



AGS NEWSLETTER

ARIZONA GEOLOGICAL SOCIETY, INC. OCTOBER 2006

DINNER MEETING SPEAKER OCTOBER 3, 2006

LEWIS TEAL, NEWMONT

Geology of the Yanacocha Gold Mine in Peru

ABSTRACT: Some 45 km from Cajamarca in northern Peru, at an altitude of 4,700 m, Minera Yanacocha operates a complex of five gold mines and two processing facilities. Not only was this the first significant foreign investment in Peruvian mining for 20 years, but the project was undertaken in an area where guerillas were active, so the operation had to be heavily protected without antagonizing local residents.

The Yanacocha gold district is a 10 x 4 km zone of altered rocks within a belt of tertiary volcanics that extends the whole length of Peru. Andesitic domes and dome complexes have been silicified and leached by epithermal gold-bearing solutions in at least nine distinct deposits. The mineralized sequences, which can also contain significant amounts of silver, are flanked by extensive argillic alteration, and subsequent events have created siliceous breccia pipes with localized high gold grades.

Year-on-year, Minera Yanacocha has usually been able to extend its oxide ore reserves faster than ore is being mined. By the end of 1998, proven and probable reserves had grown to 20.1Moz of gold and peaked at 36.6Moz by end-2000 (plus 350 Moz of silver). By end-2004 the gold content was drawn down to 23.4Moz, although 8.8 Moz have been added at Minas Conga.

Yanacocha produces ore from two open pits and is reclaiming three. First production came from the Carachugo pit, followed by Maqui Maqui in 1994 and the San José Sur pit during 1996. Cerro Yanacocha, opened in 1997, and La Quinua, where production started during 2001, provide the current production.

Yanacocha mined 175.4Mt of ore and waste in 2004, compared with 185.8Mt in 2003. The plants processed solution from 121.1 Mt of leached ore averaging 0.9 g/t. Gold output was 3.02Moz at a total cash cost of \$135/oz. The output during 2003 had been 2.85Moz, but total cash costs were only \$120/oz.

Dinner Meeting Schedule:

Inn Suites Hotel: 475 N. Granada Ave. in Tucson

Cash Bar @ 6 pm Dinner @ 7 pm Talk @ 8 pm

Cost: With reservation: Members \$20, Guest \$22, Students \$7 Without reservation \$2 additional. Please call (520) 663-5295 by 5 pm before **October 2nd**. Indicate if a low-salt or vegetarian meal is required. Please cancel if you are unable to attend.

CALENDAR OF EVENTS:

- October 14, Tour - Portland Cement Plant
- Nov. 4-5, AGS Fall Field Trip to Chino and Tyrone
- November 14, AGS Dinner Meeting, Bob Webb, USGS & Erik Pytlak, National Weather Service, Title: **Floods and Debris Flows in the Catalina Front Range, July 31, 2006** (note this talk is on the second Tuesday of the month and is not to be missed)



Member News:

Welcome to new members **Alejandra Bonilla** Golder Associates, **Stella Guillen**, Geotemps, **James Vroman**, Tucson, **Mark Stevens**, Augusta Resources, **Lisa Spahr** and **Mike Hulst**, EEC, and **Kristie Kilgore**, ADEQ. Your membership directories will be mailed to you on October 9.

2006 EARTH SCIENCE WEEK FIELD TRIP

Arizona Portland Cement Plant Tour - Saturday, October 14. In honor of **Earth Science Week** (October 8-14), AGS has arranged for members and their families to tour the cement plant near Marana. Here's where earth sciences, processing technology, environmental science, and good relationships with the neighboring community all coalesce to produce the most useful product in modern civilization. The three-hour tour will begin with an orientation at 9 AM and take the group through the plant site. Have you always wanted to look into a fiery furnace? Here's your chance. Watch while raw limestone is turned into clinker and then ground into cement powder. Meet at the cement plant by taking the Exit 240, Avra Valley Road, from Tucson and driving north on the frontage road on the west side of I-10. Take Exit 242 from Phoenix and travel south on the frontage road. Please bring hard hat, safety glasses if you can; long pants, sleeved shirts, and closed-toed shoes are required. There is no fee for this trip, but the group size is limited to 20 (no children under 12 years). Please RSVP to Secretary Cori Hoag, at (520) 663- 5295 or choag@srk.com.

