

# GEOLOGICAL SOCIETY OF NEVADA NEWSLETTER

Geological Society of Nevada, PO Box 13375, Reno, NV 89507 (775) 323-3500  
Office Location: Laxalt Mineral Research Center, Room 266, UNR Hours Monday - Friday 8-3  
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[gsn@gsnv.org](mailto:gsn@gsnv.org)

## CALENDAR OF GSN EVENTS

**Feb. 11**

**Wednesday**

### WINNEMUCCA CHAPTER *(Every 2nd Wednesday of the month)*

The monthly meeting will be held at the Martin Hotel, 94 West Railroad Street. Drinks and appetizers at 6:30 PM, speaker at 7:00 PM. Sponsor for the evening will be Drift Exploration Drilling. Speaker for the evening will be Jim Saunders, Professor of Geology, Auburn University, AL. His talk will be titled "Geomicrobiological Controls on the Geochemistry of Metals and Sulfur". (see abstract on page 8). For more information contact John Marma at (775) 635-6472.

**Feb. 19**

**Thursday**

### ELKO CHAPTER *(Every 3rd Thursday of the month)*

The monthly meeting will be held at the Western Folk Life Center, 501 Railroad Street. Refreshments at 5:00 PM, Dinner at 6:00 PM, talk at 7:00 PM beginning at 6:00 PM, speaker at 7:00 PM. Sponsor for the evening to be announced. Speaker for the evening will be Rick Redfern, Mexivada. His talk will be titled "Where is the Big Gold in the Archaean in Africa?" For more information contact Moira Smith at (775) 934-2987.

**Feb. 20**

**Friday**

### GSN MEMBERSHIP MEETING *(Every 3rd Friday of the month)*

The monthly meeting will be held at the Reno Elks Lodge, 597 Kumle Lane, Reno, NV. Drinks at 6:00 PM, dinner at 7:00 PM, and talk at 8:00 PM. Sponsor for the evening will be The Harris Drilling Companies. Student speakers for the evening will be Jessica L. Smith, Daniel M. Sturmer, and Lucia M. Patterson, students at University of Nevada, Reno. Presentation titles and abstracts can be found on pages 3 and 6. Dinner reservations must be made by 1:00 PM Wednesday, February 18th. Contact Kathy Sestanovich at (775) 323-3500 or e-mail [gsn@gsnv.org](mailto:gsn@gsnv.org) for reservations.

**Feb. 26**

**Thursday**

### SOUTHERN NEVADA CHAPTER *(The last Thursday of the month)*

The monthly meeting will be held at 6:45 PM. Speaker for the evening will be John Muntean of the Nevada Bureau of Mines and Geology. His talk will be titled "Exploration for Carlin-type Deposits in a Mature Terrain: Maintaining Nevada's Gold Rush". Sponsor for the evening will be Nick Saines of Saines Environmental Hydrogeology. For more information contact Josh Bonde at (702) 468-2500.

## FROM THE PRESIDENT

Marcus Johnston, *GSN President 2008-2009*

Will winter ever arrive in our great state? In the few weeks since Christmas, I have spent time in Reno, Winnemucca, and Elko, and been in shorts at least part of the time in each location! The weather has been great for continuing with field programs, except at higher elevations where the few snowfalls we have had still maintain footholds in the shadowy canyons and north-facing slopes. However, we could certainly use a lot more moisture, as rain or snow. Otherwise, look forward to another summer season under an orange sun shining down through brown smoky skies as we endure our quasi-annual fire season.

Since last Newsletter, gold and silver prices have remained relatively stable. Base metal prices, although relatively low still, appear to have hit bottom, and at least some are back on the rise. Some of us have experienced the normal cutbacks in our work programs, and layoffs still continue (e.g. Teck-Cominco), but the frequency of bad news has certainly slowed. I, for one, will never understand how mining companies seem to view the people

## GSN FEBRUARY MEETING SPONSOR

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(Continued on page 2)



# News and Announcements

(Continued from page 1)

responsible for their very existence (i.e. geologists who find, define, and expand their resources and reserves, and improve the potential of profits through ongoing ore-control, mapping, modeling, and reconciliation activities) as some of the most expendable experts in their various cadres. All due apologies to other professionals and support staff (including engineers, computer scientists, office managers, etc.) for my opinion, which certainly does NOT necessarily reflect the opinion of the GSN in general, but having personally endured six significant layoff periods in the last eight years, I do not think I am out-of-line by expressing the frustration (and even anger) felt by a significant portion of our membership right now.

