Arizona Geological Society Newsletter

NOVEMBER 2012

November 13, 2012 DINNER MEETING

Who: **Dr. Virginia T. McLemore** 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 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 $24, guests $27, Students free with online reservation ($10 without).

RESERVATIONS are REQUIRED: CALL 520.663.5295 by 5 p.m. by Friday, November 9 or reserve on the AGS website (www.arizonageologicalsoc.org). Please indicate regular (beef tri-tip, mashed garlic potatoes), vegetarian, or cobb salad meal preference. Please cancel by Friday, November 9 at 5 p.m. if you are unable to attend—no shows and late cancellations will be invoiced. Meals for walk-ins may be available (with a $3 surcharge), but cannot be guaranteed.

The November dinner meeting is sponsored by:

RUEN DRILLING Incorporated

AGS is grateful for Ruen's sponsorship, which helps us to offset dinner meeting costs. Learn more about Ruen Drilling at www.ruendrilling.com.

ABSTRACT

RARE EARTH ELEMENTS DEPOSITS IN NEW MEXICO

Virginia T. McLemore, New Mexico Bureau of Geology and Mineral Resources, New Mexico Institute of Mining and Technology, Socorro, NM

Our society is currently demanding more environmentally friendly technologies like solar panels and wind turbines for electricity, batteries, and electric cars. Other technologies being developed include water purification, desalination, carbon capture and storage, and even better light bulbs; they all require nontraditional minerals and elements in their manufacture. Elements such as cerium, samarium, neodymium, ytterbium, and 13 others are known collectively as rare-earth elements (REE) and are required in many of these technologies as well as other products, such as magnets used to drive many of our motors, cell phones, televisions, and computers.

Deposits of REE are found in New Mexico, but they have not been important exploration targets in past years because demand has been met elsewhere. However, with the projected increase in demand and potential lack of available REE production from China, the New Mexico deposits are being re-examined for their potential.

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REE-Th-U veins are found in the Gallinas, Caballo, Capitan, and Cornudas Mountains and Laughlin Peak-Chico Hills. A small amount of bastnaesite, a REE mineral, was recovered during processing for fluorite from the Gallinas Mountains. Resources at Gallinas Mountains amount to at least 537,000 short tons of 2.95% total REE (not NI-43-101 compliant; Schreiner, 1993). Drilling is required to identify a better resource estimate.

The Cornudas Mountains consist of ten larger sills, plugs, and laccoliths and smaller dikes and plugs of phonolite, syenite, and other alkaline igneous rocks that intrude relatively flat-lying limestones and other sedimentary rocks of the Hueco Limestone and Bone Spring Limestone (Permian). The abundant rare mineralogy in the Cornudas Mountains suggests that the area has potential for undiscovered deposits of rare earth elements, niobium, and zirconium. U.S. Borax sampled and drilled in the Chess Draw area (up to 0.06% total rare-earth oxides, 10-1400 ppm Nb, 10-3000 ppm Zr, 230-13,000 ppm F). An analysis of a dike contained 1235 ppm Ce, 700 ppm La, 270 ppm Nd, and 242 ppm Y. Additional geophysical and geochemical studies followed by drilling are required to properly assess the resource potential.

Other types of REE deposits are found in New Mexico. Carbonatites are found in the Lemitar and Chupadera Mountains, Laughlin Peak-Chico Hills, Lobo Hill, and Monte Largo (Sandia Mountains). Disseminated Y-Zr deposits in syenite are found at Pajarito Mountain, Mescalero Apache Indian Reservation near Ruidoso. In 1990, Molycorp, Inc. reported historic resources of 2.7 million short tons grading 0.18% Y2O3 and 1.2% ZrO2 as disseminated eudialyte. Two additional deposit types have potential for REE in New Mexico: Cretaceous heavy mineral, beach-placer sandstone deposits and pegmatites. Exploration is ongoing in the Lemitar, Gallinas, and Cornudas Mountains.

Many challenges face these industries in supplying REE. REE have to be mined and they have environmental issues that will be identified and addressed. Most REE deposits are associated with radioactive waste material, which will require special handling. Are there enough REE in the pipeline to meet the demand for these technologies and other uses? Future development of these green technologies will be challenging and demand more research in many fields.

About the Speaker

Virginia T. McLemore (Ginger) is a Senior Economic Geologist with the New Mexico Bureau of Geology and Mineral Resources at New Mexico Tech. She holds B.S. degrees in Geology and Geophysics (1977) and M.S. degree in Geology (1980) from New Mexico Tech and received her Ph.D in Geoscience from University of Texas at El Paso in 1993. Ginger began work with the Bureau in 1980 as an economic geologist specializing in uranium deposits. She has published numerous articles on the mineral resources of New Mexico, including gold and silver deposits in New Mexico, REE resources in New Mexico, and uranium deposits. Her current projects include (1) minerals required for emerging "green" technologies, (2) uranium, REE, and Nb resources in New Mexico, (3) alkaline magmatism, carbonatites, anorthosites, and A-type granites in New Mexico, (4) mineral resources in New Mexico, and (5) mapping in the San Mateo Mountains. She also is an adjunct professor and teaches Geology of the Industrial Minerals and Uranium Geology for the Department of Earth and Environmental Sciences and Department of Mineral Engineering at New Mexico Tech.

