



OCTOBER 2012 NEWSLETTER

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VIEWPOINT: FANTASTIC FINISH...

For months I have been writing about the upcoming Symposium that the Phoenix Chapter was planning and now that all the hard work is over and the frantic emails and phone calls have come to an end, it is so fantastic to look back and see that all that hard work has paid off in a big way. The committee had been working on a "Back to Basics" theme while assembling the program and based on the feedback I have been getting I believe it really paid off.

It was so good seeing everyone gathered in the exhibitor areas talking shop, reconnecting and enjoying the day's events. I especially enjoyed watching the interacting of attendees and sponsors with our students during the Meet and Greet event.

I would like to express my gratitude for everyone that helped make this year's Symposium a success. To Ted Lehman and company for his vision that began shortly after the 2009 Symposium. He assembled a great team and found a venue that really fits AHS perfectly. Christie O'Day our executive director for working tirelessly on the Symposium in addition to her other duties as the AHS director. Matthew Beversdorf for his web skills and ability to put up with all the last minute changes and coordination with our sponsors to get their information posted to the web site. Summer Waters and Tom Walker for really getting the program in shape (this is no small feat) and don't get me started on dealing with those last minute changes. David Sampson for his work on the field trips and getting Professor John Sabo as our dinner speaker, David Christiana for leading the workshop effort, and Jeff Trembly for pulling together the teachers workshop both from a coordination effort as well as a fundraising effort. Vicki Mills for pulling together a tremendous silent auction that generated over \$1,600 for the AHS Foundation. I am not sure which was more exciting the great items that Vicki and company gathered or the closing minutes of the auction where folks were hanging around the tables seeing if someone was going to outbid them for the item they were hoping to win. To Keith Ross, Richard Siegel, and Cindy Blegen for continual support and their hard work providing program feedback, jumping in and picking up the loose ends as well as lending a helping hand during the Symposium. And lest I forget Alan Dulaney for his fundraising efforts, he may not be our president anymore but he is always willing to lend a hand for the Society. Thank you all for a job well done!

To our sponsors and exhibitors without your support we could not have put on such a fantastic program.

- **Platinum Level Sponsor** - [Freeport McMoRan Copper & Gold](#)
- **Gold Level Sponsor** - [Montgomery & Associates](#), [USGS](#), [Southwest Exploration Services](#), [Clear Creek Associates](#)
- **Silver Level Sponsor** – [Schlumberger](#), [Salt River Project](#)
- Awards lunch sponsor – Central Arizona Project
- And all our great exhibitors

And to all of those that attended, thank you your participation helped make this a great event. Your generous contributions and participation in the 50/50 drawing helped raise over \$500 for the AHS Foundation.

With all that said, keep in mind we will be doing this all over again in Tucson next year. So, if you are interested in being a part of it mark your calendars and keep watching our newsletters.

Thank you

[Mike Hulst](#)

AHS Corporate Board President

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GOVERNMENT GOINGS-ON

Kathy Ferris, Executive Director of the Arizona Municipal Water Users Association, gave a great luncheon speech at the Annual Symposium focused on what happens with water in the future. Drawing on the past (as a young government lawyer Kathy essentially wrote the Groundwater Management Act) and looking to the future, her talk was a reminder that perfection in the water world does not occur in 2025, even though all Active Management Areas are supposed to be in safe yield by then. Arizona needs to think beyond 2025.

The recently wrapped-up report of Water Resources Development Commission (WRDC) pointed out that the disparity between available water supplies and projected demand grows over time. You can visit the WRDC Website at

<http://infoshare.azwater.gov/docushare/dsweb/View/Collection-123> and see the work of the various committees—the one from the Water Supply and Demand committee is perhaps of greatest interest to hydrologists. Arizona should be OK for another decade and a bit more. But sooner rather than later, the ride likely will get increasingly rough.

Climate change was not a variable talked about very much at WRDC proceedings. Yet its effects potentially could have major implications for the hydrologic regime of many watersheds. The first declaration of shortage on the Colorado River isn't expected until about 2017, and municipal users should not feel any impact for several years after that, thanks to the buffer of the agricultural pool. But eventually flows down the CAP canal will be diminished to the extent that all will feel the pain. It is because of the Groundwater Management Act that Arizona has the CAP canal at all, an achievement of government.

It is up to government, and specifically state government, to plan for the future and insure that life in Arizona remains sustainable given the water supplies available. State government is only now beginning to outline the problem. It may take several years to build the consensus and gather the momentum needed to take concrete action. And the catalyst may be an outside factor that we do not yet apprehend. That's what it took to get the Groundwater Management Act written and passed, only 32 short years ago, and why we need to look ahead now.

[Alan Dulaney](#)

City of Peoria

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

Well another AHS Symposium has come and gone...And by most standards it was a wonderful success. We had a bunch of firsts here – the first Meet and Greet, the first sponsored student registration program, and the first silent auction. There were two days of great presentations capped by two excellent field trips. We hope you all enjoyed yourselves and learned something along the way. Thank you!

Student Registration Sponsors – This year we have started a new program to provide Symposium registration scholarships to students. The idea was to bring in more student participation to the Symposium and make it easier for deserving students to attend. Student sponsorship donations were to the AHS Foundation and qualify as tax deductible charitable donations. A \$400 grant from Central Arizona Project also assisted in the effort. In all we sponsored eight students to the symposium in the first year of this program – Chris Bailey, Joel Biederman, Brett Fleck, Zack Guido, Luis Huizar, and Gwen Woods from UA, and, Matthew Fesk, Cheyenne Harden from ASU. Thanks to CAP and all our individual sponsors. This looks like a great program to continue in for future symposia.

Teacher's Workshop Sponsors – Thank you to all you good people who pledged for the 2012 AHS Symposium Teachers Workshop. The Teacher's Workshop was a great success thanks to

you and additional generous support from SRP!

