblogged** visit <http://www.azcentral.com/members/Blog/ShawnMcKinnon>.

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## **MEMBERS CORNER**



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Deborah Tosline, U.S. Bureau of Reclamation, transferred from the Tucson Field Office to the Phoenix Area Office in early May 2012. Deborah works as a Hydrologist for Reclamation's Program Development Division and is a registered Geologist in Arizona. In her new position, Deborah will act as the Study Manager for Reclamation's North Central Arizona Water Supply Feasibility Study. Additionally, she will provide support to the Coconino Plateau Water Advisory Council, Technical Advisory Committee, and to the USGS on their Northern Arizona Regional Groundwater Flow Model. Deborah will become involved in other ongoing water resource management studies and will be responsible for working with Arizona communities to identify and develop new water resource projects.

You can reach Deborah at [dtosline@usbr.gov](mailto:dtosline@usbr.gov).

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### ***AHS Member Wins Best of SAGEEP Award***

A presentation by Jeff Kennedy, AHS member and U.S. Geological Survey Hydrologist, at the 2012 Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP) was voted "Best of SAGEEP" by attendees. SAGEEP, which took place in March in Tucson, Arizona, is internationally recognized as the leading conference on the practical application of shallow geophysics. Jeff's paper, "Gravity-Measured Water Storage Change and Subsurface Hydraulic Properties at a Managed Recharge Facility in Tucson, AZ," discussed the unprecedented deployment of nine gravimeters (some \$2 million of instrumentation) at a single study site to measure water-storage change. Jeff's research was supported by the Water, Environmental, and Energy Solutions funding initiative at the University of Arizona. The USGS Arizona Water Science Center is at the forefront in developing non-invasive gravity methods for hydrologic monitoring. For more information, please visit <http://az.water.usgs.gov/projects/HydroGravityMonitor/>.

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<http://az.water.usgs.gov>



Jeff Kennedy, near Benson, AZ with the USGS absolute gravity meter.

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## JOB BOARD

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Check these jobs out on the [AHS Jobs web page](#):

- [Water Resources Manager - Daniel B. Stephens & Associates, Inc.](#)
- [Resource Analyst - Freeport-McMoRan](#)
- [Principal Hydrogeologists and Water Resource Engineers - RPS Aquaterra](#)
- [Environmental Resources Supervisor - CITY OF PEORIA](#)
- [Natural Resources Management Specialist - Coronado National Forest](#)

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## ADDITIONAL INFORMATION

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*For more information about the Arizona Hydrological Society, or to view current job listings and announcements, please visit our regularly updated web site at:*

<http://www.azhydrosoc.org/>

*Membership may be renewed by credit card through the AHS website or by mailing a check to the Arizona Hydrological Society, P.O. Box 1882, Higley, AZ 85236. Dues remain at \$45.00 year for regular membership and \$15.00 for students.*

*The AHS Newsletter is edited by [Christie O'Day](#), AHS Executive Director. THANK YOU TO OUR MEMBERS FOR SENDING ME INTERESTING CONTENT FOR THE MONTHLY NEWSLETTER!*

