



Arizona Geological Society Newsletter

NOVEMBER 2015

November 3, 2015 DINNER MEETING

Who: **Karen Kelley** will speak about “The Giant Concealed Pebble Cu-Au-Mo Porphyry Deposit, Southwestern Alaska: Evolution and Exploration Implications”

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 BALLROOM* (enter at northwest corner of the building) and go upstairs to the meeting room.

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

Cost: Members \$27, Guests \$30, Students Members free with on-line reservation (\$10 without).

RESERVATIONS ARE REQUIRED: Reserve on the AGS website (www.arizonageologicalsoc.org) by **11 a.m. Friday, October 30th**. Please indicate regular (Beef Tri-Tip with Aus Jus and A1 Sauce), Vegetarian, or Cobb Salad meal preference. Please cancel by Friday, October 30th at 11 a.m. if you are unable to attend - no shows and late cancellations will be invoiced.

The November dinner meeting is sponsored by Skyline Assayers and Laboratories



**The AGS is Grateful for Skyline’s Sponsorship, which helps us to offset
Dinner Meeting Costs**

The Giant Concealed Pebble Cu-Au-Mo Porphyry Deposit, Southwest Alaska: Evolution and Exploration Implications

by Karen Kelley

The Pebble deposit formed at ~90 Ma along the North American continental margin, probably far south of its present-day latitude and possibly during a transition from a contractional to a transpressional regime. Aero-magnetic anomalies in this largely covered region suggest Pebble is associated with one of a series of buried magmatic centers along the margin of a remnant ocean basin. The geologic evolution of the deposit is complex and includes at least 10 Ma of magmatism that led up to and coincided with mineralization. Grades of Cu and

Continued on Page 2

ABSTRACT - Continued from Page 1

Au grades vary with alteration type, with the highest grades associated with relatively late development of pyrophyllite-sericite alteration. The highest Mo grades appear to be host rock controlled and are associated with intrusion of subalkalic granodiorite in the eastern part of the deposit.

Exploration geochemical and mineralogical studies were designed to determine whether the concealed deposit can be detected with surface samples and to better understand the processes of metal migration from the deposit to the surface. The tilted nature of the undisturbed ore body, varying depth of cover, and later glacial processes strongly influence the geochemical responses in various media. Hydrogeochemistry (ponds, streams, and springs) and porphyry copper indicator mineral (PCIM) studies in glacial till are the most effective regional methods for vectoring to mineralization. Low-level geochemical anomalies in circum-neutral spring and pond waters from the more deeply buried part of the deposit are discernible only by using high resolution-inductively coupled plasma-mass spectrometry with lower limits of determination two and perhaps three orders of magnitude lower than traditional methods. The indicator minerals gold, jarosite, and andradite in till reveal a displaced mineralogical anomaly to the west and south of the Pebble ore body, as ore-related minerals were scraped from the ore body and deposited in till down-ice of the deposit.

**About the November Dinner Speaker**

Karen Kelley received her undergraduate degree from University of Colorado at Boulder in 1979, her masters degree in 1985 (from Univ. of Nevada), and her Ph.D. degree in 1996 (Colorado School of Mines). She has spent 34 years as a research geologist at the U.S. Geological survey as an economic geologist and exploration geochemist. Her research interests have focused primarily on the genesis of sediment-hosted Pb-Zn massive sulfide deposits and developing geochemical techniques applied to assessing resources under cover.

Pam Wilkinson Received Prazen Living Legend of Mining Award from the National Mining Hall of Fame

Long time AGS member, Pam A. K. Wilkinson received the 2014 Prazen Living Legend of Mining Award at the National Mining Hall of Fame and Museum's 27th Annual Induction Banquet on September 13, in Denver, Colorado. This award recognizes her achievements as educational outreach coordinator for the University of Arizona Lowell Institute for Mineral Resources, where she travels to schools throughout Arizona, giving lessons on the region's unique ore deposits, importance of minerals to today's society, sustainable mining practices, and mining career opportunities.



Arizona Geological Society Elects 2016 Executive Committee



From left to right; Marisa Lerew (Councilor), Stanley Evans Jr., (Councilor), Sarah Baxter (Councilor), Don Applebee (President), Ann Pattison (VP, Marketing), Alison Jones (Vice Treasurer), David Briggs (Secretary), Mike Conway (Past President), Carl Bowser (Councilor), Robert Hildebrand (VP, Field Trips). Not present: Robert Kamilli (VP, Programs), Rachel Feuerbach (Treasurer), Bruce Walker (Councilor) and Jason Miser (Councilor).

Arizona Mining Review

Monthly e-Video Magazine

Reporting on Arizona's mining industry since January 2013

Help Underwrite AMR in 2016

We need your help to produce AMR and to address the issues that impact Arizona's mining community.

To pledge your support or inquire further, please contact Mike Conway
Michael.conway@azgs.az.gov; 520.209.4146

In 2015, AMR underwriters included Mining Foundation of the Southwest, AMIGOS, Pioneer Equipment, Copper State Bold & Nut Co.





