

SEG Foundation Student Field Trip

Precious Metal Deposits of the Southwestern U.S.

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The SEG Foundation sponsored the 11th Student Field Trip offered since 2007, with emphasis on precious metal ore deposits in western Arizona and southern Nevada. Participants included 19 students representing 18 universities and 11 countries, and guest leaders included Jeff Hedenquist (F 86), Hans Rasmussen (M 01), and Robert Bennett (F 04).

Beginning in the historic Oatman district, a visit to the underground Gold Road mine illustrated the structural complexities of a low sulfidation vein system hosted by intermediate to felsic volcanic rocks. The difficulties of recognizing significant gold occurrence in a complex series of sulfide-poor, banded quartz veins were apparent, challenging students to determine how a mine geologist would perform ore control in an ore deposit of this nature.

The Mineral Park mine provided students with the opportunity to review porphyry Cu-Mo characteristics, especially with respect to supergene enrichment features. Exemplary top-to-bottom exposures of leached capping–enrichment–protore demonstrated the geochemistry of weathering in a pyritic porphyry system. A visit to the concentrator allowed students to observe the complexities of copper and molybdenum recovery and consequent production of ore concentrates; discussion of copper recovery via in situ and heap leaching demonstrated the need to understand the mineralogical nature of ores as a means of optimizing resource recovery.

Near Beatty, Nevada, visits to underground and surface exposures at the Sterling mine illustrated that low sulfidation precious metal systems display substantial variations in structural

style, and that recognition of ore-grade material may be very challenging, even to experienced mine geologists. The economics of operating a small mine and the sensitivity of such operations to even minor fluctuations in metals prices were emphasized, and demonstrated that all aspects of mine operations must be optimized in order for a mine to survive the vagaries of mineral economics.

The giant Round Mountain mine impressed upon students the economic and mine-life potential of low sulfidation systems, and showed that structural and stratigraphic influence on mineralization processes is an important part of understanding ore-controlling characteristics. Challenges in ore control were discussed in the context of maintaining metal production from a large-scale mining operation.

Our final visit, complemented by guest field leaders Jeff Hedenquist, Hans Rasmussen, and Robert Bennett, was to the Goldfield district. Structural, alteration, and economic characteristics of high sulfidation epithermal systems were discussed at various outcrops across the district, providing students the opportunity to review the complex mineralogy and geochemistry of a well-developed epithermal system.

As is our tradition, on the final evening a farewell dinner was held at the Crowbar restaurant in Shoshone, California, recognizing students and professional participant-mentor, Dr. David Hedderly-Smith, for their contributions over the weeklong field trip. The social evening provided students with the chance to discuss their observations during the field trip, and to bid a temporary farewell to their peers and future colleagues.

As Student Field Trip leaders, we would like to express our many thanks to the personnel who arranged and conducted our mine visits. Their taking time from their responsibilities is

greatly appreciated and gratefully acknowledged—without their consideration of the next generation of economic geologists, these field trips would not be possible!

Sincere and continued thanks also to supporters of the SEG Foundation Field Trip Program, which was started at the May, 2006, Keystone Conference and continues to expose interested students to exemplary ore deposits in a variety of field settings, and emphasizes the importance of professional-student relationships to students beginning careers in economic geology.

Finally, we again thank Borden Putnam, John Thoms, and Vicky Sternicki for providing logistical and technical support; their constant help and oversight allows these field trips to be offered with a minimum of complications. Our hardhats are gratefully tipped to you each.

With your continued support, the 12th offering of these SEGF Student Field Trips in March 2014 will emphasize the geology and geochemistry of major porphyry and skarn systems of the southwest U.S.A. Please see the *SEG Newsletter* and e-mail announcements for details.

Photo 1: On a last stop in the northwest Goldfields district, field trip participants pose near an outcrop of silicified Sandstorm Rhyolite of Oligocene age. In the top row, field trip leaders Bob Bennett and Erich Petersen (second and third from the left, respectively) and Hans Rasmussen (with blue glasses in the middle of the row) stand among group members. Field trip leader Bill Chávez sits front and center in the first row.



Photo 2: Erin Summerlin and Christopher Olson discuss the sulfide mineralogy associated with low sulfidation gold mineralization at the Manhattan pit overlook (Round Mountain).