USGS Lunchtime Lecture Series

Dr. McLemore will be speaking on November 13 at 12:10 p.m. in room 353 of the USGS office at the northeast corner of Park Ave. and 6th St. Parking is available in the parking garage to the east of the USGS building. The title of her talk is RARE EARTH ELEMENTS (REE) DEPOSITS OF THE GALLINAS MOUNTAINS, LINCOLN AND TORRANCE COUNTIES, NEW MEXICO. All are welcome.

ANNOUNCEMENTS

Welcome New AGS Members

Richard Leveille, Freeport McMoRan, Mesa, AZ
Carson Richardson, University of Arizona, Tucson, AZ
Susan Skirvin, Consultant, Tucson, AZ
Jessica Rudd, University of Arizona, Green Valley, AZ
Tino Sanchez, Above Enterprises
Gary Bender, Bender Environmental Consulting, Tempe, AZ
John Guy-Bray, Arizona Mine Management, Santa Barbara, CA
Simone Runyon, University of Arizona, Tucson, AZ
J.D. Mizer, University of Arizona, Tucson, AZ

Thanks to the following AGS members for their recent generous donations to the Courtright Scholarship Fund:

Richard Loring

AGS wishes to express condolences to the family of former AGS member ***Amy Eichenlaub Snyder***, 36, who passed away on October 4, 2012 in Tucson.

Field Trip Reminder: AIPG-AGS Centennial Field Trip to the Phoenix Basin, Nov. 10, 2012

There's still space on this field trip led by Dr. Stephen Reynolds of the ASU Geology Department to the Phoenix Mountains (Dreamy Draw) and to South Mountain Park. Trip fee is $20 to cover lunch mid-day at Dos Molinos. Come have some geo fun before the holidays hit. For details, carpool location from Tucson, and to sign up see http:// www.arizonageologicalsoc.org/field-trips/novft. You can pay by credit card online or by cash/check.

Mine Reconciliation & Resource Estimation Summit

The Arizona Geological Society is proud to be a media partner for the ***Mine Reconciliation and Resource Estimation Summit***, to be held in Phoenix on January 22-24, 2013. Just a few of the topics that will be presented include:

- The effective use of reconciliation for business and operational improvements,
- Strategies for successful grade modeling,
- Model generation: the differences between resource and grade models,
- Geological controls and deposit types: adapting your model to your mine's geology.

Special discount pricing is available for AGS members and student members. Register on or before November 16 for $899, and for $1099 thereafter.

Look for more details in the AGS December newsletter, on the AGS website, and at
www.MineReconciliation.com

Arizona Mining Alliance Meeting

by Alison Jones

The Arizona Mining Alliance met on October 12, 2012 at Granite Construction's conference facility in Tucson. It was the group's best turnout to date. Arizona State Senator Al Melvin, who is also a member of the Arizona Mining Caucus in the state legislature, started the Arizona Mining Alliance last year. Senator Melvin and Steve Trussell of the Arizona Rock Products Association organize and lead the meetings.

As usual, the meeting started out with introductions of all in attendance. A number of pro-mining candidates for public office were allowed to say a few words. Gabriela Saucedo-Mercer (running against incumbent Raul Grijalva for U.S. Congress), Elaine Richardson (running for Pima County Board of Supervisors), and Tyler Mott (running for Arizona State Senate District 9) all spoke about the importance of this election.

Senator Melvin spoke about his ongoing efforts to have a nuclear fuel recycling facility constructed in Arizona. He noted that the technology is not new, and that the French have been recycling 96% of their spent nuclear fuel for years. According to Senator Melvin, the estimated cost of construction is $20 billion, which would presumably be paid for by the federal government. The federal government has already collected $30 billion in fees for nuclear fuel disposal. Construction of the facility would generate 18,000 jobs. Possible locations for a facility are west of Picacho Peak, Kingman, Safford, and Holbrook. Salt deposits at these locations would serve as disposal sites for the remainder of the nuclear fuel that cannot be recycled.

Senator Melvin also reported that Arizona and other western states are working to obtain ownership of public land owned by the U.S. Forest Service and the Bureau of Land Management. He said that the USFS and BLM are destroying the land and that "we are putting the feds on notice that we will make this state land and open it up to mining, cattle grazing, forestry, and for possible sale." You can see more about this effort at www.arewenotastate.com.

Jon Spencer of the Arizona Geological Survey delivered a presentation titled, "Mineral Resource Potential of Lands within the Sonoran Desert Heritage Proposal." The Arizona Wilderness Coalition, Sonoran Institute, and the Wilderness Society are proposing to remove 750,000 acres of BLM land from mineral entry. The proposal could be approved through a bill or by executive order. If the proposal is passed, it will affect gold, silver, aggregate and copper mining potential for these lands.

