GEOLOGICAL SOCIETY OF NEVADA

NEWSLETTER

Geological Society of Nevada, 2175 Raggio Parkway, Room 107, Reno, NV 89512
(775) 323-3500 - Hours Tuesday -- Friday, 8 a.m. to 3 p.m. Monday by appointment.
Website: www.gsnv.org • E-mail: gsn@gsnv.org

March 2014, Vol. 30, No. 3

Published monthly except June and July

CALENDAR OF GSN EVENTS

March 6, 2014 Thursday

SOUTHERN NEVADA CHAPTER MEETING
The monthly meeting will be held at 5:30 p.m. in room 105 of the Lilly Fong Geosciences building, UNLV. **Speaker: Terry Spell, UNLV. Title: "Bimodal Volcanism Adjacent to the Yellowstone Caldera: A Young Evolving Magma System Since 440 ka" Sponsor: RUEN DRILLING.** Contact Wyatt Bain, bainw1@unlv.nevada.edu. Abstract, page 6.

March 12, 2014 Wednesday

WINNEMUCCA CHAPTER MEETING (Every 2nd Wednesday)
The monthly meeting will be held at the Martin Hotel, Winnemucca, NV. Appetizers/drinks at 6:00 PM, Talk at 7:00 PM. **Speaker & Title: To Be Announced. Food & Drinks Sponsored by: TBA.** Contact Andy Jansen at Andrew.jansen@newmont.com for more information.

March 20, 2014 Thursday

ELKO CHAPTER MEETING (Every Third Thursday)
The monthly meeting will be held at the Western Folk Life Center, 501 Railroad Street. Refreshments at 6:00 PM, Talk at 7:00 PM. **Speaker and Title: To Be Announced. Food & Drinks Sponsored by: GEOTEMPS INC.** For more information contact Josh Sovie at jsovie@barrick.com.

March 21, 2014 Friday

GSN MEMBERSHIP MEETING (Every Third Friday)
The monthly meeting will be held at the Reno Elks Lodge, 597 Kumle, Reno. Drinks at 6:00 PM, Dinner at 7:00 PM, Talk at 8:00 PM. **Speaker: John Dreier, Geologist. Title: "Copper Deposits of the Coast Ranges of Chile: A trip through time, space, and ore deposit nomenclature". Sponsor for the evening is: ENVIROSCIENTISTS, INC.** Dinner reservations must be made by **WEDNESDAY, MARCH 19TH.** Call Laura Ruud at 323-3500; Email: gsn@gsnv.org. DINNER $25.00. Abstract on page 3.

May 2-4, 2014 (Fri-Sun)

GSN SPRING 2014 FIELD TRIP
Humboldt Range, Majuba Hill, and Trinity Range (Au, Ag, Cu, Sn, W, Be, Hg, Sb, B). Registration Form on page 9!

FROM THE PRESIDENT, MARCH 2014
Tommy Thompson, G.S.N. President 2013-2014

Odie Christensen's well-documented discussion on gold placers at our February Membership meeting was intriguing and generated a lot of discussion, a great follow-up to Gary Clifton's description of the Ruby placer in January.

Two articles in the current *Mining Magazine* dealt with cyber-attacks on the mining sector. Customer information, sensitive R & D data, and intellectual property are just a few of the targets of such thieves. Massive cash flows are an added attraction to "hactivists." Some attacks are even government-led as documented by the Rio Tinto office based in Singapore. An Ernst and Young survey found that 44% of their mining company respondents do not have a threat-intelligence program in place!! It can only be anticipated that such cyber-attacks will increase in the future, a threat to mining companies, their shareholders, and world mineral production.

We visited the 60th Annual Tucson Gem & Mineral show in mid-February. This year's show theme was Gems, Gold, Silver, and Diamonds. Particularly intriguing were numerous gold specimens from Round Mountain, commonly for sale in the $6,000 to $75,000 range.

Round Mountain Gold Specimen priced at $75,000

Thank you to JBR ENVIRONMENTAL CONSULTANTS For Hosting the February 21, 2014 Meeting!

GSN MARCH 21, 2014 Membership Meeting

Reservations Are Required - Please Cancel if You Are Unable to Attend

Please call 775-323-3500, Fax 775-323-3599 or e-mail gsn@gsnv.org by **4 p.m. on WEDNESDAY, March 19, 2014.**
Social Hour: 6:00 PM – Dinner: 7:00 PM – Speaker: 8:00 PM
$25.00 per person. Location: Elks Lodge, 597 Kumle Lane, Reno, Nevada
Directions: across (W) from the Reno-Sparks Convention Center
(S. Virginia Street, behind the Les Schwab Tire Center)

Copper Deposits of the Coast Ranges of Chile
A trip through time, space, and ore deposit nomenclature
John E. Dreier

The Coast Ranges of Chile, extending for about 3000 km along western South America from the Peruvian border (latitude 18° S) to Tierra del Fuego (latitude 55° S), are largely underlain by volcanic and plutonic rocks of a Jurassic-Lower-Mid Cretaceous subduction-related volcanic arc complex. For slightly less than half that distance, from 18° S to ~35° S, the Jurassic-Cretaceous arc hosts numerous copper deposits (perhaps well into the thousands), which contain variable amounts of specularite and/or magnetite plus the common wall rock alteration/gangue minerals, albite, K-feldspar, chlorite, epidote, calcite, apatite, sericite, biotite, actinolite, and scapolite. Some of these mineral deposits have Au as an important byproduct, others contain Ag, a few are Ag-dominant, and some were mined for Mn. In form, the deposits include veins, mantos, stockworks, and breccia pipes.