Okay, a sip of a favorite red and a deep-breath... and... better! As with the Christmas Party, enthusiasm dominated the mood at the January meeting. Gold still looks like a star in 2009, and silver will certainly follow in gold's wake. Segue to the January talk by Don Hudson, which detailed the latest understanding of the complicated geological history of the Comstock Lode, which remains one of the greatest historic gold-silver mining camps in Nevada. In coincidence with the 150<sup>th</sup> anniversary of the discovery of the lode, Don provided new details on the styles and timing of alteration and mineralization along the Comstock and adjacent Occidental Lodes, as well as other veins in the district. Fifteen decades after its discovery, we are still adding to the story of the Comstock.

February brings the last best chance for great snows and/or rains in Nevada, which will contribute to greener pastures in April and May. Speaking of green, the February meeting will feature short presentations from three students from UNR. Please join us on the 20<sup>th</sup> as we catch up with some of the current research and young geologists working on answering questions that will enhance our future understandings of Nevada geology and ore deposits in general. Nancy Wolverson is the latest 'Face' of GSN, which means that the few of you who don't already know her get to meet a consummate professional who is also the driving force behind the GSN 2010 Symposium.

Stay safe, and good luck to all.

Marcus

## THANK YOU! MEMBERSHIP SUPPORT OF THE FOUNDATION IS OVERWHELMING

To the membership and friends of GSN, thank you again for the continual support of the Geological Society of Nevada Foundation. Contributions in conjunction with 2008-2009 membership renewal totaled slightly more than \$11,000. Additionally, we raised about \$12,500 at the Christmas auction events. These funds will be used to build the endowment and to support our programs.

Roger C. Steininger  
Chair, GSN Foundation

## UPCOMING EVENTS

- Feb. 6 Mackay Geology Seminars** at 3:00 PM in Room 353, Laxalt Mineral Research Building University of Nevada, Reno. Speaker is **Joseph Colgan**, USGS, Menlo Park, talk is titled "**Cenozoic Tectonics of North-Central Nevada: Implications for the Formation and Structural Disruption of World-Class Mineral Deposits**"
- Feb, 13 Mackay Geology Seminars** at 3:00 PM in Room 353, Laxalt Mineral Research Building University of Nevada, Reno. Speaker is **David A. Johnson**, Bronco Creek Exploration, Inc., "**Jurassic Copper-Iron Deposits of Nevada**"
- June 27 Golf Tournament (Lakeridge Golf Course)** - Hosted by Inspectorate America Corporation. Tee time will be at 1:00 PM and dinner will be at 6:00 PM. More information will be provided in the March newsletter.

# Thank you to our generous

## GSN FOUNDATION

**GOLD LEVEL DONORS \$500+**

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Charles Weakly

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## STUDENT DINNER FUND

Robert H. Lambeth  
Kim H. Roberts  
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James V. Taranik  
Charles Weakly

**Thanks to Envirotech Drilling LLC  
for hosting the January meeting**

# *GSN January 16, 2009 Membership Meeting*

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**Date:** Friday, February 20, 2009

**Location:** Elks Lodge, 597 Kumle Lane, Reno, NV

**Time:** Social-6:00, Dinner-7:00 (\$17.00), Meeting-8:00

**Directions:** Across (W) from the Reno-Sparks Convention Center (S. Virginia Street, behind the Les Schwab Tire Center)

**Reservations:** Phone: (775) 323-3500, Fax: (775) 323-3599,  
E-mail: gsn@gsnv.org

**Speaker:** Jessica L. Smith, Daniel M. Sturmer,  
and Lucia M. Patterson

**Deadline:** Reservations by 1:00 PM Wednesday, February 18th

See abstracts below:

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## **STUDENT PRESENTATIONS**

### **New Models for Mineral Exploration in British Columbia: Is there a Continuum between Porphyry Molybdenum and Intrusion-Hosted Gold Deposits?**

**Jessica L. Smith and Greg B. Arehart**  
University of Nevada - Reno

The Adanac porphyry molybdenum deposit, located in northwest British Columbia, Canada, has experienced little academic research despite 40 years of exploration drilling. This study aims to classify Adanac within the spectrum of molybdenite deposits. Whole rock geochemistry studies of the host pluton indicate highly evolved, high-silica, alkalic granites, with low FeO contents and high K<sub>2</sub>O values. The average Rb/Sr ratio is 7. Anomalous Mo, W, and F occur as stacked concentrations in cupolas over the porphyry intrusions. Alteration patterns include proximal silicification and potassic (K feldspar) alteration, intermediate and overlapping quartz-sericite-pyrite assemblages, and distal propylitic alteration characterized by chlorite. Re-Os dates from molybdenite indicate at least two episodes of mineralization at 70.9 to 69.7 Ma, and also confirm some of the lowest Re concentrations known in molybdenite samples. Seven phases of the host pluton were analyzed for U-Pb zircon age dates, with results suggesting magmatism occurred from 82.7 to 76.5 Ma. Adanac is best classified as a Climax-type, alkalic porphyry molybdenum deposit.

A secondary and more regional-scale goal of the study is to determine whether the same hydrothermal system that produced the molybdenite deposit may be responsible for gold-bearing quartz veins that occur within a kilometer of the deposit, and gold-bearing placers from two creeks that drain the area of the porphyry deposit. Historically, it has been assumed that gold in the area was derived from quartz-carbonate-bearing shear zones in Permian metasedimentary rocks and greenstones. A comparison of initial Os isotope ratios of placer gold and minerals from the molybdenite-bearing hydrothermal system is in progress. Similarities in these ratios may indicate a common origin.

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### **Maximizing carbon sequestration and minimizing product volume by modeling rock-CO<sub>2</sub>(g) reaction with mafic rocks from Nevada**

**Daniel M. Sturmer,**  
University of Nevada – Reno

**Jonathan G. Price,**  
Nevada Bureau of Mines and Geology

**and Regina N. Tempel**  
University of Nevada - Reno

Mineral carbonation is a process whereby carbon dioxide reacts with minerals or rocks to store the carbon permanently in synthetic minerals. The amount of carbon sequestered generally increases with Mg and Fe content in a rock, thereby focusing most mineral carbonation studies on ultramafic rocks. Ultramafic rocks are rare in Nevada, but mafic volcanic and plutonic rocks are abundant. Thus, the purpose of this study is to model the rock-CO<sub>2</sub>(g) ex-situ reaction for Nevada mafic rocks at various temperatures using the EQ3/6 reaction path code. Preliminary work has tested the sensitivity of the carbonation reaction to changes in reaction temperature and the basalt geochemical composition.

This study used initial model conditions set by O'Connor et al. (2002) for wet mineral carbonation of forsterite. In each model a solution containing sodium, chloride, and bicarbonate ions was reacted with one kg of basalt and CO<sub>2</sub> (fugacity fixed at 150 bars) assuming arbitrary kinetics. Major and minor oxide geochemical data from the major basalt domains in Nevada were obtained from published literature. CIPW norms calculated from these data served as input basalt mineralogies. Models were run from 0 to 200°C at 25°C intervals for each basalt.

