



Arizona Geological Society Newsletter

AUGUST 2013

AUGUST 6, 2013 DINNER MEETING

Who: Bill Stavast 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, August 1. 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 with a sun-dried tomato cream sauce and potatoes), vegetarian, or cobb salad meal preference. Please cancel by Thursday August 1 at 11 a.m. if you are unable to attend.

The August dinner meeting is sponsored by: Freeport-McMoRan Copper & Gold Inc.

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

Go to www.fcx.com to learn more about Freeport-McMoRan



FREEPORT-McMoRAN COPPER & GOLD

ABSTRACT

The Safford Mine: What we have learned since production began

Bill Stavast, Senior Geologist with Freeport-McMoRan

The Safford district located in southeastern Arizona is a linear-trending group of porphyry copper deposits. Production in the Safford district began with the Dos Pobres deposit in 2007 and the San Juan deposit in 2011. The Safford mine is currently a crushed leach operation. Ore and gangue minerals unique to different porphyry deposits have a profound effect on the processes and production of copper from the mine; hence, understanding the geology can help fine tune recovery of copper. Since mining began our understanding of the structure, alteration and mineralogical distribution, and genesis of the Dos Pobres and San Juan deposits has increased. Structures within the mining area have been mapped to aid in blasting and slope stability. Mineralogical distributions have been mapped to better determine ore types and blending of ores in the leach pad. Genesis of the deposits is better understood. Tonalite to quartz monzonite magmas (57.2 Ma) intruded into a Cretaceous andesitic volcanic package. These various intrusions had their own hydrothermal systems

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that produced the initial hypogene mineralization. Subsequent erosion and oxidation of the deposits occurred, followed by Tertiary volcanic flows (24-31 Ma), faulting, and additional erosion and oxidation. Initial hypogene alteration consisted of early sodic-calcic followed by various expressions of potassic, sericitic and later propolytic alteration. This hypogene alteration was overprinted by an in situ oxidation of the system that has produced the current ore body at Safford. Oxide mineralization is complicated but generally follows the following trends with depth—leached cap, copper bearing limonite, black oxides, chrysocolla, chalcocite. Chalcocite is above the hypogene sulfides comprised of pyrite, chalcopyrite and bornite.

About the August Dinner Meeting Speaker

Bill Stavast is a Senior Geologist with Freeport-McMoRan. He received a BS and MS in Geology from Brigham Young University (2000 and 2002, respectively) and a PhD in Geosciences from the University of Arizona (2006). He has worked with Phelps Dodge and Freeport-McMoRan since 2006. Projects he has worked on are Safford, Tenke-Fungurume, Twin Buttes, and Ajo.

Position Statements

By Alison H. Jones, AGS President

In the March 2013 edition of this newsletter, I proposed that AGS craft position statements regarding topics that are relevant to our Society and to the state of Arizona. Most of the national societies, including the Geological Society of America, have crafted position statements that you can see on their websites. I received only positive feedback on the idea. The Executive Committee has agreed to bring this issue before the general membership at our annual meeting, and to vote on the subject. We will be asking the following questions:

Do you agree that AGS should craft position statements on topics relevant to our Society, our science, and/or our state?

If your answer to the above question is yes, please rank the following topics according to your interest in seeing a position statement regarding that topic. Please feel free to suggest other topics.

- Teaching Evolution
- The importance of teaching Earth Science (K-12 level)
- Geoscience and Natural Hazards Policy
- Water Resources
- Climate Change
- The importance of mineral resources to Society
- The importance and role of the Arizona Geological Survey (AIPG has a similar position statement on the roles of state surveys).
- OTHERS?

The goal of these position statements is not to divide the Society. If the Society votes that this is a goal we wish to pursue, we will form a position statement committee, choose two to three topics on which there is broad agreement regarding the Society's stance, and then we will craft the statements and allow for comment. Position statements will allow our society to make a public response when legislators, government agencies, or the media make statements that are not supported by our science. I hope you will support this endeavor, and if you wish to be involved in the process, please contact me (ajones@clearcreekassociates.com).