The copper deposits of the Coast Ranges vary in structural control according to age of formation. Jurassic deposits are dominantly related to and/or controlled by ENE or WSW-trending strike slip faults of apparently small displacement, whereas the Cretaceous deposits tend to be controlled by regional-scale northerly-trending high-angle transpressional faults or reverse faults related to the compression and uplift of the volcanic arc and the closure of a Jurassic-lower Cretaceous back arc basin located to the east of the volcanic arc. Within intrusive rocks, mineralization is localized in veins, whereas in volcanics and sediments, mineralization occurs as mantos, stockworks, and breccia pipes in addition to veins (all often in close proximity to each other). In general, copper mineralization in the Coast Ranges differs from porphyry-style deposits in that it is not focused on a point source; rather it is widely dispersed over very large areas (hundreds of sq km). In many Coast Ranges districts it is possible to follow vein systems for many km along strike within batholiths and have the veins morph into vein-manto-chimney systems when they pass into the volcanic and sedimentary wall rocks adjacent to the batholiths. An important feature of the Coast Ranges deposits is mineralogical zoning of wall rock alteration and mineralization, which is in addition to the vertical zoning of deposit morphology.

Deep-Level deposits are 1-5 m wide veins hosted by intermediate-composition plutonic bodies plus volcanics and sediments metamorphosed to greenschist or higher facies. Wall rock alteration selvages adjacent to the deep-level veins are generally narrow and consist of biotite, K and/or Na-feldspar, and actinolite. Vein minerals include quartz, calcite, apatite, actinolite, magnetite, chalcopyrite, and bornite. Individual deep-level veins or vein clusters may contain up to 50,000 tonnes of Cu metal as chalcopyrite and lesser bornite, plus 60,000 ounces of gold. The Coast Ranges batholiths and their metamorphic host rocks contain hundreds or perhaps thousands of such individual vein deposits. About 10 of these deposits are in production by milling operations, which process 2,000 – 3,000 TPD of ore grading ~1.5% Cu and 0.5 to 1 g/t Au and ship 4,000 – 5,000 TPM of concentrate to smelters. Geologic relationships and other features suggest depths of formation in the range of 6 km to possibly as deep as 10 km

Intermediate-level deposits vary in form from veins to mantos and chimneys. Ore minerals of the intermediate-level deposits include chalcopyrite, bornite, and minor hypogene chalcocite; gangue/alteration minerals include magnetite, specularite, K-feldspar, albite, biotite, scapolite, chlorite, epidote, and calcite. The bulk minable intermediate-level deposits are hosted by volcanic and sedimentary rocks. In detail, mineralization in the intermediate level deposits is controlled by structures and certain favorable beds or stratigraphic units; vesicular lava flow tops and brecciated lava flow tops and bottoms are very common and important ore hosts. The deposits typically contain 0.2 - 0.3 g/t Au and up to 20 g/t Ag. Important intermediate-level deposits include Candelaria, Atacama Kozan, Santa, and others in the Tierra Amarilla district. Cumulatively, Intermediate-Level Cu deposits of the Coast Ranges have produced 2-4 M tonnes of Cu metal, and many of these deposits are (or were in the past) mined by bulk methods.

High-level deposits assume a variety of forms, including veins, breccia pipes, and mantos and the breccias appear to be multi-generational and magmato-hydrothermal in origin. The stratigraphic control to the high-level deposits is similar to that of the intermediate-level deposits, especially in respect of control by lava flow tops and (Cont. page 4)

(Dreier, cont. from page 3)
bottoms. Common ore minerals in the high-level deposits include hypogene chalcocite, digenite, bornite, lesser chalcopyrite, and minor native silver, plus hematite. In some high-level deposits, a portion of the mineralization is intimately related to hydrocarbons. The high-level deposits lack Au and may contain up to 150 g/t Ag. At least one high-level district contains deposits that resemble epithermal veins in form and ore texture and, like many epithermal veins, the veins terminate upward by pinching out. Near their tops, the veins in this district have adjacent mantos that were mined for Ag, Cu, and Mn. Common gangue/wall rock alteration minerals in the high-level deposits include quartz, calcite, chlorite, sericite, K-feldspar, albite, and epidote, plus galena and sphalerite. Rocks surrounding the high-level deposits are commonly affected by regional zeolite/pumpellyite alteration/metamorphism. High-level systems include Michilla, Buena Esperanza, Mantos Blancos, Frankenstein, El Soldado, and Cerro Negro (sur), and Chañarcillo. Total production from these deposits is > 4 M t Cu metal and >>100M oz Ag. Recent exploration in some former Chilean Ag districts indicates that these represent upper halos above Cu-Fe systems.

Geological relationships evident throughout the Coast Ranges make it abundantly clear that the mineral systems are vertical zoned with respect to form, mineralization, and gangue/wall rock alteration mineralogy. Thus, IOCG-like characteristics predominate in the lower levels of the systems but gradually give way upward first, to Cu-Au-Ag, then to Cu-Ag, then to Ag, and finally, in the upper-most regions, to Mn mantos or Mn-rich chalcedony veins. A full understanding of the vertical zoning and the principal structural and stratigraphic controls to mineralization is a requisite for successful exploration.