Earth Science Week Resources for Teachers and Students

The theme of Earth Science Week this year is "Be a Citizen Scientist!" The website www.earthsciweek.org lists information on classroom activities, how to order a free classroom toolkit, U.S.G.S. and National Park events, and resources for earth science careers.

AGS FALL FIELD TRIP - FIRST ANNOUNCEMENT

Overview: This year's fall field trip on **November 4th and 5th** will take us to the **Phelps Dodge copper mining operations at Tyrone and Santa Rita (Chino), New Mexico.**

Leaders: Robert North and Mark Thoman (Chino); Andy Lande and Ralph Stegen (Tyrone).

What We'll See: At Tyrone, field stops will be made in the pit to examine the hypogene and supergene geology and mineralization styles, plus we will examine the exotic Fe, Mn and Cu-rich deposits in Miocene-aged sedimentary units. The visit to Santa Rita will involve stops within the pit to view skarn, stockwork chalcopyrite-molybdenite, and supergene geology and mineralization types. We also will examine the key breccia masses in the northern area of the mine.

Preliminary Agenda: We will leave Tucson at 6:00 AM on Saturday Nov. 4th, tour the Tyrone Mine (15 miles southwest of Silver City), and spend the night in Silver City. A presentation on the mining history of the area is tentatively scheduled for Sat. evening. We will tour the Chino Mine, located 15 miles east of Silver City on Sunday, Nov. 5th and return to Tucson by 6:00 PM that day.

Group Size: Limited to 30 participants, including 5 AGS-sponsored student members, depending on final arrangements.

Travel: The cost of the trip will cover rental vans, pending response. Carpool locations will be arranged for those leaving from Tucson and from Phoenix. It is about a 3.5-hour drive from Tucson to Silver City. Phelps Dodge will provide transport w/in the mines.

Lodging: We will try to arrange a block of rooms at a couple hotels in Silver City, but reservations and payment will be left to individual participants. Information available to registered participants and on AGS web site.

Food: AGS will provide sodas, fruit, and snacks and Phelps Dodge will provide sack lunches. Bring your own water bottle. Breakfast will be left up to individual participants but we will try to arrange for a group dinner Saturday night (dinner cost not included).

Cost: Will depend on the final arrangements, but will be about \$40 (\$20 for spouses) and will include snacks/sodas, and a guide-book. Those who carpool from Tucson in the van will pay an additional fee to offset the rental and gas fees. No charge to the first 5 students who make a reservation (\$20 for additional students).

Safety equipment: Participants will need their own safety equipment. Details to follow and on AGS web site.

Reservations & Cost: Reserve your spot on the field trip by leaving voicemail at AGS (520) 663-5295 or emailing Rich Brown at rbrown@clearcreekassociates.com. Honored on a first-come basis with paid \$25 deposit sent by check to AGS Field Trip, P.O. Box 40952, Tucson, AZ 85717 or paid at dinner meeting. Please indicate whether you are interested in riding in the van from Tucson. We will maintain a waiting list to fill cancellation slots.

For updated information come to the October dinner meeting and see the AGS web site at www.arizonageologicalsoc.org. Contact Rich Brown at (520) 322-6222 or Bob Powell at (520) 670-5505. Further details will be provided to participants and wait-listees.

2006 J. HAROLD COURTRIGHT SCHOLARSHIP

Applications are now being accepted for the 2006 J. Harold Courtright Scholarship to be awarded at the December AGS dinner meeting. Harold Courtright, former chief geologist with ASARCO, was a pre-eminent exploration geologist instrumental in the early development of well-known porphyry copper deposits such as Silver Bell, Arizona and Toquepala, Peru. The Courtright Scholarship was initiated upon his death in 1986 to encourage geologic field work in the areas along the Cordillera where Courtright himself worked.