Thanks Mark Cocker

The Arizona Geological Society would like to thank Mark Cocker for his work on the AGS Scholarship Committee. Mark has recently ended his tenure on the committee. The AGS relies on volunteers to accomplish the Society's goals and we appreciate the time and effort people put into AGS.

Amended Bylaws for New AGS Scholarship

The Executive Committee has voted to recommend amending the bylaws to reflect the creation of the AGS Scholarship and to allow for more flexibility in the date of scholarship awards. **The membership will vote on this proposed change at the September dinner meeting.** The old wording can be seen on the AGS website (arizona Geological Society.org). The Executive Committee proposes that Section 1.2 of the bylaws be revised to read as follows:

1.2 Scholarship Committee.

The Society awards scholarships to recognize excellence in the study of the geosciences. The J. Harold Courtright Scholarship Fund has been established by the Society to promote graduate research in geology with special emphasis on field geology and the study of ore deposits. The Arizona Geological Society Scholarship has been established to recognize a deserving graduate or undergraduate student of the geosciences who is engaged in research at an Arizona university.

The Scholarship Committee shall consist of three voting members of the Society in good standing (inclusive of the Chair) appointed annually by the Executive Committee. The Committee is charged with advertising the terms of competition for the scholarships to students and professors in geology departments at the three major Arizona universities. The Committee shall solicit applications from these universities, review submitted applications, correspond with applicants as deemed necessary, and select one or more recipients for each scholarship award for that year. The scholarships may be awarded in the fall or the spring, at the discretion of the Executive Committee.

The competition announcements shall be delivered to the university departments three months prior to the Society meeting at which the award(s) will be presented—by the 15th of the month—and included in the society newsletter. The Scholarship Committee's selections shall be announced one month prior to the society meeting at which the award(s) will be presented and included in the society Newsletter that announces that meeting.

The Scholarship Committee shall notify the successful student(s) and extend an invitation to attend a meeting of the society to receive the award(s) (with reimbursement of reasonable travel expenses).

The Executive Committee shall determine the money available for the J. Harold Courtright Scholarship and the Arizona Geological Society Scholarship annually. The determination shall be based on the performance of the Society's investments, contributions to the scholarship fund(s), and the recommendations of the Investment Committee. The Scholarship Committee shall have complete discretion in the determination of the amount of each individual Scholarship award within the limits of the total funds designated by the Executive Committee.

2013 MEMBER DIRECTORY AD SOLICITATION

The AGS member directory is in press and will be mailed to current members and advertisers in early September. Please make sure we have your correct mailing address as the directory is sent by bulk mail, and thus it will not be forwarded by the post office in the event of a changed or incorrect address.

AGS is grateful for the support of our generous advertisers who completely offset the production costs. Please contact Directory Coordinator Cori Hoag at choag@srk.com or (520) 400-4135 to place an ad in the Directory. More information is available on the website.

Business Card	\$25	Standard Business Card
½ Page	\$100	4.7" w x 4" h
Full Page B&W	\$200	4.7" w x 7.9" h
Full Page Color	\$300	4.7" w x 7.9" h
Inside Color Cover	\$400	6" w x 9" h



Isabel Fay wins Geological Society of America Award

Isabel Fay, an AGS councilor and a Ph.D. candidate in economic geology at the University of Arizona Geosciences Department recently won the "GSA History of Science Student Award" for 2013 for her abstract titled "Georgius Agricola's Contributions to Hydrogeology." The \$1000 award will be presented to her at the time the paper is presented, and she will also be recognized at the annual luncheon of the History and Philosophy of Geology Division during the national GSA annual meeting in Denver in October.

Isabel's research on the history and philosophy of science is actually a sideline to her dissertation research, which concerns the formation and evolution of the Fungurume copper-cobalt deposit in the Democratic Republic of Congo.

This award, established in 2004, is made possible by a bequest from the estate of Mary C. Rabbitt, one of the most distinguished woman ever to work for the U.S. Geological Survey.

See <http://www.usgs.gov/newsroom/article.asp?ID=354> for details.