Mafic rock-CO<sub>2</sub> reactions maximized carbon sequestration at 25-50°C, but were fairly insensitive to temperature below 100°C. At these temperatures, most of the basalts captured 6-8 moles of carbon per kg of basalt reacted. However, low-temperature mafic rock-CO<sub>2</sub> reactions resulted in 3-5 times as much product volume as high-temperature reactions. In the models, carbon was sequestered in four phases: siderite, magnesite, dolomite, and dawsonite (below 150°C). Dawsonite has a much larger molar volume than other product minerals, resulting in the increased product volume with lower reaction temperature. At temperatures ≥150°C albite precipitated instead of dawsonite and the carbon that would have gone into dawsonite remains CO<sub>2</sub>. *(Continued on page 6)*

# **FACES OF GSN**

*Nancy J. Wolverson, Reno, Nevada  
Consulting Geologist*

Since first moving to Reno in 1979, I have been a loyal member of the Geological Society of Nevada, which remains a constant source of timely technical information, and also of community. Last year, I decided it was time to give back to the organization that has kept me informed and connected to the Nevada mining community for three decades, no matter where in the world I happened to be working. As many GSN members may already know, I volunteered to be Chairman for the GSN 2010 Symposium. Joined by a dedicated group of volunteers, we plan to present another high-quality Symposium in May, 2010.

I earned my B.S. in Geology from Eastern Washington University in 1978. Our Field Camp in the Muddy Mountains of southern Nevada introduced me to the geology, climate, and people (or lack thereof) of the Great Basin of Nevada. I looked for a job in Reno after graduation, and moved here in 1979 to work for Bendix on the National Uranium Resource Evaluation (NURE) program.

Following the dramatic decline of the uranium price in 1980, I began working in gold exploration and started post-graduate studies at the Mackay School of Mines. With the support of Dome Mines and Amax Inc., I completed my M.S. in Geology. My thesis focused on a gold prospect in the Palmetto Mountains, south of Silver Peak, Nevada. I then continued doing grass-roots exploration in Nevada, with Keradamex/Minnova. My exploration area focused primarily on volcanic- and sediment-hosted gold and silver deposits in the Walker Lane and adjacent parts of central Nevada.

In 1989, I took a job with Amax Gold, Inc. evaluating and generating U.S. gold properties for acquisition. During this time, I also managed the geologic evaluation of the Pre-Feasibility Study on the Bodie Property, California. Amax transferred me to the Denver office in 1991 to continue U.S. acquisitions and some international project work (Guanaco, Chile). Soon after the acquisition of the Haile Project, I moved to South Carolina to manage that exploration program. After the completion of the Pre-Feasibility study at Haile, in 1994, Cyprus bought Amax Gold and I decided to resign and expand my experience into other countries and geologic environments.

In 1995 I took a position with a consulting group and spent several months in Kyrgyzstan evaluating precious metal properties for a Kyrgyz company. The area I worked in the Tien Shen Mountains was very similar in geology and metallogeny to Nevada. A few months of working on geologic interpretations of coal deposits convinced me to return to precious metals exploration and I decided to begin working as an independent consulting geologist. Over the next couple of years I consulted for several junior mining companies. My work included six months conducting exploration at the Refugio Mine, Chile; during the El Nino winter of 1997, six months in Ecuador evaluating properties in Nambija and Macuchi; and property evaluation in the Fresnillo District, Mexico.

During the downturn in the mining industry in the late 1990s and early 2000s, I completed an MBA at the University of Missouri, St. Louis, while caring for my aging parents. I was able to focus most of my class work and independent study projects on aspects of the mining industry, which made it more interesting than simply learning finance, accounting, marketing, and production.

In 2005, I returned to Nevada, and have since been consulting for several junior exploration companies. I am currently exploring for tabular and roll front uranium deposits in the Colorado Plateau of Utah and Colorado. Over the last few years, uranium exploration has also taken me to New Mexico and back here to Nevada. Additionally, I continue to be involved in precious metals exploration and evaluation in Nevada and Utah.