Bill Dunn and Stephanie Smallhouse of the Arizona Board of Natural Resource Conservation Districts spoke about the AZRCD's review of the Endangered Species Act in response to the Center for Biological Diversity's proposal to revise the Act. AZRCD's proposal that the Act be updated and modernized has met with approval from Arizona Rock Products Association, the Arizona Farm Bureau, and the Arizona Cattle Association.

New mining project updates were provided by Rosemont Copper, Curis Resources, and Wildcat Silver. Rosemont announced that they expect a record of decision from the USFS by the end of 2012. They are planning to start construction in the second quarter of 2013. Curis was issued their Aquifer Protection Permit for their Florence project on September 28. They are currently working with the EPA on their underground injection control permit. Curis's test facility will start in early 2013, and commercial operations are expected to start in late 2014 or early 2015. Wildcat Silver announced that their recent resource update indicates reserves of 315 million ounces of silver at their project in Santa Cruz County. The deposit also includes lesser, but significant gold, copper, and manganese reserves.

The next Arizona Mining Alliance meeting will be held on November 9, 2012 at Granite Construction from 11:30 a.m. to 1 p.m. Lunch will be provided.

Field Trip Report – Wickenburg, Vulture Mine, Anderson Project

by Cori Hoag, Centennial Field Trip Coordinator

It was a toasty 2-day weekend in early October, but we enjoyed ourselves in style in what turned out to be a grand combination – knowledgeable leaders, great guidebook, fantastic geology, comfortable accommodations, good food, and many interesting conversations along the way.

On Saturday, Jon Spencer had us nimbly scrambling up a ridge like mountain goats to examine volcanic outcrops in the Vulture Mountains after which we visited the Vulture Peak Gold LLC property. Mike Smith provided a project status update; Bill Feyerabend gave us an excellent discussion about the complex geology, structure, and mineralization at the Vulture Mine and took us through the small open pits. We ate lunch in the shade of an historic headframe and got a touch of gold fever when we saw the free and wire gold in vuggy, iron-stained silicified samples collected for processing by an on-site artisanal miner. We topped the evening by relaxing at the Wickenburg Rec Center enjoying a few beers, a barbeque dinner, and an after-dinner talk by Cindy Thrasher, President Wickenburg Historical Preservation Society.

Sunday saw us heading north-northwest out of Wickenburg to the Anderson Project with an overview stop amongst the Joshua Trees and expansive desert vistas. Jon discussed the regional geology of the Date Creek Basin and Rick Edge, Uranium Energy Corp, gave us an overview of uranium mining methods, the deposit geology/mineralization, and project status including an extensive effort to verify the location of the historic drillholes and confirm resources. After crossing the wide, sandy Date Creek Wash, we stopped at the south edge of the pit area to examine the chalcedony/silica alteration (later found to fluoresce a lime green) forming a desert pavement over lacustrine sediments and then combed the pit looking at the formations, fossilized palm wood, and secondary uranium mineralization along fracture partings. After a “hot” time eating lunch near a mineralized stockpile, we visited a exploration drill pad with a spectacular view of the countryside and returned home.

Thanks go to the trip leaders, guidebook authors including Rick, Bill, Mike, Jon, and Gary Carter, guidebook compiler Jan Rasmussen, drivers, and all those who helped in a myriad of ways. Copies of the guidebook are available for $25; please contact Cori at choag@srk.com.

Left: Early morning climb to look at a volcanic tuff in the Vulture Mountains. (J. Rasmussen)

More photos of this great trip are provided on pages 5-7.

WICKENBURG AREA FIELD TRIP HIGHLIGHTS

Right: Nyal Niemuth, Brin Lindley, and Bruce Kilpatrick listen as Bill Feyerabend describes Vulture Mine pit geology (C. Hoag).

Left: Examining outcrops in the Vulture pits and workings (J. Rasmussen).

Below: Discussing Vulture Mine geology in the shade of an old hoist house (K. Wenrich).

FIELD TRIP PHOTOS—Continued

Left: Jon Spencer discusses the regional geology of the Date Creek Basin on the way to the Anderson Project (K. Wenrich).

Below: Rick Edge, Uranium Energy Corp., gives an overview of the Anderson Project on the way to the mine area (B. Lindley).

Above: Karen Wenrich, Nyal Niemuth, and Will Wilkinson (B. Lindley).

Left: Dick Jones, Bruce Kilpatrick, and David Lawler examine silica alteration in lakebed sediments (J. Rasmussen).

FIELD TRIP PHOTOS—Continued

Above: Fossilized palm log (K. Wenrich) and inset of palm (J. Rasmussen).

Right: Rick discusses drilling efforts with grand vista and Anderson Project area in the center view (C. Hoag).

2013 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 Scholarship Fund.