



AGS NEWSLETTER

ARIZONA GEOLOGICAL SOCIETY, INC., MARCH 2007

DINNER MEETING, MARCH 6, 2007

Karen Wenrich, Consultant

Arizona Breccia Pipe Uranium Deposits: The Highest Grade Uranium in the USA

ABSTRACT — The mineral resources of roughly 17,000 mi² of northwestern Arizona are enormous; here thousands of solution-collapse breccia pipes crop out on the plateaus and in the canyons. About 8% of the pipes show evidence of some Ag, Co, Cu, Mo, Ni, Pb, U, V, and or Zn mineralization. Those being mined in the 1980s had an average grade of about 0.65% U₃O₈, and during the waning period of mining in the 1990s the grade approached 1% (Mathisen, personal commun.). Individually the pipes may have as much as 7 million pounds of uranium.

The mineral resource impact is in the total value of this district of clustered breccia pipes. The pipes are generally less than 300 feet in diameter, with the brecciated Paleozoic and Mesozoic strata downdropped as much as 700 ft in some pipes. The pipes are distributed throughout the entire Grand Canyon region, although those closest to the edge of the Colorado Plateau and in the depths of the canyons appear to have lost their uranium ore bodies through erosion and oxidation.

The geochemistry and mineralogy of the breccia pipes ore bodies is remarkably similar from pipe to pipe, although there appears to be minor variation between pipes on the North and South Rims. The ore horizon appears to be slightly lower south of the Grand Canyon—commonly at the level of the Esplanade Sandstone and Hermit Shale—whereas to the north most ore appears to be higher in the Hermit Shale horizon.

The mineral paragenesis is fairly consistent from pipe to pipe. Although few underground samples are available from South Rim ore bodies (other than the Orphan Mine), they do appear to have been more mineralized by the later stage copper sulfides than were North Rim pipes. In addition South Rim pipes appear to contain slightly more Ag, Cu, and V—the Ag appears to be mineralogically associated with copper sulfides. This Ag, Cu, and V enrichment also occurs in breccia pipes that have undergone more oxidation

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CALENDAR OF EVENTS

- April 3: AGS Dinner Meeting – Bob Powell, U.S. Geological Survey, *Basins and Landscapes Coevolution*
- April: Spring Field Trip Date and Destination TBA
- May 1: AGS Dinner Meeting – Mary Poulton, University of Arizona, *Pattern Recognition Technologies in the Minerals Sector*
- June 5: AGS Dinner Meeting – Eric Seedorff, University of Arizona, *The End of Detachment Faults*

Dinner Meeting Schedule — Inn Suites, 475 North Granada, Tucson

Please call 520-663-5295 by 5 pm before March 2, 2007. Indicate if a low-salt or vegetarian meal is required. Please cancel if you are unable to attend.

Cost: With reservation: Members \$20, Guest \$22, Students \$7. Without reservation \$2 additional.

Cash Bar @ 6 pm

Dinner @ 7 pm

Talk @ 8 pm



Update on AGS Symposium

“Ores and Orogenesis: Circum-Pacific Tectonics, Geologic Evolution, and Ore Deposits”

A symposium honoring the career of
William R. Dickinson

Hilton Tucson El Conquistador, Golf & Tennis Resort
24-30 September 2007

Co-sponsored by the USGS, SEG, SME, and GSN

www.agssymposium.org

The pace is picking up as we are now only seven months away from the *Ores and Orogenesis* symposium, which promises to be one of the premier events of 2007 for both the ore deposits and tectonics communities. Registration details are being finalized, and an electronic form should be showing up in your electronic mailbox shortly. Be sure to take advantage of early registration discounts!

The main meeting consists of four days of talks by a world-class set of presenters from Wednesday through Saturday, with posters, a core shack, and a vendor exhibit. The main meeting will be preceded by a one-day symposium on “Advances in the Understanding of Supergene Processes” sponsored by the Society of Economic Geologists on Tuesday the 25th of September. Short courses and workshops and an international slate of more than 20 field trips are scheduled, mostly preceding and following the meeting. This update focuses on the generosity of our corporate sponsors and on the social events and luncheons.

The success of a meeting such as this—particularly one held at a resort—depends heavily on corporate sponsorships to keep the cost affordable for individual attendees and students. We are fortunate to have generous financial support from corporate

sponsors, and we have a number of pledges that we expect will be finalized shortly as sponsorships. To date, our Platinum Level sponsors are Phelps Dodge Exploration Corporation, BHP Billiton, and Bell Resources. Newmont Mining is a Gold Level sponsor. SRK Consulting, Clear Creek Associates, Geotemps, and Augusta Resources Corporation are sponsoring the meeting at the Silver Level. Resolution Copper, Skyline Assayers and Laboratories, Redhawk Resources, and International Royalty Corporation are our Copper Level sponsors, and we have seven Molybdenum Level sponsors. AGS and its co-sponsoring organizations thank our sponsors for their support. Some of their support is targeted toward financial support of student attendees.