*Nancy Wolverson Underground at Troy Canyon, Nye County, Nevada*

## GSN MEMBERS' PERSONAL NOTES & NEWS

### Ed Lawrence

#### Honorary Lifetime Member of GSN

Edmond Francis Lawrence, age 90, died Sunday, January 4, 2009, in Spanish Fort, AL. He was born in Bessemer, AL. He lived in Reno for many years, working for the Nevada Bureau of Mines and all over the State of Nevada and internationally for over 40 years as a consulting geologist. In his later years he returned to his native Alabama. He is survived by his wife, Phyllis M. Lawrence of Spanish Fort, his daughter, Mary Lawrence Mieth of Sacramento, California, his step-daughter, Connie Cotton (Stan) of Daphne, Alabama, grandchildren Ashley West of Atlanta, Ga. and Layne West (Susan) of Charleston, S.C., two great-grandchildren, Reagan Olivia West, Drake Alexander West of Charleston, SC, a sister Evalyn Gladden of Brandon, FL, and 8 nieces and nephews.

Ed received his B.S. in geology from the University of Alabama, a M.S. from the University of California - Los Angeles and a PhD from the University of California - Riverside. His career as a consulting mining, exploration, and engineering geologist took him all over the world, but Nevada held his heart. He taught geology at Purdue, University of California at the Davis, Riverside and Santa Barbara campuses, as well as the University of Alabama. He was a member of The Geological Society of America for 50 years and was selected as an Honorary Lifetime member of The Geological Society of Nevada. He also was a quite active member of the SME-AIME in various states.

Geology was not just a profession but his passion. He delighted in sharing his knowledge of and collection of "rocks" with school children, universities around the world and anyone who was interested. Ed was widely published and his Nevada Bureau of Mines and Geology Bulletin 61, Antimony Deposits of Nevada, has been a widely used reference work aiding modern exploration for gold.

He also was a member of Rotary International participating in chapters in Reno, Nevada; Hot Springs, AR; Birmingham and Spanish Fort/Daphne, AL where he was a Paul Harris Fellow. Ed had a great love for wild flowers and plants as well as the earth itself. While living in Birmingham, he spent many hours working at The Birmingham Botanical Gardens creating the Sunny Bog and Upland Meadow Garden which was named for him. In conjunction with the Spanish Fort/Daphne Rotary Club, he worked with Daphne Middle School staff developing a butterfly garden.

A memorial service was held near Dr. Lawrence's home on Thursday, January 8, 2009. Another memorial service is being planned that will be held at the Birmingham Botanical Gardens in the spring. For further information, contact his daughter, Mary Mieth.

Ed was a man of stories. He collected them and created them as he lived his life with energy, vitality, great compassion for others and an all-abiding sense of adventure. Mary is collecting what Ed referred to as "shaggy Lawrence" stories. If you have any to share, please contact her at 916-921-2097 or [marymieth@gmail.com](mailto:marymieth@gmail.com) or Doug McGibbon at [doug\\_mcgibbon@yahoo.com](mailto:doug_mcgibbon@yahoo.com)

### Michael Geary

Michael Lee Geary, 61, passed away on January 12, 2009 after a lengthy illness. He was the only child of Retired USN Captain Mervyn Otis and Bette Marie Geary and was born April 8, 1947 in Walnut Creek, CA.

Michael served his country as a Marine and was a Vietnam veteran. He moved to Reno in January 1975 to attend the University of Nevada, Reno and went on to become a geologist. Throughout his career he worked for several Nevada mining companies and eventually owned his own reclamation firm. He once claimed to have touched every single inch of Nevada and made many friends in his travels. He was an avid golfer and traveler and enjoyed hanging out with friends and co-workers in his spare time.

He is survived by his three children, Christina (Mike) Carver, Joshua (Missy) and Megan (Ed) Hill and seven grandchildren. He was preceded in death by his parents.

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## W.M. Keck Earth Science and Mineral Engineering Museum

### For Educators

The W.M. Keck Museums is available for tours from all K-12 schools and also community groups. We generally work with the Nevada Seismological Laboratory to provide tours that enhance earth science standards-based lesson plans and activities.