The winners of the drawing for a \$150 gift certificate to the restaurant of your choice and the two coffee mugs were:

- Scott Journell – Mug
- Ron Blegen – Mug
- Mike Geddis - \$150 gift certificate to the restaurant of his choice

Finally, a great thanks to all the members of the Symposium Planning Committee. It's a great pleasure to see how the collective efforts of the group can pay off.

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PHOENIX CHAPTER NEWS

Phoenix Chapter's October 2012 Dinner Meeting

The next Phoenix chapter dinner meeting will be held **on Tuesday, October 9, 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!

Tim Skarupa of SRP will give us an update from the standpoint of SRP Water Resource Operations, including watershed & reservoir conditions, outlook for the upcoming winter, impacts from the Sunflower burn area, & the evolution of water supply planning at SRP in the face of climate change & increasing variability.

Location:	SunUp Brewery 322 E. Camelback Road Phoenix, AZ 85012
Event:	The Salt River Project's Reservoir and Precipitation Outlook, Tim Skarupa, SRP
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 or 602-248-7702.

Hope to see you there!

Tim Skarupa of SRP will give us an update from the standpoint of SRP Water Resource Operations, including watershed & reservoir conditions, outlook for the upcoming winter, impacts from the Sunflower burn area, & the evolution of water supply planning at SRP in the face of climate change & increasing variability.

Tim Skarupa is a Senior Hydrologist in SRP's Water Resource Operations group. He graduated from Auburn University in 1993 with a bachelor's degree in Civil Engineering, and went on to pursue a master's in Civil Engineering (specializing in hydrology & hydraulics) from Arizona State. While attending ASU, he began working at SRP in 1996 and was hired on full-time in 1999.

Tim's responsibilities range from day-to-day reservoir system operations, to setting groundwater use goals, to short-term operations planning, to bi-weekly winter runoff forecasting, to long-range water resources planning. During runoff season, he takes part in regular trips to SNOTEL sites across the watershed to measure and assess snowpack. His group also coordinates and activates the Reservoir Emergency Operations Center (EOC) as necessary to safely manage flood releases.

He is also an avid sports fan, and coached freshman and junior varsity football in Mesa for six years.

Abstract:

SRP's reservoir system provides surface water supplies to many in the Salt River Basin. A look at this past water year's watershed and reservoir conditions will be provided as well as projected operations and reaction to the Sunflower Fire debris flows. Additionally, the evolution of long-term planning at SRP will be discussed.

Future Event Calendar (see also calendar on www.azhydrosoc.org)

Ø **November 13, 2012:** Monti's Casa Viejas in Tempe, topic to be announced.

Ø **December 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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TUCSON CHAPTER NEWS

Tucson Chapter's October 2012 meeting announcement

Alan Forrest, Tucson Water's new Director

The next meeting of the Tucson Chapter will be held on **October 9 at the offices of Errol Montgomery and 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 October meeting, **Alan Forrest, Tucson Water's new Director**, will provide an overview of the utility's operations and goals for the future. Mr. Forrest has been working in the water industry for about 27 years, with a primary focus on public utility operations and management. As such, he has held the position as top manager of public water utilities for a period of more than 10 years. Mr. Forrest also worked in the private sector, having spent over 7 years managing the operations of CH2M HILL's Tucson area office – a Fortune 500 consulting engineering firm. He became the Director of Tucson Water in June, 2012. Mr. Forrest attended the University of Arizona where he earned both a BS and MS degree in Civil Engineering. Alan has been a long standing member of several trade associations including the Southern Arizona Water Users Association (SAWUA), the American Waterworks Association (AWWA), the American Society of Civil Engineers, the Association of Metropolitan Water Agencies (AMWA) and currently serves as a Board Member for AZ Water (the Arizona Section for both AWWA and WEF). He is also a registered professional engineer (Civil) in the state of Arizona and obtained Certification as a Diplomate, Water

Resources Engineering (D.WRE) through the Academy of Water Resources Engineers, a Division of ASCE.

Also at the October meeting, representatives from the AHS Foundation will provide information about the foundation and be available to answer any questions that AHS members might have.



Special Event: Sarah Andrews book signing at the AZGS store

AHS members are invited to attend a book signing with geologist/author Sarah Andrews on October 16 from 4 to 6 PM at the Arizona Experience Store, 416 W. Congress St. The event is hosted by the Arizona Geological Survey, [click here for full color flyer](#). Please RSVP at store@azgs.az.gov or call 520-770-3500.

Note: For another really interesting read, visit <http://www.sarahandrews.net/whitepapers.htm> and explore the mind of a geologist!

October meeting announcement for the Tucson 2013 AHS Symposium Planning Committee:

The Tucson Chapter of the Arizona Hydrological Society (AHS) will be hosting the annual AHS symposium in Tucson in the fall of 2013. The symposium planning committee was officially formed in April and will be holding its fourth meeting as follows:

When: Wednesday, October 24th at **6:00 p.m.**

Where: Offices of Montgomery & Associates

1550 E. Prince Road

(520) 881-4912

*****Beer, soda, chips, and sandwiches from Baggins will be provided. Please contact Marla Odom (see contact information below) with any dietary needs prior to the meeting. **Please RSVP to ensure accurate food count.****

Benefits: Volunteering to serve on the symposium planning committee allows you to get to know others in the Tucson hydrology community in a creative atmosphere. Revenue generated by the AHS annual symposia is the primary source for funding AHS activities, including our intern and scholarship programs. This revenue also provides the means to reach out to our membership through monthly meetings and educational workshops. ***All AHS members are welcome to join us for food, drink, and fun at our August planning meeting!***

October Meeting Agenda:

1. Input/lessons from 2012 Symposium
2. Review venue selected
3. Review initial draft budget
4. Reports from committees
5. Delegate tasks to subcommittees

If you are interested in joining the symposium planning committee, please contact Marla Odom, the Symposium Chair, at (520) 881-4912 or modom@elmontgomery.com with any questions.