The Coast Ranges deposits are enigmatic in their placement within the classification of mineral deposits. Historically they were described as either veins or Chilean Manto-Type Cu Deposits, but within the past 15 years or so, spurred by work at Candelaria, they were reclassified as IOCG deposits. The evident zonal nature of these deposits and the absence of gold in many of the important ones provide evidence that the Coast Ranges ore systems extend beyond the bounds of the IOCG designation and thus their place within the world of ore deposits should be given further consideration. An additional complication to the categorization of the Coast Ranges copper deposits is that several of them have porphyry-like characteristics and others, with non-porphyry characteristics are located in close proximity to well-recognized Cretaceous-age porphyries.

The copper deposits of Chile have played an important role in the development of the Chilean copper industry. Copper mining in Chile began in the 1830's in the Coast Ranges as small-scale operations focused on high-grade veins of oxide and secondary enriched sulfides. The ore from these operations was hand-sorted and treated in small smelters scattered along the coast, or shipped to Wales for smelting. Beginning in the 1960's, production from the small-scale operations was progressively supplanted by increasingly larger-scale mine-for-leach operations, which have produced a total of ~8 M tonnes of Cu metal, mostly from mine-for-leach/SXEW operations. Large modern operations include Michilla, Mantos Blancos, Manto Verde, and El Soldado. Modern intermediate-scale operations include Ivan-Zar, Mantos de la Luna, Sierra Valenzuela (closed), Sierra Miranda, Las Luces, Frankenstein (recently failed SXEW operation), Santa, Atacama Kozan and other operations in the Tierra Amarilla area, Cinabrio, Cabildo, Cerro Negro, and Pudahuel (closed). Small-scale operations are numbered in the hundreds and include the many small mines which ship hand-sorted oxide ore to ENAMI (government-operated) leaching plants located at various points along the Coast Ranges.

JOHN DREIER BIOGRAPHY:

Mr. Dreier received a bachelor's degree in geology from Union College (1964), a Masters in geology from the University of Wyoming (1965), and a Ph. D. in Geosciences from the University of Arizona (1976). He began his career in economic geology with Inco in northern Manitoba and the Northwest Territories of Canada exploring for nickel deposits. After completing his M. S. he went to work for Bear Creek Mining Co. exploring for sediment hosted copper deposits in the northwest U. S. and later for porphyry copper deposits in Arizona and New Mexico. During this time, he also worked as a mine geologist at Ray, Arizona, where his interest in copper leaching took root. At the University of Arizona he became interested in the application of thermodynamics to geological problems. However, as thermodynamic data in the early 1970's stopped at about 300 – 350o C he decided to employ the then new approach of collecting data on ore forming fluids by the study of fluid inclusions in samples from an epithermal system (porphyry copper deposits were formed at temperatures higher than upper reaches of the thermo. data set). Spence Titley then brought up Pachuca and Spence and John Guilbert obtained funding from Guillermo Salas, Director of the Consejo de Recursos no Renovables de Mexico. With the promise of funding and Spanish 1A and 1B under his belt, Mr. Dreier jumped in his 65 Mustang and drove down to Pachuca, camping out on the way to save money. After many experiences, some of them of the near-death type and others of a more pleasurable kind, he returned from Mexico, completed his Ph.D. and went on to cofound Sage Associates with Dave Hackman and Perry Durning with the purpose of exploring for epithermal silver deposits in the Western U. S. SAGE came up with a number of good epithermal targets, but the program was gradually enlarged to include Carlin systems and a placer gold deposit in Alaska.

His experience in Chile began in the mid 1980's when he briefly consulted there for Cyprus Minerals and he has worked on the Coast Ranges copper deposits on and off ever since then. From 2004 to 2009, he managed a program to explore for and acquire oxide copper deposits in the Chilean Coast Ranges first on behalf of Newcrest Mining, and later for a private group. These exploration/acquisition programs took Mr. Dreier to a great majority of the copper districts in the Coast Ranges. These programs and subsequent work in the Chilean Coast Ranges form the basis for tonight's talk. His work with oxide copper deposits lead him to a study of copper leaching the geochemistry and geometallurgy of copper leaching, to designing and managing copper leach metallurgical test programs, and to working as a consultant to copper leaching projects and operations. He has taught the chemistry and geometallurgy of copper leaching in the SME Copper Heap Leach short course since 1990 and is presently the course organizer.

"FACES OF GSN"

Ruth Carraher

When I was asked to be the March "Face" of GSN I appreciated the recognition this request represented. I have been involved with GSN for many years, including helping with the field trips for the symposiums starting with the first one in 1987 and a couple of terms as an officer. This organization has always offered some of the best opportunities to network with colleagues and keep abreast of the Nevada mining industry.

Ruth on a field trip to Round Mountain

While I could review the various places (Bolivia, Argentina, Chile, Mexico, China, Africa and exotic ports of call such as Kansas and Tennessee) and projects I have worked on around the planet I really want to throw some questions out there to see if anyone has answers to them.

Questions such as;
Is there really a black cow out there waiting to jump in front of us as we drive around Nevada in the dark?