FALL 2015 Field Trip
Arizona Geological Society
November 14-15

N. Plomosa Mtns
| Bouse Fm

Jon Spencer & Phil Pearthree
Arizona Geological Survey

More information about the Fall 2015 Field Trip is available on the [Events Page of the AGS Web Site](#).



Technical Program — Geology Session - Chair: Ann Pattison, Consulting Geologist

Brownfields Exploration Tactics as Applied to a Porphyry-Related Skarn Deposit, ASARCO Mission Complex, Pima County, Arizona by Sarah Baxter, University of Arizona

McGhee Peak: A Hybrid Greenfields/Brownfields Porphyry Cu-Mo Target in SW New Mexico by David Brown, Consulting Geologist

Beyond the Shadow of the Headframe: Brownfields vs. Greenfields Exploration Opportunities by David Maher, Bronco Creek Exploration

Foreign Brownfields Exploration Targets by Wolfram Schuh, Freeport-McMoRan, Inc.

Foreign Greenfields Exploration Targets by William H. Wilkinson, Freeport-McMoRan, Inc.

Up-coming Arizona Geological Society Dinner Meetings

Date	Speaker	Title of Presentation
12/1/2015	Peter Smith	Lunar and Planetary Sciences Department, U of A - Title to be Announced
1/5/2016	Sarah Baxter	Calc-silicate Alteration and Ore Characterization, ASARCO Mission Complex: Implications for the Optimization of Molybdenum Recovery
2/2/2016	Karen Wenrich	The Ga-Ge Rich Apex Mine, Utah - A Tsumeb, Namibia Analogue

Arizona Geological Society Membership Stats (10/25/2015)

Total Membership	Professional Members	Student Members	Organizational Members
531	414	110	7

Geology in the News — with Emphasis on Southwestern United States

[EPA to Blame for ‘Preventable’ Gold King Mine Spill](#): Alan Neuhauser, U.S. News and World Report, October 22, 2015.

[Technical Evaluation of the Gold King Mine Incident, San Juan County, Colorado](#): U. S. Department of the Interior, Bureau of Reclamation, Technical Service Center, Denver, Colorado, October 2015.

[Freeport further Cuts Mining Output on Low Prices, Posts Loss](#): Susan Taylor, Reuters, October 22, 2015.

[Why is California Sinking? \(Hint: Drought\)](#): PBS News Hour Extra, October 8, 2015.

[Arizona Still Tops in Copper, up 28% in 50 Years](#): Tom Tracey, Verde Independent, September 29, 2015.

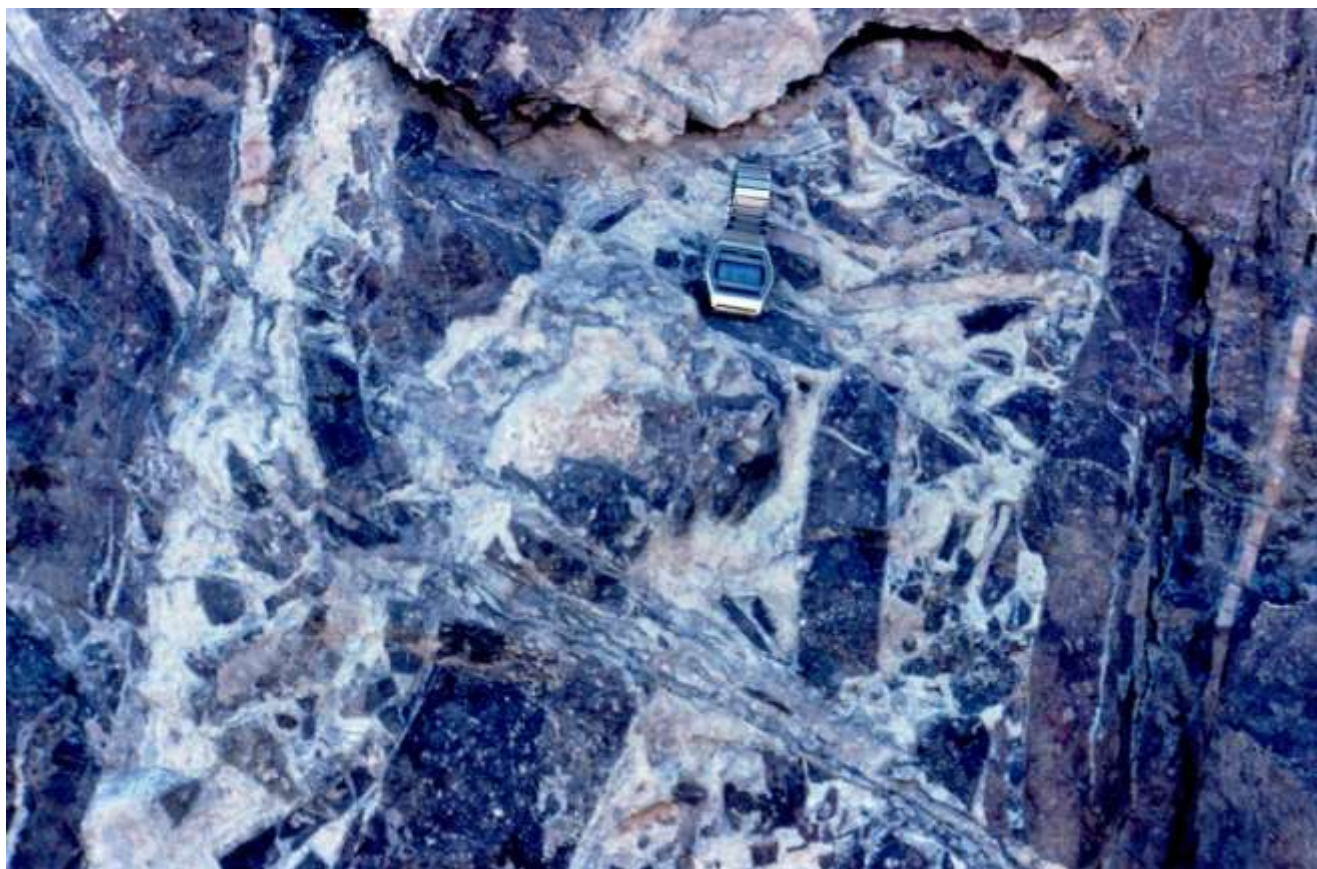
[Drivers Describe Long Night on Road as Mudslides Engulf nearly 200 Vehicles](#): Veronica Rocha and Brittny Mejia, Los Angeles Times, October 25, 2015.