Water Resources
Research Center

Brown Bag Seminars



COLLEGE OF
AGRICULTURE
& LIFE SCIENCES



Wednesday, October 17

Time: 12:00 - 1:30 pm

Speaker: Val Little, Director, Water CASA

Title: INT-N-EXT Water Use Study, Tucson

Val will present a summary of the first 9 years of data from an ongoing 20 year study on residential interior/exterior water use. Through dual metering of 32 homes, valuable lessons have been learned on water use patterns over time and there are some interesting side stories to share.

Wednesday, October 24

Session 1: 12:00 - 1:30 pm

or Session 2: 4:30 - 6:00 pm

Speaker: Emily Brott, Sonoran Institute; Lisa Shipek, Watershed Management Group; Candice Rupprecht, WRRRC

Title: Tucson Conserve to Enhance Workshop for Funding Local Enhancement Projects

Tucson Conserve to Enhance (C2E) program leaders will provide an update on C2E successes and share opportunities for new participants to join and grant funding for neighborhood projects. Tucson C2E is seeking community leaders with ideas on how to improve local rivers and washes. In 2013, the Tucson C2E program will invest funds raised from C2E participants and the Tucson Water bill check box to fund Community Enhancement Projects. Community Enhancement Projects will directly benefit a neighborhood's natural areas and waterways through conservation and restoration practices. More information about the grant process will be covered at the workshop; please come with your project ideas to discuss with the C2E team.

An RSVP is required for this special Brown Bag Workshop. You will need to let us know which session you plan on attending. RSVP to [Candice Rupprecht](mailto:Candice.Rupprecht@wrrrc.arizona.edu) or 520-621-6318.

The views, opinions, advice or other content expressed by the author(s) or speaker(s) are their own and do not represent those of the Water Resources Research Center.

Persons with a disability may request a reasonable accommodation, such as a sign language interpreter, by contacting (Jane Cripps at 621-2526). Requests should be made as early as possible to allow time to arrange the accommodation.

wrrc.arizona.edu

Invitation to enroll in Tucson's Conserve to Enhance (C2E) program

We know you are passionate about watershed health and how water is used in our community! Do you want to take your passion to the next level and make personal water conservation choices that will benefit the watershed?



The WRRC, along with the Sonoran Institute and Watershed Management Group, invite you to enroll in the C2E program see how your water savings can work for the environment. For more information and to join, go to:

watershedmg.org/c2e

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FLAGSTAFF CHAPTER NEWS

The next Flagstaff Chapter meeting will be on Wednesday October 17, 2012 at 6:00 PM, at the Peabody offices, 3001 W Shamrell Drive (near the Flagstaff airport). For additional information please contact [Mike Tomlinson](#), [John Cochran](#), or [Erin Young](#).

Flagstaff members John Cochran, Paul Whitefield, and Erin Young are working to put together an electronic list of potential speakers willing to give a talk during our monthly meetings or during the Northern Arizona University School of Earth Sciences and Environmental Sustainability (SESES) Seminar Series. Anyone interested in giving a talk (even if they are not in the Flagstaff Chapter) should contact John Cochran (Secretary).

In case you missed it, the National Academies Press (<http://www.nap.edu/>) is making the pre-publication *Challenges and Opportunities in the Hydrologic Sciences* available free in PDF. The book description follows:

“New research opportunities to advance hydrologic sciences promise a better understanding of the role of water in the Earth system that could help improve human welfare and the health of the environment. Reaching this understanding will require both exploratory research to better understand how the natural environment functions, and problem-driven research, to meet needs such as flood protection, supply of drinking water, irrigation, and water pollution. Collaboration among hydrologists, engineers, and scientists in other disciplines will be central to meeting the interdisciplinary research challenges outline in this report. New technological capabilities in remote sensing, chemical analysis, computation, and hydrologic modeling will help scientists leverage new research opportunities.”

As I said, the book is free but you will need to register (free also) with the National Academies Press (NAP). Also, please remember that NAP offers more than 4,000 titles in PDF. All of these PDFs can be downloaded for free by the chapter or the entire book. NAP is an excellent source of books written by various committees of the National Research Council.

[Mike Tomlinson](#)

Flagstaff Chapter President

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HYDRO-NEWS

DOUBLE CIRCLE RANCH EROSION CONTROL WORKSHOP

Help us improve our watershed and aquatic habitat, and learn about erosion and sedimentation control and revegetation methods at these FREE hands-on three day workshops led by Craig Sponholtz, owner of [Dryland Solutions, Inc.](#) We will learn to design, site and install rock check dams, media lunas, splash



aprons, zuni bowls and armoring. Click here for [full flyer](#).

Erosion Control Workshop #7: October 12-14, 2012

Excess sediment is a major problem in the creeks and washes in our area, affecting water quality and potential habitat for aquatic and riparian species including loach minnow, spike dace and Chiracahua Leopard frog. By catching silt and stopping or slowing soil loss, we can help alleviate the problem and improve the integrity of our creeks and rivers.

The [Double Circle Ranch](#)'s public involvement and education programs are both fun and informational. You will work alongside us as we improve our watershed, and at the end of the weekend you will have new friendships as well as new skills and knowledge of erosion issues that you can easily implement around your own home and property.

Meals will be provided. Bring work gloves; all other supplies will be provided. Bring your tent and camp out for free, or if you prefer a bunk, you may reserve one of our outfitter tents for \$60/night. (Maximum of four people to a tent.)

Limit of 30 participants. Free.

[Contact us](#) to let us know how many people you'll be bringing, and we'll put you on the list!

Sponsored by the [Arizona Water Protection Fund \(AWPF\)](#).

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STATEWIDE STUDY OF DEEP GROUNDWATER SALINITY

Contact: [Michael Conway \(Michael.conway@azgs.az.gov; 520.971.3688\)](mailto:Michael.conway@azgs.az.gov)

Tucson. Arizona receives about 43% of its water supply from groundwater. A new [statewide study](#) documenting salinity concentrations of 270 deep groundwater wells in Arizona found that fresh water can extend as deep as 5,000 feet (1,500 m) in some areas but below 6,600 feet (2,000 m) only brackish or saline groundwater was encountered (Figure 1, attached).