Do those fighter pilots from Fallon, Nellis and elsewhere target us as we drive along the "Loneliest Highway"?

What does "rabido" mean? That was the first word out of the geologist's mouth down in Mexico after I was bitten by a dog wandering through the property. The geologist, drilling crew and geophysics crew all thought it was very interesting that the dog picked the only woman and the only American on the property to taste. Five weeks and 11 injections later close friends and relatives would shove me out in front when dogs came after us figuring I was protected from rabies!

And what did those cowboys think as they drove down Antelope Valley past 2 naked ladies (by the way, there were a lot less wrinkles and cellulite at that time!) throwing water from the hot springs at each other? It still seems like a good decision; either take a bath in a stream running with snow melt, or take a bath at the hot springs. Since no vehicles had been down the road for days why would we expect to see anyone driving by?

Any thoughts on why a man would be standing next to his parked truck on the highway (Highway 50 near Mt. Hamilton) naked except for a cowboy hat and boots? He did take his hat off to cover his _____, but what was he thinking?
As you can see all of these are questions which can cause a person to lose sleep.

Growing up in northeastern Ohio one would never expect to end up traveling around the planet looking at rocks, spending time with drillers and becoming a connoisseur of diner menus. Speaking of food we all know the best places to eat in Nevada but ordering in China can really bring variety to your meals. Things like turtle (they bring it to the table then smash the shell), snake (which they bring live to the table prior to cooking so you can see how fresh it is), and maybe a sheep's head or horse head. However, some of the best meals I have ever had were in China, and some of the worst meals were also there.

Back to Ohio I received my Bachelor's degree from Bowling Green State University (way after Dieter Krewedl) and then married fellow student Paul Muto (he is also a geologist), working our way from Kansas and Tennessee (looking for Pb-Zn) to Nevada. We both received our Master's degrees from Mackay School of Mines (when it was a college on its own) then ended up working for Amselco for 5 years in Ely, Nevada. Since then I have worked in Nevada, China and Argentina, with briefer periods of project work in Bolivia, Chile and Mexico.

I have also had the opportunity to help promote the modern mining industry through the Women's Mining Coalition which has been "tutoring" our legislators on the importance of domestic mining since 1993. This organization (not restricted to women) has been able to bring the face of modern mining to legislators and policy makers hopefully helping them to make better decisions on issues of importance to the industry.

I have enjoyed all of the opportunities accorded to me through the years to delve into the geology mineralizing systems and to meet dedicated and knowledgeable people. Life is and has been good!

G.S.N. SOUTHERN NEVADA CHAPTER MEETING

Thursday, MARCH 6, 2014

Time: 5:30 P.M.

Sponsor: RUEN DRILLING

Speaker: Dr. Terry Spell, UNLV Geology Dept.

Room 105 of the Lilly Fong Geosciences building, UNLV.

"Bimodal Volcanism Adjacent to the Yellowstone Caldera: A Young Evolving Magma System Since 440 ka"

Abstract: Yellowstone National Park is well known as the site of multiple large-scale caldera forming eruptions since 2.1 Ma. Beginning at 350 ka a series of basalt, rhyolite and mingled lava eruptions occurred immediately north of the 640 ka Yellowstone Caldera in the Norris-Mammoth corridor. Geochemical and isotopic data, phenocryst chemistry, 40Ar/39Ar dating and U/Th-Pb dating of zircon indicate that these eruptions record an continuously present, evolving magma system driven by mantle-derived basalt injections into the crust. Rhyolitic magmas have been present beneath the Norris-Mammoth corridor since 440 ka, thus this magma system represents almost a half-million years of silicic magma production. Mingled lavas erupted from 316-263 ka record the presence of basalt beneath this area prior to an apparent lull in basaltic input from 263-60 ka. Renewed basaltic input into the crust at 60 ka is associated with eruption of young mingled lavas and the eruption of nearly aphyric high-temperature rhyolites, marking a significant change in silicic volcanism in this area. The eruption of the youngest rhyolites in the Yellowstone Volcanic Field occurred in the Norris-Mammoth corridor during this time.

Biography: BS State University of West Georgia, MS New Mexico Tech, PhD State University of New York at Albany, Postdoc Australian National University, interests include continental silicic volcanism associated with caldera forming eruptions and development of 40Ar/39Ar geochronology.

G.S.N. WINNEMUCCA CHAPTER MEETING

WEDNESDAY, MARCH 12, 2014
The Martin Hotel, Winnemucca, Nevada

6:00 p.m. - Appetizers/Drinks

7:00 p.m.—Talk begins

SPEAKER and TOPIC:

TO BE ANNOUNCED

G.S.N. ELKO CHAPTER MEETING

THURSDAY, MARCH 20, 2014

Refreshments and appetizers @ 6:00 p.m,
Talk @ 7:00 p.m.

Western Folklife Center

501 Railroad Street, Elko, Nevada

Sponsor for the evening is: GEOTEMPS, INC.

