Arizona Geological Society Newsletter

NOVEMBER 2013

NOVEMBER 5, 2013 DINNER MEETING

Who: **Malcolm Siegel** will be our featured speaker. See abstract below.

Where: Sheraton Tucson Hotel and Suites, 5151 East Grant Road, at the intersection of Grant and Rosemont on the North side of Grant in the ***Pima Room***. The Pima Room is located on the second floor in the northwest corner of the hotel.

When: Cash Bar at 6 p.m.—Dinner at 7 p.m.—Talk at 8 p.m.

Cost: Members $27, Guests $30, Students are free with an online dinner reservation ($10 without).

RESERVATIONS are REQUIRED by 11 a.m. Thursday, October 31, Reservations can be made on the AGS website (www.arizonageologicalsoc.org). If you do not have internet access, you may call 520-663-5295. Please indicate regular (chicken breast with a sun-dried tomato and thyme cream sauce), vegetarian, or cobb salad meal preference. Please cancel by Thursday, October 31 at 11 a.m. if you are unable to attend.

srk consulting

The November dinner meeting is sponsored by: SRK Consulting

AGS is grateful for SRK's sponsorship, which helps to offset dinner meeting costs.

Go to www.srk.com to learn more about **SRK Consulting.**

ABSTRACT

Uranium Mining in the American Southwest: Can Medical Geologists Ask the Right Questions?

Malcolm Siegel **LJS Consulting, Inc. and School of Medicine, University of New Mexico**

The debate around proposed new uranium mining in the American Southwest is fueled by uncertainties in both the health and geosciences. The controversies are centered around two areas: 1) the effectiveness of contaminant plume control during mining, site restoration, and long-term stabilization by natural attenuation, and 2) potential long-term health effects for exposed indigenous populations. Strong stands are being taken by proponents and opponents of new mining on places such as the Navajo Reservation. In many cases, the disagreements are related to the practice of predicting future system performance and health effects by extrapolating from historical health data and engineering case studies that may not applicable to site-specific proposed mining practices or conditions.

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Demonstration of the efficacy of site restoration to the earth scientist rests on assurance that a low-concentration plume will dissipate, be irreversibly sequestered, or have no potential to reach a susceptible population. This is difficult because of uncertainties in both geochemical and hydrologic data. This presentation will provide an overview of key aspects of the recent history of in situ mining and assessments of the potential role for natural attenuation as predicted by laboratory, field, and modeling studies.

For the health professional, acceptance for future mining will require demonstration that vulnerable populations will not be negatively impacted by uranium exposures. This depends, in part, on demonstrating that current exposure limits are sufficiently protective of susceptible populations. This talk will highlight some of the sources of major uncertainties in the data and methods used to determine the possible risks to potentially exposed populations, including challenges to assessing low-level, chronic exposures and identifying relevant health effects.

It may not be possible to obtain agreement between the opposing sides in the emotional debate over uranium mining, however, a holistic approach, which addresses the relative importance and uncertainties of key parameters and models is needed to advance the discussion. This talk will attempt to identify the reducible and irreducible risks associated with new uranium mining and explore the potential role of Medical Geology in bridging the gap between the sciences and sides in this controversial debate.

Member News

Arizona Geological Society offers condolences to the family of exploration geophysicist, prospector, and AGS Life member **Walter E. Heinrichs, Jr.,** who passed away in Tucson on October 10th. Walt graduated from the Colorado School of Mines in 1940 and was co-discoverer with Robert E. Thurmond of the Pima deposit in 1950 – now part of the ASARCO Mission Complex. He and his brother Grover founded Heinrich's GEOEXploration Company of Tucson, which provided geophysical consulting services in water, energy, minerals and environmental matters. Walt was an active board member of several local and national organizations including AGS (founding member), AIPG (Charter member), SME, and the Mining Foundation of the Southwest.

Condolences also to AGS member **Paul Lindberg** on the October 13th loss of Phyllis, his wife and companion of 57 years.