As part of a program to examine the suitability of sedimentary basins in Arizona as potential geologic repositories for industrial carbon dioxide (CO₂) injection and disposal (called "geologic sequestration"), geologists of the Arizona Geological Survey (AZGS) reviewed geophysical well logs to catalog the concentration of total dissolved solids (TDS, i.e., salinity) of 270 water wells. This included all water wells that penetrated deeper than about 2,600 feet (800 m), which is the minimum depth necessary to sequester carbon dioxide.

Of the 56 wells that penetrated 2,600 feet (800 m) depth, 36 were on the Colorado Plateau and 18 were in sedimentary basins of Arizona's Basin and Range Province. Twenty-two deep wells (wells > 2,600 feet) had TDS values greater than 10,000 milligram per liter (mg/L), while 34 showed TDS concentrations less than 10,000 mg/L. The study concludes that fresh, brackish, saline, and brine water exist below 2,600 feet (800 m) depth in the Colorado Plateau and sedimentary basins. Fresh water can extend as deep as 5,000 feet (1,500 m) but below 6,600 feet (2,000 m) only brackish or saline groundwater was encountered.

To further characterize salinity of Arizona's groundwater, AZGS geologists documented all shallower wells with elevated salinity values. This resulted in an additional 214 wells being analyzed: 115 wells with TDS greater than 10,000 mg/L, and 99 wells with TDS between 5,000 and 10,000 mg/L.

From these data AZGS geoscientists inferred that:

- Correlations between salinity and depth are difficult to discern regionally or even in individual basins.
- Brackish and saline conditions are present in both provinces below 6,500 feet (2,000 m) depth.
- Groundwater salinity of basins varies broadly and there is no obvious trend between basin-sediment volume and groundwater salinity.
- Basin groundwater is influenced by sampling methods, depth, borehole-screened intervals, drilling fluids at the time of sampling, and a variety of geologic factors (e.g. rock chemistry, faults,

geothermal gradients, and salt domes).

Groundwater data was provided by the US Geological Survey – National Water Information System, Arizona Dept. of Environmental Quality, Arizona Department of Water Resources - Groundwater Site Inventory, Arizona Oil and Gas Conservation Commission, and consulting geologist James Witcher's Geothermal Resource Data Base. For well reports reporting conductivity in place of TDS, a conversion factor was used to calculate the equivalent TDS value.

The U.S. Department of Energy (DOE) funded this research as part of nationwide program to explore a variety of geologic repositories for their carbon dioxide sequestration potential. The report is available online for review or downloading at no cost.

Citation: [A Summary of Salinities in Arizona's Deep Groundwater](#), 2012, Gootee, B.F., Mahan, M.K and Love, D.S. Arizona Geological Survey Open-File Report, OFR-12-26. 10 p.

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NEW SOURCE OF GEOTHERMAL ENERGY IN WESTERN U.S.

Contact: Michael Conway (Michael.conway@azgs.az.gov; 520.971.3688)

Tucson. Discovery of a new type of geothermal energy resource in Utah offers hope for significantly more potential across the western U.S., and a boost in geothermal power production.

In 2011 and 2012, Utah Geological Survey geoscientists, in partnership with a U.S. Geological Survey research drilling crew, drilled nine temperature gradient holes in Utah's Black Rock Desert basin south of Delta to test a new concept that high temperature geothermal resources might exist beneath young sedimentary basins. Preliminary results show that near-surface temperature gradients in the basin vary from about 60°C/km (33°F/1000 feet) to 100°C/km (55°F/1000 feet). This implies temperatures of 150 to 250°C (300 to 500°F) at 3 – 4 km depth (10,000 to 13,000 feet) beneath the basin. An abandoned oil exploration well drilled near Pavant Butte in the central part of the basin in 1981 confirms these exceptionally high temperatures. Seven of the drill holes were funded by the U.S. Department of Energy as part of a National Geothermal Data System project, managed by the Arizona Geological Survey. The new holes also confirm the results from three other research holes that were drilled in the basin over the past few years; these were funded by the Utah State Energy Program and the Utah Division of Wildlife Resources.

The 1,000 square kilometer Black Rock Desert basin is filled with unconsolidated sediments to a depth of 3 km, while the underlying basin floor comprises a variety of Paleozoic and older bedrocks. In some parts of the basin, porous and permeable carbonates (limestones and dolomites) are known to be present and these would be natural hosts for a geothermal reservoir. Using the drilling results, a reservoir modeling team at the University of Utah estimates a basin-wide power density of about 3 to 10 MWe/km², (megawatts of power per square kilometer) depending on reservoir temperature and permeability. Given the large area of this basin, the power potential is conservatively estimated to be hundreds of megawatts, and preliminary economic modeling suggests a cost of electricity of about 10c per kilowatt-hour over the life of a geothermal power project. The modeling assumes air-cooled binary power generation with all produced water injected back to the reservoir so that there would be no emissions or consumption of water. The heat in the produced water would be exchanged at the surface in an air-cooled binary power plant. Such power plants are common these days in geothermal power developments. The cool, injected water would move laterally in the reservoir between injection and production wells, and can be considered as heat-farming at depth.

This basin is especially attractive for geothermal development because of the existing nearby infrastructure – it is next to a large coal-fired power plant, a 300 MWe wind farm, and a major electrical transmission line to California.

Geothermal exploration in the Basin and Range Province of western Utah and Nevada has traditionally focused on narrow, hydrothermal upwelling zones along bounding faults of mountain ranges. Most current power developments have reservoir areas of less than 5 km² (2 square miles). However basins within the Basin and Range usually have areas of many hundreds of square kilometers. Although the depth to potential reservoirs beneath these basins is deeper than the geothermal industry is used to, the large reservoir area offers economies of scale. Drilling to depths of 3 – 4 km is not unusual in oil and gas developments.