SPEAKER and TOPIC: TO BE ANNOUNCED

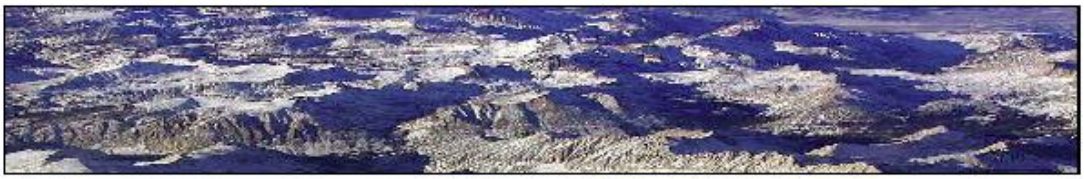
GEOLOGICAL SOCIETY OF NEVADA—2015 SYMPOSIUM

ANNOUNCEMENT and CALL FOR PAPERS

THEME: New Concepts and Discoveries

WHEN: MAY 14-24, 2015

WHERE: JOHN ASCUAGA'S NUGGET, RENO/SPARKS, NEVADA



GEOLOGICAL SOCIETY OF NEVADA 2015 SYMPOSIUM

ANNOUNCEMENT and CALL FOR PAPERS

THEME: New Concepts and Discoveries
WHEN: MAY 14-24, 2015
WHERE: JOHN ASCUAGA'S NUGGET RENO/SPARKS, NEVADA

The Geological Society of Nevada invites contributions for oral, poster, and core shack presentations covering a broad range of geological topics for its upcoming seventh symposium. The symposium's focus is New Concepts and Discoveries emphasizing both the major deposit types and the trends that have sustained the mining industry for several decades as well as other deposit types and areas that may eventually have greater influence. The focus of the meeting is to utilize case studies; descriptions of new and reinvigorated deposits and targets; framework geology; tectonics and metallogeny; and the latest deposit concepts and exploration technologies.

Oral presentations require abstracts and a written paper that will be peer-reviewed and published in the Symposium Proceedings following the meeting. Poster presentations require abstracts and written papers are encouraged. Core shack presenters are welcome to submit abstracts and written papers, but are not required to do so.

Draft abstracts up to 500 words should be submitted no later than May 30, 2014. Written papers should be 2,000 to 20,000 words and include figures and tables. Draft manuscripts are due November 30, 2014.

Information for contributors is available on-line at: http://www.gsnv.org/2015-symposium/. Submit abstracts via e-mail at: munteanj@unr.edu and msmith@pilotgold.com.

GSN-SEG Forum
Sunday, May 17th, 2015

Topic:

Carlin-like Gold Deposits: What Can We Learn Beyond the Known Trends and Nevada

Technical Program
Monday-Thursday

May 18th- 21st, 2015

Focus Topics:

- Regional Geology and Metallogeny of the Great Basin
- Exploration Technology
- Case Histories of Discoveries and Exploration Update
- Intrusion-Related Cu-Au-Mo Deposits
- Northeastern Nevada: The New Frontier
- Advances in Carlin-type Gold Deposits
- Epithermal Deposits
- Diversification: Looking Beyond Gold, Copper and Silver

Questions? Contact us at:
http://www.gsnv.org/2015-symposium/ or email at mollymhunsaker@2015GSNsymposium.org

Meeting Co-Hosts

Field Trips
May 14th-16th and May 21st-23rd, 2015

Pre-meeting:

- Introduction of Carlin Gold Deposits
- Epithermal Deposits of Northern Nevada
- Mining for Non-Geologists: Exploration to Reclamation

Post-meeting:

- The Pequop Trend-Nevada's Newest "Carlin" Trend
- Epithermal Deposits of Central Nevada
- Porphyry-related Deposits of Nevada
- The Famous Comstock Gold and Silver District

Short Courses
May 14th -16th and May 21st-23rd, 2015

Topics to be Announced

Exhibits
An active exhibit hall will provide excellent industry exposure for your company or organization. Space will go fast for this popular venue, so **please reserve your booth early! Contact us at** exhibits@2015GSNsymposium.org for more information.

Sponsorship Opportunities
We invite you to join GSN as we continue the tradition of excellence in presentations, field trips, and short courses. Opportunities are available for Patronage sponsorships, along with specific events. Please visit the website: www.gsnv.org/symposium or e-mail us at: dshaddrick@aol.com

The **Geological Society of Nevada** (GSN) is a non-profit scientific society whose principal mission is to promote the advancement of the geological sciences, especially as they relate to Nevada. The Society encourages the dissemination of scientific and practical knowledge through semiformal presentations, field trips and symposia as well as by publishing the literature resulting from these activities.

WINNEMUCCA CHAPTER FEBRUARY SPONSOR

AMERICAN ASSAY laboratories

Thanks to AMERICAN ASSAY LABS for sponsoring the Winnemucca Chapter meeting in February!

ELKO CHAPTER FEBRUARY SPONSOR

MAJOR Drilling America, Inc.

Thanks to MAJOR DRILLING INC. for sponsoring the Elko Chapter meeting in February!

Your G.S.N. 2014 Membership Directory is in the mail!

If you weren't able to pick-up your 2014 directory in Nevada this month it is now on its way to you in the mail.

Thank You

A big thank-you to the Reno crew at SRK Consulting for hosting the GSN Directory Pick-up Party at the Great Basin Brewing, Co. in February! We had a big turnout and everyone had a great time!

srk consulting

The G.S.N. also thanks the folks at Mine Development Associates in Reno for again offering to hand out the GSN Directories to those in town who couldn't make it to the party. They make it convenient for members and save the GSN postage! Thank You MDA!