Isabel's paper to be presented at the Denver GSA meeting summarizes the advances Georgius Agricola (1494-1555) made in hydrogeology and discusses their influence. She writes in the abstract, "Widely acknowledged among economic geologists and mineralogists as the father of their professions for his book "De Re Metallica" (On the Nature of Metals), he also studied the movement and origins of groundwater. His influential writings on the subject, once well known and used by the likes of Boyle, Steno, Kircher, and Werner, have fallen into obscurity in the last two centuries. The theses Agricola advanced in "De Ortu Et Causis Subterraneorum" (Of the Sources and Causes of Things Underground, 1546) brought the newly developing scientific method to the study of groundwater origins and movement, and for the first time developed the concepts of permeability, porosity, water-rock reaction, hydraulic fracturing, and the erosional cycle. In it are found the first known statement of the erosional cycle; advances in the description of the mechanisms of fluid storage and transport; the first suggestion of water-rock interaction; the novel hypothesis that fluid pressure could fracture rocks; and the first understanding of the slowness of geological processes. Agricola's meticulous and empirical studies represented a major advance for hydrogeology, and deserve to be better known by hydrogeologists, who daily use the theories he helped to develop."



Arizona Mining Review



Join host Lee Allison, Arizona State Geologist, for Episode 7

Arizona Mining Review video magazine – Live!

Day: Wednesday, 31 July Time: 10:00 – 10:30 a.m. (MST - PDT)

Where: Streaming online at the Arizona Mining Review Live Stream Channel

(<http://new.livestream.com/accounts/2496466/azminingreview>)

Arizona Mining Review is a live, online video magazine from the Arizona Geological Survey exploring and reviewing mining in Arizona—its challenges and successes. From potash to copper to gold, from mineral exploration to policy development, tune in to see experts from industry, academia, research, and politics discuss the current state and future of mining in Arizona.

June 26 Topics

- **Mining News & Update.** Lee Allison and Nyal Niemuth explore the newest developments and trends in Arizona mining.
- **Fred Banfield**, Chairman & Founder of Mintec, Inc. discusses providing mine modeling and design solutions to the world's mining community from Tucson, Arizona, for the past 40 years.

Subscribe to the Arizona Mining Review listserv (<http://azgeology.azgs.az.gov/newsletters/amr>) for regular reminders of upcoming episodes.

The Arizona Mining Review, a product of the Arizona Geological Survey, is broadcast live and recorded for later viewing at the AZGS YouTube Channel (<http://www.youtube.com/user/azgsweb>).

New Arizona Geological Survey Publications

The publications are available at the AZGS Document Repository (<http://repository.azgs.az.gov/>)

Rauzi, S.L. and Spencer, J.E., 2013, Potential targets for shale-oil and shale-gas exploration in Arizona. Arizona Geological Survey Open File Report, OFR-13-09 v. 1, 9 p.

Gootee, B.F., 2013, An Evaluation of Carbon Dioxide Sequestration Potential in the Luke Basin, South-Central Arizona. Arizona Geological Survey Open File Report, OFR-13-05, 10 p., 2 map plates and 2 appendices.

Gootee, B.F., 2013, An Evaluation of Carbon Dioxide Sequestration Potential in the Higley Basin, South-Central Arizona. Arizona Geological Survey Open File Report, OFR-13-10, 14 p., 6 map plates and 2 appendices.

Video Abstracts – AZGS is introducing a new video product to accompany new geotechnical literature and to showcase the staff and products of the Arizona Geological Survey. We are just now experimenting with this format and we would greatly appreciate hearing from AGS members regarding the usefulness and design of this approach. Please send your comments to Michael Conway (michael.conway@azgs.az.gov).

Carbon Sequestration Potential in Arizona with Brian Gootee (<http://tinyurl.com/CO2Sequestration>)

Shale-Oil and Gas Exploration in Arizona with Jon Spencer (<http://tinyurl.com/AZGSOil-Gas>)

**Our thanks to
Margie DeRose
for her recent generous
donation to the
AGS General Fund**

Welcome New AGS Members

Amanda Alfing,
Margie DeRose, USDA Forest Service
Kelly Hermanson, Golder Associates
Scott Hill, student at UA

Jesse Martinez, student at UA
Nansen Olson
Robert Smith, PSOMAS
Nicole Tucker



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BHP Billiton for
their generous
support of our
student members!**

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That is why we are proud to sponsor the student dinners of the Arizona Geological Society.



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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.