Dr. Rick Allis, Director of the Utah Geological Survey and joint lead scientist of the sedimentary basin geothermal research project, said that existing heat flow maps of the Basin and Range don't have the resolution to identify this type of geothermal energy resource. "There are other potentially hot basins across the Basin and Range province that need to be investigated using this exploration model. We have identified the Steptoe Valley and Mary's River –Toano basins in northeast Nevada as obvious geothermal targets. There may also be hot basins across the western U.S. that have similar unrecognized geothermal energy potential."

The project findings are being presented at 2:30pm on Monday, October 1, at the annual meeting of the Geothermal Resources Council in Reno, Nevada. A question and answer period with Dr. Allis will take place following the close of the session at 3:45pm at the Department of Energy Geothermal Technologies Program booth, 610-612.

The National Geothermal Data System is in operational test mode, integrating large amounts of information from all 50 states to enhance the nation's ability to discover and develop geothermal energy. Visit the State Contributions site at www.stategeothermaldata.org.

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WRRC'S 2013 ANNUAL CONFERENCE TAKES ON "WATER SECURITY FROM THE GROUND UP"



Water security is a large and complex issue encompassing the many efforts required to assure a safe, reliable, and sufficient water supply for people, the environment and the economy now and in the future. The Arizona Water Resources Research Center's 2013 Annual Conference will tackle this important topic. On March 5, 2013, the conference, "Water Security from the Ground Up", organized in collaboration with the United States Geological Survey, Arizona Water Science Center, will take place at the University of Arizona, Student Union Memorial Center. To examine water security from multiple angles, the conference will present perspectives from scientists and water policy and management experts on sustainable use, augmentation and protection of water resources from over-exploitation, contamination and other hazards, including drought and climate variability. Speakers will discuss issues of water policy and the role sound governance plays in safeguarding human values and ecosystem functions. Experts will inform us on current trends and strategies for securing the supplies to support quality of life for future generations.

Please join us as we explore the path to water security.

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AIPG ARIZONA SECTION "GOLDEN ANNIVERSARY" TRIP TO CHIHUAHUA, MEXICO

To celebrate AIPG's 50th anniversary, the Arizona Section has prepared a geologic vacation to the State of Chihuahua, Mexico during **April 5 to April 11, 2013**. The Mexican state of Chihuahua is the birthplace of Pancho Villa and the Mexican Revolution, and has a diverse range of cultural and geologic attractions. This trip will have excursions to world-famous localities that can be appreciated by both the professional geologist and the general public.

Guests will be highly encouraged to join us so that this will truly be a vacation with a multi-cultural, geologic

bent. The trip is open to others outside of the Arizona section.

Our trip will start at the capital of the state, Chihuahua City, with the first travel day on Friday, April 5, 2013. The trip itinerary is as follows (click here for full flyer):

Day	Description of Activities
Day 1 (Friday, April 5)	Participants travel to Chihuahua and check into hotel.
Day 2 (Saturday, April 6)	Day trip to Naica Mine and tour the Cave of Giant Crystals; Evening dinner in conjunction with local geologists (AIMMGM).
Day 3 (Sunday, April 7)	Visit to nearby historic mining district Santa Eulalia. Excursion to historic district of Chihuahua City and local museums.
Day 4 (Monday, April 8)	Check out of hotel in Chihuahua City and travel to Nuevo Casas Grandes with stop at exploration project (Terrazas). Check into hotel at Nuevo Casas Grandes/have lunch. Travel to Mata Ortiz to see pottery-making with visits to artists' studios and watching a firing of pottery.
Day 5 (Tuesday, April 9)	Drive to scenic outlook along flank of the Basin and Range to view regional geology. Tour of museum and archeological ruins at Paquimé. Visit the Mormon settlement of Colonia Juarez.
Day 6 (Wednesday, April 10)	Check out of hotel in Nuevo Casas Grandes and return to Chihuahua City. Group dinner at restaurant with regional specialty menu.
Day 7 (Thursday, April 11)	Return to USA or start optional excursion to Copper Canyon (the optional trip would be with a local tour company).

The localities listed in our itinerary each deserve their own detailed description, but at this time this is just a taste of the trip. A visit to the **Naica Mine** and the enormous selenite crystals is a one-in-a-lifetime experience in itself (dare I say "geologic pilgrimage"?). The Discovery Channel programs and National Geographic articles on Naica are great, but experiencing the cave yourself is unworldly. The geologic setting that we'll explore in Chihuahua includes a Cretaceous limestone sequence with the lower formation at Naica and the upper formation near our northern destination of **Nuevo Casas Grandes** with stops at **Santa Eulalia** and **Terrazas**.



Cueva de los Cristales (Naica)

Learning about local history will be a fascinating part of our trip. We'll cover history from millions of years (for the growth of the crystals at Naica), to the pre-Columbian time when **Paquimé** was occupied, to the Mexican Revolution in 1910.

Our trip is planned for early April 2013, when temperatures vary between 50 and 80 degrees F, and make for lovely days to enjoy **spring in the Chihuahuan Desert**. We'll be traveling on a comfortable 50-passenger tour bus, and the *registration will be limited to 40 participants*. We'll be staying in first-class hotels, the water is safe, and the food is fabulous.

We'll have a stop at the small village of **Mata Ortiz**, which is the artistic center for the world-class, modern pottery that is sold in fine galleries and museum shops in the U.S., Europe, and Japan. Ceramic artists produce hand-formed vessels that are painted with mineral pigments from the local soil and fired in the traditional method using local wood. We'll meet the artists and see how the pots are made and fired.

At this time we are only soliciting interest for the field trip. Later we will have the details available and

interested parties can confirm their spots with a deposit. If you are interested in the field trip, please contact **Dawn Garcia** (trip coordinator) at dgarcia@srk.com or via cell 520-471-9387. Dawn is the President-Elect for the Arizona section, and has extensive travel experience in Mexico. The trip leader for the area of Nuevo Casas Grandes will be **John Bezy**, retired geologist and co-author of the book "The Artistry and History of Mata Ortiz". John has been traveling in Mexico for decades and has a wealth of knowledge not only on the geologic but on the culture and history of Chihuahua.