MINE DEVELOPMENT ASSOCIATES

Mark Your Calendar

When:
WEDNESDAY,
March 26, 2014
5:00 PM Judging Dinner
6:00 PM – 10:00 PM or
Until Finished Judging.

Where:
Lawlor Events Center
Mezzanine Level
and
Main Floor

Free Parking:
Floors 4 & 5 of
West Stadium Parking Complex

WESTERN NEVADA REGIONAL SCIENCE & ENGINEERING FAIR

2014 Western Nevada Regional Science & Engineering Fair
and
Lemelson Young Inventors Challenge

Help us judge the science projects or inventions. Basic science, technology and engineering background needed.
Visit our website: www.nevadasciencefair.net

If you are planning on assisting us, please RSVP to
George T. Ochs
HJudge@nevadasciencefair.net
OR
ochsg@charter.net

Register now for the G.S.N.'s Spring Field Trip coming up on Friday, May 2, to Sunday, May 4, 2014!

Jonathan Price, GSN V.P. and field trip leader has laid out a great itinerary for the 3-day trip. We will overnight in Lovelock, Nevada both nights. This trip will be a bit different as we will be riding in 4WD vehicles so we can visit places that a bus just can't get to. Bring your rock hammers and questions and join your fellow geologists on this one-of-a-kind adventure.

Registration form on page 9.

Geological Society of Nevada
Spring 2014 Field Trip Registration
Friday, May 2, to Sunday, May 4, 2014

"Humboldt Range, Majuba Hill, and Trinity Range (Au, Ag, Cu, Sn, W, Be, Hg, Sb, B)"

Friday, May 2nd: 8:00 a.m. – Depart from the GSN Office
Snack lunch provided
Day 1 - Oreana, Nevada Packard, & Nevada Quicksilver mines
6:00 p.m. - Dinner provided at the C Punch Ranch Inn in Lovelock, NV
Overnight at C Punch Ranch Inn (formerly Sturgeons)

Saturday, May 3rd: Breakfast on your own.
8:00 a.m. – Depart Lovelock
Day 2 - Majuba Hill and the Trinity Range
12:00 p.m. - Sack lunch provided.
6:00 p.m. - Dinner provided in Lovelock, NV
Overnight at C Punch Ranch Inn (formerly Sturgeons)

Sunday, May 4th: Breakfast on your own.
8:00 a.m. – Depart Lovelock
Day 3 - Lincoln Hill, Gold Ridge, Calcite-quartz vein wall, Willard mine, Willard Group (historical)
12:00 p.m. - Sack lunch provided.
5:00 p.m. - Return to Reno.

Sponsorship Opportunites for the SPRING 2014 Field Trip

Snacks/beer in the 4WD vehicles - $750; Saturday or Sunday Lunches - $650; Friday Dinner - $2,000. Saturday Dinner - $2,000. Friday or Saturday Evening Drinks - $750. Please call Laura at the GSN office 775-323-3500 or e-mail gsn@gnsv.org if you would like to be a sponsor. Each donor will be acknowledged on the field trip and in the field guidebook.

Payments must be made by April 18, 2014
No refunds after April 18, 2014

Name: _____

Phone: _____

Company: _____

Email: _____

Person to contact in case of Emergency:

Name: _____

Phone: _____

Lodging: ☐ Single ☐ Double ☐ No Room

Double Roommate: _____

MEMBER COSTS:

$260 - Double Room (2 nights)
$305 - Single Room (2 nights)
$155 - No Room in Lovelock
Students Double Room comped - limited space!

*NON-MEMBER COSTS:

$310 - Double Room (2 nights)
$355 - Single Room (2 nights)
$205 - No Room in Lovelock

*Non-members are encouraged to become members of the GSN for $50 annual dues in order to take advantage of the reduced rate.

Total amount included with this form: _____

Payment: ☐ Check # _____ ☐ Cash ☐ Visa ☐ Master Card

Card Number: _____ Exp. Date: _____ 3-digit security code: _____

Name (as it appears on card): _____

Return with payment to: Geological Society of Nevada
2175 Raggio Parkway, Room 107
Reno, NV 89512
Phone: (775) 323-3500, Fax: (775) 323-3599; E-mail: gsn@gsnv.org;

(Reprinted from Oregon State University—News and Research Communications, Feb. 17, 2014)

Volcanoes, including Mt. Hood, can go from dormant to active quickly

CORVALLIS, Ore. – A new study suggests that the magma sitting 4-5 kilometers beneath the surface of Oregon's Mount Hood has been stored in near-solid conditions for thousands of years, but that the time it takes to liquefy and potentially erupt is surprisingly short – perhaps as little as a couple of months.

The key, scientists say, is to elevate the temperature of the rock to more than 750 degrees Celsius, which can happen when hot magma from deep within the Earth's crust rises to the surface. It is the mixing of the two types of magma that triggered Mount Hood's last two eruptions – about 220 and 1,500 years ago, said Adam Kent, an Oregon State University geologist and co-author of the study.

Results of the research, which was funded by the National Science Foundation, were published this week in the journal Nature.