Who is eligible to apply?

The Courtright scholarship fund is designed to promote graduate research in all geology fields with special emphasis on field geology, economic geology, and the study of ore deposits. Graduate students working towards a degree in the geological sciences at Arizona State University, Northern Arizona University, and University of Arizona are eligible to apply. Students should be working on a field-related project in the North or South American Cordillera. Preference will be given to proposals related to economic geology and the study of ore deposits, but proposals related to structural geology, petrology, geochemistry, geochronology, tectonics, and geophysics will be fully considered. Proposal evaluation will consider the scientific significance of proposed research, the applicability of the research methodology to the problem at hand, and the likelihood that research goals can be achieved. United States citizenship is not a requirement.

What will the scholarship cover?

Awards are intended to help with thesis-related field costs, associated costs related to rock-sample collection, transport, and laboratory analysis, and thesis preparation following field work. The maximum individual award this year is \$2,000.

How to apply?

You can print out the application form from the AGS web site at www.arizonageologicalsoc.org. Submit the completed application form, a one-page description of your field project including a budget proposal, and a letter of support from your research advisor to the Arizona Geological Society by Friday, October 31st. Scholarships will be awarded at the December dinner meeting, to be held December 5th in Tucson.

OTHER GEOSCIENCE & MINING NEWS

The 24th annual **American Mining Hall of Fame Awards Banquet** sponsored by the **Mining Foundation of the Southwest** will be held at the Tucson El Conquistador Resort on Saturday, December 9. The inductee this year is Jack Thompson, Jr., former CEO of Homestake Mining, former Vice Chairman of Barrick Gold, and director of Phelps Dodge. Tickets and additional information are available by calling (520) 577-7519 or by E-mail at mfs@dakotacom.net.

The **Arizona Dept. of Mines & Mineral Resources** is currently seeking a qualified applicant to fill a **Mining Engineer** position, which is also open to geologists. Please see <http://www.mines.az.gov/General/PositionAvailable.html>.

Committee work on the **AGS Ores & Orogenesis Symposium for September 2007** is currently focusing on advertising for the program and field guide books. Flyers to solicit exhibitors and advertisers will be mailed this month. Field Trips Chair, Bob Cummings, reports that he has approximately 20 field trips lined up. Student Affairs Chair, Lukas Zurcher, has prepared a draft scholarship application for student registrants to apply for subsidized conference sponsorship using the allocated portions of the corporate donations targeted at encouraging student participation. The Reunion Committee has made great strides in compiling the lists of current and former employees of exploration/mining companies, universities, and government agencies. Please see the Reunion Night info on www.agssymposium.org and contact Bruce Kilpatrick at bkilpa5538@aol.com, Richard Jones at rocknocker@juno.com, or Charles Miller at milroc@comcast.net if you are interested in coordinating a reunion for a specific company or institution. Also see the web site for information on the SEG Symposium "Advances in the Understanding of Supergene Processes" to be held on September 25 before the main conference. Volker Spieth, SME Activities Chair, reports that speakers and additional field trips are in progress and will be posted to the web.



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GEOLOGICAL SOCIETY

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For info on ordering AGS
publications, visit
www.arizona Geological Soc.org.
AGS books & maps are sold at the
dinner meetings and by the
Arizona Geological Survey.

Current membership stands at 372. As always, please keep us up-to-date as you move, change jobs, or email addresses.

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 (check box) 1 year: \$15; 2 years: \$30; 3 years: \$40; full-time student (membership is free)

Name: _____ Position: _____

Company: _____

Mailing Address: _____

Street City State Zip Code

Work Phone: _____ Home Phone: _____

Fax Number: _____ Cellular Phone: _____

E-Mail: _____ I wish to receive newsletter by E-mail

If registered geologist/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.