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PRACTICAL STATS FALL 2012 COURSES AND WEBINARS



ProUCL 4 webinar: Oct. 15

This 1.5 hour webinar will highlight the many good procedures computed by ProUCL, as well as point out methods that are outdated, not of value, or computed incorrectly.

What you will learn from this webinar:

- How to input data (including nondetect values) into ProUCL and perform its procedures
- Which methods get the 'green light', so are useful and correct
- Which methods get the 'yellow light', requiring you to understand and correctly use the methods and options within the procedure
- Which methods get the 'red light' and should be avoided because they are either computed incorrectly or of little technical use.

Applied Environmental Statistics: Dec. 3-7.

Phoenix AZ

Our flagship in-person training course surveying the methods needed for interpreting environmental data.

What you will learn from this course:

- How to compute nonparametric, permutation and parametric tests, and when to use which type.
- How to build good regression equations (hint: r^2 isn't the best guide)
- Trend analysis methods
- not to be fooled by 'Urban Legends' in environmental statistics

For a detailed outline, go to our [AES outline page](#)

Dennis Helsel

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MODELING PREDICTS EXCESSIVE NITRATE AND ARSENIC IN SOUTHWESTERN U.S. AQUIFERS

September 27, 2012	David Anning	928-556-7139	dwanning@usgs.gov
	Leslie Gordon	650-329-4006	lgordon@usgs.gov

Modeling results from the U.S. Geological Survey indicate that groundwater in basin-fill aquifers (sediment-filled valleys) beneath about 2.4 percent of the area in the southwestern U.S. may equal or exceed the drinking-water standard for nitrate, and groundwater beneath about 43 percent of the area may equal or exceed the standard for arsenic. These aquifers are an important resource, providing about 40 percent of the water used in that region. While several compounds occur in groundwater from these aquifers, nitrate and arsenic are among those most frequently found to exceed drinking-water standards established by the U.S. Environmental Protection Agency for protection of human health.

While public water supplies are treated to ensure that water reaching the tap of households meets federal requirements, there are no such requirements for private supplies. The results highlight the importance of private well owners testing and potentially treating their water. All of the contaminants identified in the aquifers can be reduced or eliminated through a variety of treatments.

"The alluvial basins of the American Southwest can provide a valuable water resource to growing populations who often lack other sources of fresh water," said USGS Director Marcia McNutt. "However, the results of this modeling study raise a cautionary flag for private well owners of the need to test water to ensure its safety and to take action to remediate any contamination that is found."

Areas where nitrate concentrations are predicted to equal or exceed the EPA drinking-water standard (10 milligrams per liter as nitrogen) occur in several basins in central Arizona near Phoenix; the southern part of California's Central Valley; as well as several basins near Los Angeles along the southern coast; and the San Luis Valley of south-central Colorado.

Much of the area where arsenic concentrations are predicted to equal or exceed the drinking-water standard (10 micrograms per liter) is within several basins in parts of southwestern Arizona, southeastern California, western Nevada, and western Utah. Most of the area with predicted high arsenic concentrations is in sparsely populated rangeland, whereas most of the area with predicted high nitrate concentrations occurs where agricultural or urban communities are located.

The USGS National Water-Quality Assessment Program study, which included parts of Arizona, California, Colorado, Nevada, New Mexico, and Utah, applied a statistical modeling approach that extrapolates nitrate and arsenic occurrence from areas where concentrations are known, to other areas where such data are unavailable. The extrapolation is based on nitrate and arsenic analyses from well-water samples collected from 1980 to 2010, and a wide variety of hydrologic, geologic, climatic, soil, land use, water use, agricultural, and biotic conditions that local-scale geochemical studies have found to be relevant to nitrate or arsenic occurrence in groundwater.

Results from this study are available [online](#).

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ARIZONA'S MONSOON RELIABLY UNPREDICTABLE

by *Shaun McKinnon* - Sept. 30, 2012 12:00 AM
The Republic | [azcentral.com](#)

Matt Pace was watching the weather radar in the early hours of Sept. 7 and saw a storm start to develop in the far East Valley. He hopped in his van and hit the streets, hoping to get a good view of the system as the sun cleared the Superstition Mountains.

As a storm chaser, Pace prefers to watch from the outside, where he can track the movement, collect data and see the immediate aftermath. In this case, he found himself swallowed up quickly, surrounded by some of the most intense rain he had seen all summer.

"I wasn't expecting rainfall that heavy," said Pace, who owns a weather-consulting company called Executive Meteorology. "The flooding was curb to curb, the streets were pure rivers. I tracked a lot of cloud-to-ground lightning."

By midmorning, the storm ended, leaving behind as much as 3 inches of rain in several east Mesa locations. The official National Weather Service gauge at Phoenix Sky Harbor International Airport

recorded about half an inch for the day, while stations in the West Valley and north Scottsdale were virtually dry.

The sudden onset of rain, the brief but intense bursts of wind or lightning and the hopscotch path of the storm's center are all typical of the Arizona monsoon season, which officially ends today. The data points that Pace and scores of other weather watchers collect, along with official observations, help draw one picture of the monsoon, but weather experts say anecdotal information is just as valuable for the notoriously fickle phenomenon.

Read more: http://www.azcentral.com/news/articles/20120929arizonas-monsoon-unpredictable.html?nclick_check=1#ixzz27yq6GENN

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MARS ROVER CURIOSITY FINDS SIGNS OF ANCIENT STREAM

*Sept. 27, 2012 04:13 PM
Associated Press*

LOS ANGELES -- The NASA rover Curiosity has beamed back pictures of bedrock that suggest a fast-moving stream, possibly waist-deep, once flowed on Mars -- a find that the mission's chief scientist called exciting.

There have been previous signs that water existed on the red planet long ago, but the images released Thursday showing pebbles rounded off, likely by water, offered the most convincing evidence so far of an ancient streambed.

There was "a vigorous flow on the surface of Mars," said chief scientist John Grotzinger of the California Institute of Technology. "We're really excited about this."