"If the temperature of the rock is too cold, the magma is like peanut butter in a refrigerator," Kent said. "It just isn't very mobile. For Mount Hood, the threshold seems to be about 750 degrees (C) – if it warms up just 50 to 75 degrees above that, it greatly increases the viscosity of the magma and makes it easier to mobilize."

Thus the scientists are interested in the temperature at which magma resides in the crust, they say, since it is likely to have important influence over the timing and types of eruptions that could occur. The hotter magma from down deep warms the cooler magma stored at 4-5 kilometers, making it possible for both magmas to mix and to be transported to the surface to eventually produce an eruption.

The good news, Kent said, is that Mount Hood's eruptions are not particularly violent. Instead of exploding, the magma tends to ooze out the top of the peak. A previous study by Kent and OSU postdoctoral researcher Alison Koleszar found that the mixing of the two magma sources – which have different compositions – is both a trigger to an eruption and a constraining factor on how violent it can be.

"What happens when they mix is what happens when you squeeze a tube of toothpaste in the middle," said Kent, a professor in OSU's College of Earth, Ocean, and Atmospheric Sciences. "A big glob kind of plops out the top, but in the case of Mount Hood – it doesn't blow the mountain to pieces."

The collaborative study between Oregon State and the University of California, Davis is important because little was known about the physical conditions of magma storage and what it takes to mobilize the magma. Kent and UC-Davis colleague Kari Cooper, also a co-author on the Nature article, set out to find if they could determine how long Mount Hood's magma chamber has been there, and in what condition.

When Mount Hood's magma first rose up through the crust into its present-day chamber, it cooled and formed crystals. The researchers were able to document the age of the crystals by the rate of decay of naturally occurring radioactive elements. However, the growth of the crystals is also dictated by temperature – if the rock is too cold, they don't grow as fast.

Thus the combination of the crystals' age and apparent growth rate provides a geologic fingerprint for determining the approximate threshold for making the near-solid rock viscous enough to cause an eruption. The diffusion rate of the element strontium, which is also sensitive to temperature, helped validate the findings.

"What we found was that the magma has been stored beneath Mount Hood for at least 20,000 years – and probably more like 100,000 years," Kent said. "And during the time it's been there, it's been in cold storage – like the peanut butter in the fridge – a minimum of 88 percent of the time, and likely more than 99 percent of the time."

In other words – even though hot magma from below can quickly mobilize the magma chamber at 4-5 kilometers below the surface, most of the time magma is held under conditions that make it difficult for it to erupt.

"What is encouraging from another standpoint is that modern technology should be able to detect when magma is beginning to liquefy, or mobilize," Kent said, "and that may give us warning of a potential eruption. Monitoring gases, utilizing seismic waves and studying ground deformation through GPS are a few of the techniques that could tell us that things are warming."

The researchers hope to apply these techniques to other, larger volcanoes to see if they can determine their potential for shifting from cold storage to potential eruption, a development that might bring scientists a step closer to being able to forecast volcanic activity.

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Upcoming Events

3-6 March, PDAC, Prospectors and Developers of Canada Convention, Toronto, Ontario, CANADA. Stop by the **GSN Booth #1611** and visit Laura Ruud while you are there (Tradeshow side)! Please go to their website for more information: http://www.pdac.ca/convention

4 March, Arizona Geological Society, Speaker: John Dreier, Golden, CO; Title: "Copper Deposits of the Coast Ranges of Chile; A trip through time, space, and ore deposit nomenclature". Sheraton Hotel,Oasis Room, 5151 E. Grant Rd., Tucson, AZ. Drinks @ 6 pm, Dinner @ 7 pm, Talk @ 8 pm. Reservations required by Feb. 1, 2013. For more information please go to: http://www.arizonageologicalsoc.org/

6 March, Nevada Petroleum & Geothermal Society, Reno, Nevada. Speaker: Patrick Walsh, Ormat Nevada, Reno NV. Topic: Steamboat Geothermal Complex. 6:30 PM, Ramada Reno Hotel; 1000 East 6th Street, Reno, NV. Contact Vicki Ehni for dinner reservations: vehni@aol.com

10 March, DREGS meeting, Speaker: Nancy Wolverson, Consulting Geologist. Title: "Awakening of the Sleeper Deposit". Colorado School of Mines, Golden, CO, Berthoud Hall Room 241. Social at 6 pm, Presentation at 7 pm. Please Visit the DREGS web site at http://www.dregs.org for more information.

27-28 March, Mining and Land Resources Institute (MALRI) Seminar to be held at the Peppermill, Reno, NV. You can register online at www.landman.org. Discount for early registration ends March 13, 2014.

NEVADA

Gold Standard Ventures Corp. announced that recent drill results at the North Bullion Project include 294.7-325.3 meters @ 2.47 gpt Au (RR13-14). *Press Release:* January 22

Nevada Sunrise Gold Corp.(22%) announced that recent drill results at the Kinsley Mountain Project include 7.6 meters @ 5.0 gpt Au (PK096C); 24.4 meters @ 2.5 gpt Au (PK104C) and 5.9 meters @ 6.34 gpt Au (PK106C). *Press Release:* January 13

Nevada Copper Corp. announced that its 24-feet diameter production shaft at the Pumpkin Hollow Project is now complete to a depth of 550 feet (planned 1,906 feet). (resource = 155,900,000 tonnes @ 0.59% Cu, 0.10 gpt Au measured) *Press Release:* January 14