The tour generally takes 45 minutes, but can be expanded or reduced depending on grade or interest level. Some of the highlights of the tour are:

- Introduction to Rocks and Minerals
- Scavenger Hunt for Minerals
- Fossils
- Introduction to the Mackay Statue
- Mackay Family Silver
- Mining History

To schedule a tour either call the museum at (775) 784-4528 or sign up online: [http://www.mines.unr.edu/museum/schedule\\_form.html](http://www.mines.unr.edu/museum/schedule_form.html)

**New:** Mineral and rock activities that can be used in the classroom or at home. <http://www.mines.unr.edu/museum/activity.htm>

### Hours and Tour Information

The museum is open Monday - Friday from 9:00 a.m. to 4:00 p.m., closed weekends and University holidays. Parking is available near the information booth located at the Center Street entrance to the University or in the parking garage north of the Mackay School of Mines building.

### Admission is free

The museum is open to the public for self-guided tours Monday - Friday from 9:00 a.m. to 4:00 p.m. If you would like to schedule a group tour or arrange for an after-hours tour, call the museum office at (775) 784-4528.

# HISTORIC NEVADA SANBORN MAPS

Now available online at the DeLaMare library

516 full-color Sanborn maps of 28 Nevada towns are now available on the historic Nevada in Maps site:  
<http://www.delamare.unr.edu/maps/digitalcollections/nvmaps/sanborns>

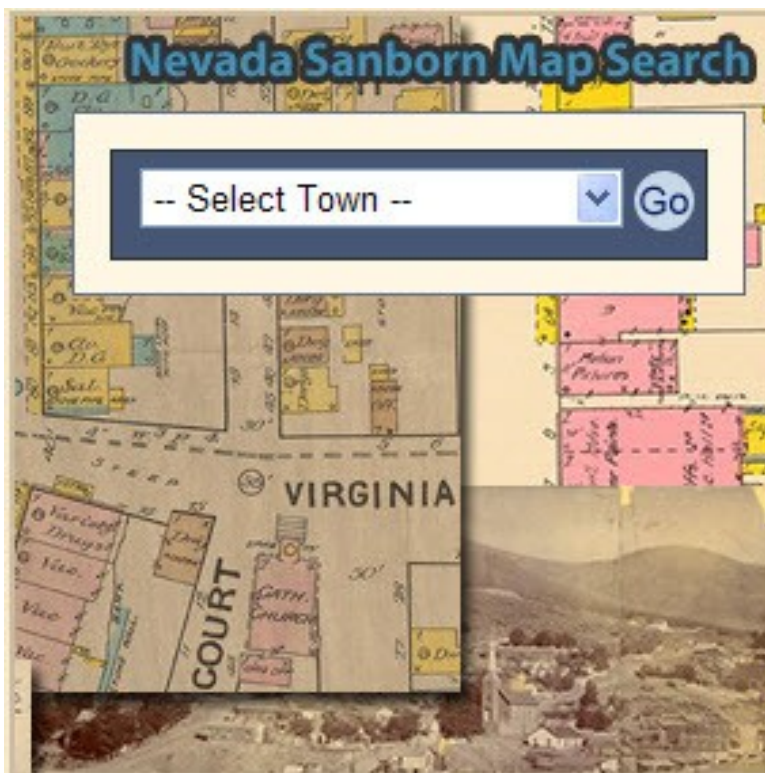
This set includes all identified Sanborn maps of Nevada between 1879 through 1923. These town maps are often the only cartographic documentation of early Nevada towns and reflect the western settlement history of this state, often based on the mining industry. The colors on the map are significant, not specifically for esthetic reasons but because they indicate the nature of the building [frame, brick, stone, etc.] and are an indication of the development of towns in Nevada. The nature of many businesses as well as proprietary names are abundant on these detailed maps.

The presentation explains the nature of these maps and demonstrates the use of historic photos in coordination with the maps. Most maps are fully viewable with JPEG, TIFF and Djvu file versions, in addition to the JPEG2000 default display .

The INVENTORY [on the web site] of all identified Nevada Sanborn maps lists the libraries [within NV and other institutions] who own Sanborn maps and type of map [original, microfilm, online.] Sanborn maps have been available in black and white microfilm in various libraries in NV as indicated in the Inventory. The University of Nevada, Reno also subscribes to an online edition [based on the black & white microfilm] available to Nevada affiliated patrons or from within a university library.