The discovery did not come as a complete surprise. NASA decided to plunk Curiosity down inside Gale Crater near the Martian equator because photos from space hinted that the spot possessed a watery past. The six-wheeled rover safely landed Aug. 5 after a nail-biting plunge through the Martian atmosphere. It's on a two-year, \$2.5 billion mission to study whether the Martian environment could have been favorable for microbial life.

Present day Mars is a frozen desert with no hint of water on its radiation-scarred surface, but geological studies of rocks by previous missions suggest the planet was warmer and wetter once upon a time.

Read more: <http://www.azcentral.com/arizonarepublic/news/articles/2012/09/27/20120927mars-rover-curiosity-finds-signs-ancient-stream.html#ixzz27yrQomP8>

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FOES AIM TO BLOCK FLORENCE MINE PLAN

Injunction sought vs. wastewater permit

*by Craig Harris - Sept. 25, 2012 10:19 PM
The Republic | azcentral.com*

Opponents of a proposed Florence underground copper mine are seeking an injunction to stop the Arizona Department of Environmental Quality from issuing a temporary wastewater permit that would allow the project to move forward.

[Curis enlists allies in copper mine fight](#) | [Curis shares sink amid mine delay](#)

Developers Southwest Value Partners and Pulte Home Corp., along with Johnson Utilities, the water provider in Florence, filed the lawsuit late last week in Maricopa County Superior Court. The court has taken no action.

The suit is the latest salvo in a long-running fight between mine opponents and Curis Resources. Opponents contend the mine would pollute the groundwater, while Curis has said there is no environmental danger and the company has promised jobs, tax revenues and mining royalties for the state if it is allowed to extract copper from the ground.

The chief executive of Curis said Tuesday the suit has "no real basis," and the company wouldn't do the project if it can't be done safely.

Curis needs permits from the ADEQ and the federal Environmental [Protection](#) Agency to begin mining on 160 acres of State Land Department trust land that Curis leases. Curis also plans to mine on 1,182 acres of property it owns. Downtown Florence is south of the proposed mine, off Hunt Highway.

Read more: <http://www.azcentral.com/news/articles/20120925florence-foes-aim-block-mine-plan.html#ixzz27ysGvKUa>

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SAFETY OF ACID-INJECTION MINING TECHNIQUE DEBATED

by **Ryan Randazzo** - Sept. 8, 2012 11:48 PM
The Republic | [azcentral.com](#)

The tantalizing copper deposit at the foot of a butte near Florence has drawn interest from mining firms since the 1960s. But the [cost](#) of extracting the rich ore from deep underground always sent miners in this copper-rich state to more easily harvested deposits.

Rising copper prices have changed the equation, prompting Curis Resources to embark on a plan to extract the copper by injecting sulfuric acid into formations more than 400 feet underground, where it would strip the fractured rock of copper. The mix of acid and minerals would be pumped back to the surface for processing.

The process, called "in-situ" mining, meaning "in place," is a point of white-hot controversy in a battle between the mining company and Southwest Value Partners, a developer seeking approval for a nearby housing project.

The key question about Curis' proposal is whether pumps could recapture all of the acid pumped underground, where it could encounter groundwater, geologic fault lines, abandoned mining tunnels and nearby wells.

Opponents, including Southwest, fear it would poison the water supply and derail the planned development. But mining experts say the technique is safe and effective.

The mine's future turns on securing permits from the U.S. Environmental Protection Agency and the Arizona Department of Environmental Quality. The agencies are expected to make decisions later this year on whether the mining operation would be safe.

Read more: <http://www.azcentral.com/community/pinal/articles/2012/07/26/20120726acid-injection-mining-technique-debated.html#ixzz27yxJrPD9>

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BITTER DEBATE OVER MINING IN SMALL TOWN FLORENCE

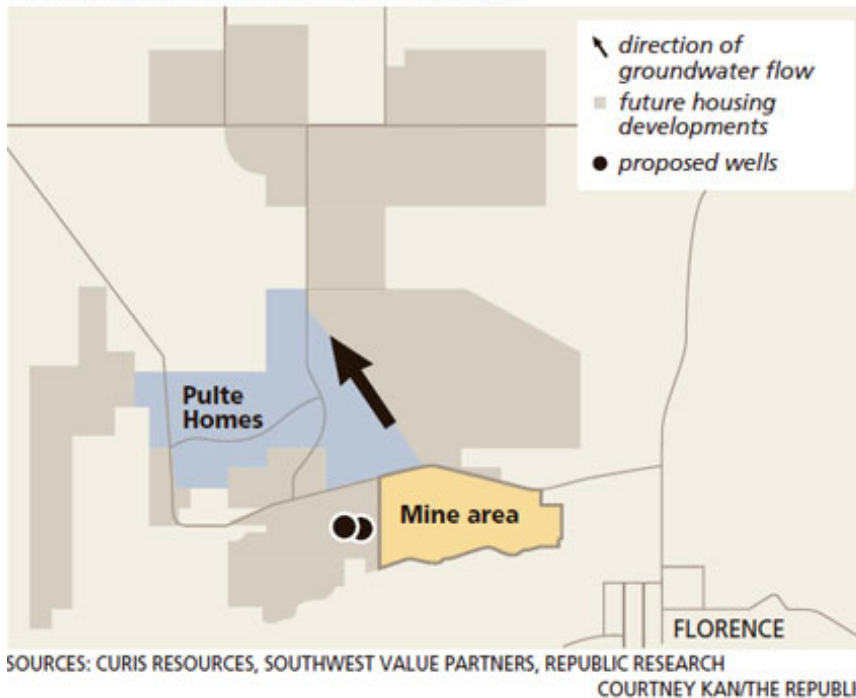
by **Dennis Wagner and Craig Harris** - Sept. 8, 2012 11:38 PM
The Republic | [azcentral.com](#)

FLORENCE - A coyote skitters through greasewood desert in the geographic heart of one of Pinal County's most historic towns, a tranquil scene that gives no hint of the fortune in copper hidden deep beneath the soil here -- or to the swirl of human turmoil the ore has caused above ground.