[NASA Study Improves Understanding of LA Quake Risks](#): Jet Propulsion Laboratory, California Institute of Technology, October 20, 2015.

[National Monument Bill Aimed at Preventing Mining in Northern Arizona](#): Arizona Geology, October 14, 2015.

[Seismic Hazards of Santa Rita Fault in Southeast Arizona](#): Arizona Geology, October 14, 2015.

[Mining Diorama Finds New Home at Papago Park Museum](#): Arizona Geology, September 12, 2015.



Gold Road Vein, Oatman, Arizona

Arizona Geological Survey News Brief



October's [Arizona Mining Review](#) (AMR) e-Video Magazine will be available by 10am, Wed. 28 Oct.

- Arizona mining update with Nyal Niemuth – Bad news out of Green Valley's Sierrita Mine
- Pursuing environmentally sustainable mining in Arizona and Sonora, MX – a joint UA – UNAM venture with Dr. Raina Maier (University of Arizona) and Elena Centano (UNAM)
- AZGS STATEMAP 2016 Focus: Economic Geology with Dr. Jon Spencer (AZGS)

AZGS News

AZGS will be out in force at the Annual Geological Society of America Meeting in Baltimore, 1-4 Nov. Staff will present on Earth science cyber infrastructure and Arizona's first comprehensive landslide database. AZGS will be staffing the EarthCube exhibit booth – an NSF-funded initiative. If you are at GSA, please look us up.

Nearly 75,000 people, mostly K-12 and college students, participated in the Great Arizona ShakeOut's "Drop, Cover and Hold On" exercise on 15 Oct.

New Publications – Online at the AZGS Document Repository

Briggs, D.F., 2015, [History of the Warren \(Bisbee\) Mining District](#). Arizona Geological Survey Contributed Report CR-15-b, 8 p.

Spencer, J.E., Johnson B.J. and Peters, L., 2015, [Geology of the Hookers Hot Springs area, Galiuro Mountains, southeastern Arizona](#). Arizona Geological Open-File Report OFR-15-06 p.

Newly Released Online

Karlstrom, T.N.V., Swann, G.A., and Eastwood, R.L., eds., 1974, [Geology of northern Arizona with notes on archaeology and paleoclimate, pt. 1, Regional studies, and pt. 2 Area studies and field guides](#): Northern Arizona University, Museum of Northern Arizona, and U.S. Geological Survey, 804 p.

NOTE: This document was released with permission of GSA, Museum of Northern Arizona, and Northern Arizona University. Kevin Horstman scanned the report and provided the high quality PDF document to AZGS.

Schnabel, L. and Welty, J.W., 1986, [Bibliography for Metallic Mineral Districts in La Paz, Mohave, and Yuma Counties, Arizona](#). Arizona Geological Survey Circular 25 (C-25), 53 p.

Welty, J.W., DeWitt, E. and Schnabel, L., 1989, [Bibliography for Metallic Mineral Districts in Gila, Maricopa, Pinal, and Yavapai Counties, Arizona](#). Arizona Geological Survey Circular 27, 85 p.

ANNOUNCEMENTS

Welcome New AGS Members

Jason Burwell

Alexandra Huff

Andrew Reyna

Hayley De Witt

Leslie Insixiengmay

Veronica Reyna

Roy Greig

JR Morgan

Kelsey Sherrard

Arizona Geological Society is grateful to Freeport-McMoRan, Inc for their generous support of our student members!



Freeport-McMoRan is sponsoring student dinners for the 2015 AGS monthly meetings.

2015 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 registered geologist/engineer, indicate registration number and State: _____

Enclosed is a _____ tax-deductible contribution to the J. Harold Courtright or the Arizona Geological Society Scholarship Funds.