Miranda Gold Corp. announced that Montezuma Mines Inc. failed to make a scheduled lease payment to Red Canyon Corp. regarding the Red Canyon Property so Miranda made the required payment. Miranda therefore filed a "notice of Default" letter to Montezuma. *Press Release:* January 15

Midway Gold Corp. announced that construction of the Pan Mine is now in progress. The mine is planned to produce 81,000 ounces/year of gold at a capital cost of $99,000,000. (reserve = 48,311,000 tonnes @ 0.56 gpt Au proven+probable) *Press Release:* January 15

Americas Bullion Royalty Corp. announced that it acquired a 1.5% NSR on the Adelaide Property and a 1.5% NSR on the Tuscarora Property from Wolfpack Gold; a 3.0% NSR on the Atlanta Property from Meadow Bay Gold; a 3.0% NSR on the Windfall Hills, B.C. property from Canarc Resources and a 0.5% NSR on the Celeste, Chile Property from Coro Mining for $120,000. (resource @ Atlanta = 15,500,000 tonnes @ 1.27 gpt Au measured+indicated) *Press Release:* January 3

Corvus Gold Inc. announced that recent drill results at the North Bullfrog Project include 116.9-124.5 meters @ 4.9 gpt Au, 57.9 gpt Ag (NB13-362); 67.0-70.1 meters @ 3.25 gpt Au, 11.5 gpt Ag (NB13-363); 68.7-79.7 meters @ 7.11 gpt Au, 21.0 gpt Ag (NB13-347) and 150.9-166.1 meters @ 3.19 gpt Au, 30.1 gpt Ag (NB13-369). (resource = 15,230,000 tonnes @ 0.37 gpt Au indicated) *Press Release:* January 22

West Kirkland Mining Inc. announced that it acquired an option to purchase a 100% interest in the Hasbrouck and Three Hills properties from Allied Nevada Gold Corp. for $30,000,000 cash over 6 months. (resource @ Hasbrouck = 116,900,000 tonnes @ 0.31 gpt Au, 7.8 gpt Ag inferred; @ Three Hills = 5,214,000 tonnes @ 0.78 gpt Au indicated+inferred) *Press Release:* January 27

NEVADA BUREAU OF MINES & GEOLOGY JOB ANNOUNCEMENT

ASSISTANT PROFESSOR
Economic Geology

The Nevada Bureau of Mines and Geology (NBMG) at the University of Nevada, Reno seeks applicants for a tenure-track faculty position focused on hydrothermal mineral deposits. NBMG is a research and public service unit of the University of Nevada, Reno (UNR) and the state geological survey. Managed as part of the Mackay School of Earth Sciences and Engineering in the College of Science at UNR, NBMG functions as an academic unit, and its principal scientists are tenure-track faculty members. Nevada is one of the most exciting regions in the world to do research in the geosciences and the best in the U.S. for the study of hydrothermal mineral deposits.

Interested applicants must have a doctorate in geology or a related geoscience field by the time of hire and a demonstrated record of research on topics related to hydrothermal mineral deposits as indicated by dissertation research or peer-reviewed publications. Excellent communication skills, as demonstrated in written application materials; commitment to public service; potential for, or established record of publications; and ability to attract funding are essential. Doctoral research must include one or more of the following disciplines: economic geology, structural geology, igneous petrology, and geochemistry.

Additional preferred qualifications include: 1) industrial or academic experience in hydrothermal minerals deposits, particularly in field-based studies in a variety of geological settings; 2) expertise in structural geology, geologic mapping, and active hydrothermal systems (geothermal activity); 3) research productivity with publications in the peer-reviewed literature; 4) achievable plans for funded research on Nevada-focused topics in economic geology and geothermal energy, as described in the applicant's letter of interest; and 5) both an understanding of and interest in contributing to the role of a state geological survey on issues related to mineral deposits and other resources, beyond basic scientific research.

Position responsibilities and expectations include: 1) working independently as well as collaborating with NBMG faculty-staff, faculty in other geoscience units at UNR and UNLV, and others in industry and government in developing funded projects and conducting research; 2) contributing to the development of datasets and reports on Nevada's mineral and energy resources, including resource assessments; 3) communicating effectively with the public and community leaders regarding the geology of Nevada and its mineral and energy resources; 4) focusing research on mineral deposits in Nevada; and 5) supervising graduate students and teaching undergraduate and graduate classes.

The position will be a tenure-track faculty appointment with an academic-year base salary that is competitive with other research universities. Starting date will be July 1, 2014 or shortly thereafter, depending on availability of the successful candidate.

To apply, please visit: https://www.unrsearch.com/postings/13967. Please complete the online application and upload a letter expressing your interest in the position and research plans; a complete vita; contact information (names, e-mail and postal addresses, and telephone numbers) for at least three references; and electronic copies of up to three of your publications. Additionally, applicants must submit examples of geologic mapping related to mineral deposits that they have conducted with their application materials. To ensure full consideration, all information must be submitted by **March 24, 2014**. For further information about NBMG, please consult our website (http://www.nbmg.unr.edu).

Equal Employment Opportunity/Affirmative Action. Women and underrepresented groups are encouraged to apply.

If you have any questions, please contact John Muntean, who is serving as the Chair of the Search Committee (munteanj@unr.edu).

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