This barren patch of land is at the center of a political and economic battle over a proposed \$700 million mining project and, by extension, the community's future.

WATCHING OUT FOR GROUNDWATER

Debate over a proposed underground copper mine in Florence is based on what it could do to the groundwater, which generally flows to the northwest in the area. Downtown Florence is south of the mine site, but more than 20,000 homes are planned north and west of the mine.



[Safety of technique debated](#)

[Florence Copper Project](#)

[Republic public records inquiry](#)

[Brewer response to Republic](#)

This drama's chief adversaries are both corporate Goliaths. One wants to make money mining copper at the site, the other wants to cash in on development of surrounding lands. The townsfolk are seemingly caught in the crossfire.

These rivals offer two very different explanations of the proposed Florence Copper Project. Both involve forces intent on swaying a small Arizona town.

The object of this debate is a unique type of mine that would inject millions of gallons of sulfuric acid solution deep into the ground

to leach out the copper. It is a cost-effective method of mining, but the community is less certain about its safety.

Opponents say the mine is being pursued by greedy foreign speculators hoping to cash in on the copper lode, coming to a depressed, rural outpost with promises of an economic boom. Project owners, they say, hired sophisticated public-relations firms to influence opinion and assist pro-mine candidates in municipal elections. They used local leaders, powerful lobbyists and big-city lawyers to influence powerful politicians, including Gov. Jan Brewer. They promised clean mining with jobs and prosperity.

Read more: <http://www.azcentral.com/community/pinal/articles/2012/09/08/20120908florence-economic-future-debate.html#ixzz27yyaeY00>

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ROSEMONT BACKS OFF WATER-USE STATEMENT

Air-quality issues may offset recent conservation claims

September 23, 2012 12:00 am • [Tony Davis Arizona Daily Star](#)

Rosemont Copper is backing off from a recent statement that its proposed mine will use less water than originally thought due to changes in its operations.

In a new letter to Coronado National Forest Supervisor Jim Upchurch, Rosemont Vice President Kathy Arnold describes a potential tradeoff:

- Water use will be reduced by more than 10 percent due to the company's new plan to eliminate heap leaching and solvent extraction facilities to process copper oxides.

- But that could be offset by a need for more water for increased dust control requirements. The dust control could be required for air- quality purposes and "longer haulage roads," the letter said, without elaborating.

That contrasts with Arnold's July 8 letter to Upchurch, in which she wrote that because of eliminating plans for heap leaching and solvent extraction, "the quantity of water used for mineral processing will be reduced, reducing the project's overall water demand and groundwater pumping in the Santa Cruz Sub-Basin."

In the new letter, dated Sept. 12 - and sent because Upchurch asked for more details - Arnold said the company wants the Forest Service to assume that the Rosemont Mine's water use will stay at its legally permitted level of 6,000 acre feet a year. That way, Rosemont Copper can "ensure (that) maximum potential impacts are disclosed." An acre-foot is 326,851 gallons, or enough to serve three families homes for a year.

Upchurch said his staff is reviewing Arnold's new letter for accuracy.

Rosemont Mine opponents are skeptical of the letter's conclusions about water use, and still want the Forest Service to do an updated or new draft environmental impact statement to analyze the changes. The Forest Service has said it will decide that question by December.

Arnold said the company has given more details to the Forest Service about mitigation measures that haven't been made public yet. Until it is, outsiders' statements about the mine's impacts are "speculative," she said.

Rosemont Copper officials would not answer most questions from the Star about Arnold's letter. One area that her letter didn't address in most cases was whether the predictions took into account the impacts of increases in copper production now planned for the mine, due to a newly discovered, large increase in copper sulfide reserves at the site.

Read more: http://azstarnet.com/news/science/environment/rosemont-backs-off-water-use-statement/article_01dfab24-8133-5950-adb8-5fadee2f1f09.html

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COUNTY TO DROP APPEAL ON ROSEMONT WATER PERMIT

September 20, 2012 12:00 am • [Tony Davis Arizona Daily Star](#)

Pima County plans to drop its appeal of an April decision by the state's environmental agency approving a groundwater pollution prevention permit for the proposed Rosemont Mine.

In a rare moment of harmony on the mine issue, the county, Rosemont Copper and the Arizona Department of Environmental Quality have submitted a proposed settlement of the appeal to the state Water Quality Appeals Board, which was to have decided on the appeal.

While this settlement represents one less hurdle for the long-delayed, \$1.2 billion mine project, the company isn't home free yet on its Aquifer Protection Permit from the state. Here's why:

Because the Forest Service is proposing a different alternative for the mine layout than what Rosemont Copper had submitted to the state agency, it's possible or likely the company will need a new permit from the state if that alternative - known as the Barrel Alternative - is ultimately approved by the service, ADEQ spokesman Mark Shaffer said this week.

"A new permit would be needed on that or any other changes on Rosemont's part," Shaffer said.

The leading mine opposition group, Save the Scenic Santa Ritas, is continuing its appeal of the permit. An administrative law judge is holding hearings on that appeal in Phoenix this week.

Also, rather than concede defeat to Rosemont Copper over this permit, County Administrator Chuck Huckelberry, an outspoken mine foe, said one reason he's willing to drop the appeal is that he believes the county got most of what it wanted from it. One factor is that he thinks the company will need to file

another permit application, Huckelberry's top aide, Nicole Fyffe, told the Star in an email.

Read more: http://azstarnet.com/news/local/govt-and-politics/county-to-drop-appeal-on-rosemont-water-permit/article_4396b199-eea1-504b-b177-fb5b506f79a3.html

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WATERBLOGGED BY SHAUN MCKINNON, ARIZONA REPUBLIC

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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JOB BOARD

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

- [Hydrogeologist - DBS&A](#)
- [Senior Groundwater Modeler/Hydrogeologist - Montgomery & Associates](#)
- [Mid-level Hydrogeologist/Modeler - Montgomery & Associates](#)

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ADDITIONAL INFORMATION

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!