More AGS Publications Available for Download

Two 1986 guidebooks (Geologic hazards of Tucson and Field Trip Guidebook 13 - Lower Cretaceous coral-algal-rudist reefs in southern Arizona) have been uploaded to AGS webpage. Out-of-print AGS Digests and Guidebooks are available for you to download for your personal use. This includes AGS Digests 1 through 12 and guidebooks dating from 1950 through 1999. More recent guidebooks (2000-2007) are available to **members** only. The most recently uploaded publications are designated by a red ***New*.**

https://arizonageologicalsociety10.wildapricot.org/Default.aspx?pageId=1665439

About the November Dinner Meeting Speaker

Malcolm Siegel received a BA in Chemistry in 1973 from Columbia University. In his senior year, he was lured away from lab chemistry by Wallace Broecker from Columbia with the temptation of spending a post-graduate year at sea as a marine chemist in the South Seas. Due to changes in project funding, he didn't get his marine experience until the following year, when he was a member of the Harvard University team on the French American Mid-Ocean Undersea Study Project and then again in 1976-1977 when he worked at the Israel Oceanographic and Limnologic Institute in Haifa, Israel. He completed his PhD in Geology at Harvard in 1981, working with Heinrich Holland of Harvard and Roger Burns of MIT, focusing on the mineralogy, geochemistry, and economic potential of marine manganese nodules.

In 1981, he began a 30-year career at Sandia National Laboratories in Albuquerque, NM, where he carried out applied research in the areas of environmental geochemistry, groundwater remediation, drinking water treatment and risk assessment. During the first part of that period, he led project teams examining the geochemistry and potential radionuclide transport from the proposed nuclear waste geologic repositories sites in New Mexico. In the second phase of his career at Sandia, he led Department of Energy programs to evaluate the use of innovative environmental remediation and treatment technologies to clean up groundwater and soil contamination at DOE Weapon fabrication sites and to remove arsenic from drinking water sources in rural New Mexican communities.

It wasn't until he was in his mid-50s that Malcolm discovered that he wanted to be a Medical Geologist when he grew up. In 2004, he received a Masters of Public Health/Epidemiology from the School of Medicine at the University of New Mexico. He retired from Sandia Labs in December 2011 and is currently on the adjunct faculty in the Department of Internal Medicine and the Department of Family and Community Medicine in the School of Medicine, University of New Mexico. In this position, he conducts research examining the potential relationships between uranium, arsenic, and ultra-violet exposures and public health and is active in designing the environmental health program for a proposed College of Public Health. He is active in the Medical Geology community, serving on the organizing committee for the recent international conference sponsored by the International Medical Geology Association and the Geological Society of America.

Malcolm is also active in several non-profit organizations dealing with science education and with environmental assistance in developing countries. These include the New Mexico Museum of Natural History and Science, the Explora Museum, Engineers without Borders, the Environmental Education Association of New Mexico, and the Water Resources Action Project, which builds rain water harvesting systems connected to environmental education programs in Jerusalem, Palestine, and Israel.

Field Trip Report—H. Wilson Sundt Generating Station

by Alison Jones

On Friday, October 4, 2013, a contingent of AGS members and other interested parties were treated to a tour of Tucson Electric Power's H. Wilson Sundt Generating Station. The tour guide, Reland Kane, is a chemist who is one of the most senior employees at the facility. The station supplies 10-15% of Tucson's total power needs. TEP also generates power at plants located near Grant and I-10, in Avra Valley, in Nogales, and in Kingman. TEP is a partial owner of the Navajo Generating Station (Page, AZ), and the Four Corners Plant. If additional power is needed, TEP buys power from the wholesale market.

At the H. Wilson Sundt Generating Station, power is generated by two gas turbines and four steam turbines ranging from 83 to 165 megawatts. The steam units can be fueled by coal, natural gas, or fuel oil. In addition, landfill gas from Los Reales landfill is used. Generally, though, about 90% of the power generated at the station is from coal.

We were able to view the coal dumper, where aluminum train cars dump coal into a giant hopper that goes several stories underground. Currently TEP has about a year's supply of sub-bituminous coal stockpiled at the site. This coal originated from a mine in Hayden, Colorado. It is a low-sulfur coal, which allows TEP to comply with their air quality permit.

Reland showed us a field of mirrors, still under construction, that will be used to focus sunlight on a giant heating pipe to generate steam for about 5 MW of power.

TEP is responsible for less than one percent of Tucson's total water usage. They have Type 2 groundwater rights for power generation—water is needed for steam generation and for cooling. A well field with seven operating wells is located on the property. Some of the deeper wells (2300 feet and 3000 feet deep) produce hot water (ranging from 130 to 167 degrees F) so they are not terribly effective as cooling water.