The conference will kick off with an icebreaker reception on Tuesday evening. A box lunch reception will mark the opening of the exhibits, posters, and core shack at noon on Wednesday, followed by a Western Theme Dinner designed for registrants and their families that evening. William R. Dickinson, Emeritus Professor at the University of Arizona, will speak at the Tectonics Luncheon at noon on Thursday, and Bill will be honored that evening at a Reception and Banquet. Jack Thompson, former President and CEO of Homestake and a current member of the Board of Directors of Phelps Dodge, will be the featured speaker at the Mining Luncheon on Friday, sponsored by SME. Reunion Night will be on Friday evening, consisting of a buffet dinner in a ballroom and a series of reunion reception gatherings with no-host bars in smaller rooms scattered around the resort. On Saturday, Douglas B. Silver, Chairman and CEO of International Royalty Corporation, will speak at the Economic Geology Luncheon. A Beer Blast concludes the final day of the meeting on Saturday evening, before the post-meeting field trips, short courses, and workshops begin on Sunday morning.

Civilization exists by geological consent, subject to change without notice.

— Will Durant (1885-1981)

Other Geoscience News

Newsletter Delivery Options—

To all AGS members,
We now have three delivery options for the AGS Newsletter. When renewing your membership, check the appropriate box for: E-mail only, Regular mail only, or E-mail AND Regular mail. You can also change your delivery method by contacting the Vice-Secretary, Keith Rodgers at jkroddgers@terracon.com.

Student Membership—

To all AGS student members,
If you have not sent in a renewal form for 2007, now is the time! Please send us a renewal form confirming your student status and we will extend your free membership another year. In addition, in the future students will receive the newsletter only by e-mail, so please include your e-mail address on your membership forms. You can also download a renewal form on our web site.

ANNOUNCEMENT: Spring Field Trip

An AGS spring field trip to the Rosemont Project is in the works, tentatively planned for a Saturday in late April. Watch for details on the AGS web site and April newsletter and announcements at the meetings.

Member News:

Many thanks go to our newest sponsors for their generous symposium support:

Bell Resources, Platinum Sponsor

Geotemps, Silver Sponsor

Welcome to new members David Knight, Copper Triangle Mining Supplies & Service, and Gary Lenzi, Phelps Dodge Morenci.

As of mid February 2007, we have 381 AGS members.

ABSTRACT, continued

along the Plateau margins and in the canyon bottoms. Perhaps the higher concentrations of these metals are a result of supergene enrichment, which occurred in some cases after erosional removal of the pyrite cap over the ore bodies. The slight mineralogical and geochemical differences could also be the result of slightly higher oxygen fugacity of the mineralizing fluids when they encountered pipes south of the Canyon.

Announcement: Ore Microscopy Short Course Colorado School of Mines — March 20-22 , 2007

The course will address the following topics:

- Practical use of the reflecting microscope.
- Identification of 40-45 common ore minerals, including native metals, oxides, sulfides, sulfosalts, and tellurides.
- Interpretation of common ore mineral textures, including those produced by magmatic segregation, exsolution, open space filling, colloform growth, replacement, and recrystallization phenomena.
- Review of representative ore mineral suites from North America, including:
 - Stillwater chromite, Montana
 - Porphyry copper deposits at Bingham, Utah, and Santa Rita, New Mexico
 - Base metal vein deposits at Butte, Montana, and Coeur d'Alene, Idaho
 - Sudbury and Kidd Creek massive sulfides, Ontario
 - Climax and Henderson porphyry moly systems, Colorado
 - Iron Springs replacement deposits, Utah
 - Homestake gold, South Dakota
 - Others, as time permits

For information on course content, contact:

Dr. John Lufkin
lufk3@comcast.net
Phone: 303-284-2646

For registration information, contact:

Office of Special Programs & Continuing Ed.
Colorado School of Mines
Golden, CO 80401
Phone: 303/273-3321
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For information on ordering AGS
publications, visit
www.arizonageologicalsoc.org.

AGS books and maps are also sold at the dinner
meeting and by the
Arizona Geological Survey.



Current membership stands at 381. As always, please keep us up-to-date as you move, change jobs, or E-mail address. Thanks to all our wonderful Membership Directory Sponsors for a great directory.

2007 AGS MEMBERSHIP APPLICATION OR RENEWAL FORM

Please mail check with membership form to: Arizona Geological Society, P.O. Box 40952, Tucson, AZ 85717. Dues (circle one): 1 year: \$15; 2 years: \$30; 3 years: \$40. Full-time students receive free membership (E-mail only). However, a membership application form must be returned to AGS annually to remain on the membership list.

Name: _____

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Please send the newsletter by E-mail only by regular mail only by E-mail AND regular mail

If registered geologist or engineer, indicate registration number and state: _____

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

Enclosed is a _____ tax-deductible contribution for the 2007 AGS Symposium.