No location owns a complete set of Nevada Sanborn maps in any combination of formats but this online edition offers the first and most complete full-color set available to all via the web. The Nevada in Maps site also presents other historic series <http://www.delamare.unr.edu/maps/digitalcollections/nvmaps/search.html>

Linda Newman, Geoscience & Map Librarian, project director  
Glee Willis, Digital Projects Librarian  
Vicki Toy-Smith, Metadata Librarian  
Justin Blum, Web Development Librarian



*(Continued from page 3)*

## STUDENT PRESENTATIONS

**Hydrothermal Footprints of Carlin-type Gold Deposits at the District Scale:  
Jerritt Canyon Mining District, Elko County, Nevada**

**Lucia M. Patterson  
The Ralph J. Roberts Center for Research in Economic Geology,  
University of Nevada - Reno**

The Jerritt Canyon district, located in northeastern Nevada, hosts several Carlin-type deposits and has produced over 7 million ounces of gold to date. In 2000, Anglo Gold collected a data set consisting of multi-element analyses from 6,416 drill holes, from one stratigraphic interval at the bottom 5 feet of the Roberts Mountains Formation, directly above the Saval Discontinuity in the Jerritt Canyon district. This data set eliminates the effect that different lithologies may have on a hydrothermal footprint. Yukon-Nevada Gold also supplied their data set, which consists of previously logged geology from the Anglo Gold data set. A sub-set of holes were re-logged to document and obtain data on the Saval discontinuity, and to generate maps depicting patterns of alteration, veining, mineralization, carbonate isotopes, and clay distribution with respect to known mineralization. The geochemical data set was analyzed visually and statistically to document associations between gold and other elements. This presentation will detail some of the results of these analyses.

**\*\*\*\*SAVE THE DATE\*\*\*\***  
**GEOLOGICAL SOCIETY OF NEVADA 2010 SYMPOSIUM**  
**MAY 14-22, 2010**

**\*\*Preliminary Program\*\***

**Technical Sessions**

- Geology and Tectonics of the Great Basin
- Regional Metallogeny and Mineral Belts
- Rumors from the Bush—Great Basin Exploration Update
- Styles of Tertiary Magmatism and Metallogenesis
- New Mine Development
- Intrusion Related Deposits
- The Walker Lane—Geology and Ore Deposits
- Volcanic Hosted Precious Metal Deposits
- Active and Recent Gold Systems
- Controversies in Great Basin Geology
- Geothermal Resources
- Molybdenum and Tungsten Exploration—Americas
- New Exploration Technologies
- Student Research
- Case Histories of Discoveries
- Environmental/Regulatory Issues



2010 SYMPOSIUM  
May 14 - 22

John Ascuaga's Nugget Hotel and  
Casino  
Reno-Sparks, Nevada

**Short Courses**

- SEG Forum—Gold Deposits in the Great Basin
- Structural Systematics
- Epithermal Deposits
- Fundamentals of Canadian NI 43-101
- Porphyry Copper Deposits
- Molybdenum Deposits
- Getting the Most from your Data
- Isotopes and Exploration
- Remote Sensing

**KEYNOTE SPEAKERS:**

William R. Dickinson  
Jonathan G. Price

**Field Trips**

**Pre-Meeting**

- Introduction to Carlin Deposits
- Epithermal Deposits, Northern Nevada
- Porphyry Related Deposits of Eastern Nevada
- Industrial Deposits

**Post-Meeting**

- Introduction to Carlin Deposits
- Recent Advances in Carlin Type Deposits
- Epithermal Deposits of Central Nevada
- Porphyry Related Deposits of Western Nevada
- Modern and Ancient Geothermal Systems

**CO-HOSTS**



**Questions?**

- Website [www.gsnv.org/symposium](http://www.gsnv.org/symposium)  
 General Information [symposium2010@gsnv.org](mailto:symposium2010@gsnv.org)  
 Technical Sessions [technicalsessions@gsnv.org](mailto:technicalsessions@gsnv.org)  
 Short Courses [shortcourses@gsnv.org](mailto:shortcourses@gsnv.org)  
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**CO-HOSTS**