The tour took us into the generating station. One of the turbines was being repaired, so the shroud was removed, and we were able to see the turbine blades. Many of these turbines date from 1958, and they never really wear out, although they require periodic maintenance and repairs.

The control room looked much as you might think—lots of electronic control panels and computer screens. Security rules kept us a safe distance away from any of the controls.

The power station hosts a number of burrowing owls who return year after year, and migratory water birds are visitors at the evaporation ponds for boiler blowdown or runoff from the coal pile.

Unfortunately, due to security rules, no photos were allowed during the trip. But you can see the plant for yourself, as they have regular tours which are well-organized, and frankly, more fascinating than I ever anticipated. Thank you to all AGS members who attended, and especially Reland Kane, our guide, who was sure that a bunch of geologists would bring beer. Sorry we disappointed you on that count, Reland. We'll know better next time.

2014 Grand Canyon Geology Raft Trip

by Alison Jones

I am planning a raft trip through the Grand Canyon from July 6-12, 2014. The trip will start at Lee's Ferry and end at Whitmore Wash (Mile 188) where we will be flown out of the canyon by helicopter to Bar 10 Ranch, and from there we will fly back to our starting point (Marble Canyon) or to Las Vegas. Hatch River Expeditions is the outfitter; we will be on two of their large motorized rafts. The trip is for geologists and geologist wanna-bes. We'll be looking at the stratigraphy, depositional environments, structural features (including a great hike to see the Butte Fault), and more recent geologic features like lava dams and debris flows. We'll also be learning about the human history of the Grand Canyon.

If you want to know more about this fantastic trip, contact me (ajones@clearcreekassociates.com). The trip is about two-thirds full at this point, and we hope to fill it in the next few weeks.

Eighth Annual W.C. Lacy Distinguished Lecture

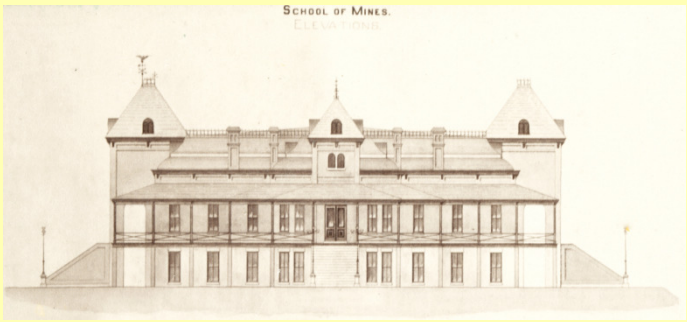
Speaker: Douglas B. Silver, Board Chair
J. David Lowell Institute for Mineral Resources

"The Inseparable Relationship Between the University of Arizona and the Global Mining Industry"

When: Friday—November 8, 2013. 4:00-5:00 p.m.

Location: UA Student Memorial Union, Kiva Room (Located just south of the 2nd Street Garage)

An informal reception will follow the lecture.



Welcome New AGS Members

Angela Lexvold	Arthur Wickham	Scott Mesich	Saige Williams	John Malusa
Melissa Schwan	Jennifer Kielhofer	Casey John	Alexis Salting	Daniel Slane
Katie Stoll	Mark Birch	Emily Ryan	Thomas Kelty	

AGS is grateful to BHP Billiton for their generous support of our student members!

AGS MEMBERSHIP APPLICATION OR RENEWAL FORM

Please mail check with membership form to: Arizona Geological Society, PO Box 40952, Tucson, AZ 85717

Dues (check box) ☐ 1 year: $20; ☐ 2 years, $35; ☐ 3 years: $50; ☐ full-time student (membership is free)

NEW MEMBER or RENEWAL (circle one) Date of submittal _____

Name: _____ Position: _____

Company: _____

Mailing Address: _____

Street: _____ City: _____ State: _____ Zip Code: _____

Work Phone: _____ Home Phone: _____

Fax Number: _____ Cellular Phone: _____

E-mail: _____ Check this box if you do not have an email address ☐

All newsletters will be sent by email. If you do not have an email address, we will mail a hard copy to you, but we cannot guarantee timeliness.

If you are a registered geologist/engineer, indicate your registration number and State: _____

Enclosed is a _____ tax-deductible contribution to the J. Harold Courtright Scholarship Fund.

Enclosed is a _____ tax-deductible contribution to the AGS Scholarship Fund.

Enclosed is a _____ tax-deductible contribution to the AGS Greatest Needs Fund.