# GSN Winnemucca Chapter Meeting February 18, 2009

## “Geomicrobiological Controls on the Geochemistry of Metals and Sulfur”

By: Jim Saunders  
Professor of Geology  
Auburn University, AL

Biobleaching of “refractory” pyrite-rich gold ores is used on some Carlin-type ores in Nevada, and no doubt other ore types elsewhere. In this process, bacteria are catalyzing (making it happen much faster) a chemical reaction that is thermodynamically (energetically) possible. Similar bacteria are the main source of Fe-sulfide oxidation and acid mine/rock drainage formation. I have spent a part of my 30+ year career studying the geochemical effects of anaerobic sulfate-reducing bacteria (SRB) in groundwater, as agents for bioremediating metal(loid)-contaminated groundwater, their role in low-T in sulfide mineral formation, in sediment-hosted mineral deposit formation (e.g., S, Zn+Pb, U), and most recently, in “secondary” gold nugget formation. Further, it is becoming increasingly apparent that bacteria are involved in karst geology and cave formation, which might have been the precursor process to MVT ore deposition in places like east Tennessee district. Similarly, bacteria are forming coal-bed (and shales as well!) methane, in the Warrior Basin of Alabama and elsewhere. The common thread to these seemingly disparate processes is that natural bacteria are opportunistic, hardy, facilitate some useful geochemical and ore-deposit formation processes (and some not so useful processes like AMD), can tolerate extreme temperature and salinity conditions along with what would seem to be toxic levels of heavy metals and even organic contaminants. It is the speed and the scale of their activity which comes as a surprise to us geoscientists, who are used to thinking in terms of millions of years and slow processes. We have been researching what causes natural arsenic pollution of groundwater that millions of people are drinking in SE Asia, and it is a class of bacteria that can reductively dissolve Fe-oxyhydroxides that cause that problem. But other bacteria come to the rescue perhaps! We are stimulating SRB to remove As in Bangladesh by getting them to form Fe-sulfides that can adsorb As from groundwater under reducing conditions. So perhaps a brave new world awaits us in the future, where bacteria can be made to mine ores as well as help in their metal extraction, and also mitigate contamination of, and clean up, water resources. Unfortunately, current higher education lacks the requisite structure to teach students the needed scientific information in this area.

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## ACTIVITY UPDATE

Mike Brady, October 2008

[www.activityupdate.com](http://www.activityupdate.com)

### NEVADA

Desert Gold Ventures Inc. announced that it now has spent \$5,000,000 on exploration at the Goldbanks Project thereby earning it a 50% interest in the property from Kinross Gold Corp. *Press Release:* December 1

Desert Gold Ventures Inc.(50%) announced that recent drill results at the Goldbanks Project include 485-505 feet @ 0.627 opt Au (G211); 570.3-577.7 feet @ 0.837 opt Au (KDV04); 715-725 feet @ 1.265 opt Au (K606) and 455-485 feet @ 0.627 opt Au (KW19). (resource = 28,450,000 tons @ 0.020 opt Au inferred) *Press Release:* December 16

Firstgold Corp. announced that it now is loading crushed ore onto the leach pads at the Relief Canyon Mine. (resource = 12,930,000 tons @ 0.033 opt Au inferred) *Press Release:* December 16

Fronteer Development Group Inc.(49%) announced that recent drill results at the Sandman Project include 17.07-43.26 meters @ 0.075 opt Au, 0.51 opt Ag (NSM-04); 25.24-46.49 meters @ 0.054 opt Au, 0.45 opt Ag (NSM-05); 11.49-29.85 meters @ 0.045 opt Au, 0.66 opt Ag (NSM-06) and 15.3-37.68 meters @ 0.034 opt Au, 0.49 opt Ag (NSM-07). (resource = 1,710,000 tons @ 0.048 opt Au measured) *Press Release:* December 8

Victoria Gold Corp. announced that recent drill results at the Cove/Helen Zone Project include 413.6-421.2 meters @ 0.033 opt Au (NW-13a); 425.8-456.3 meters @ 0.068 opt Au (NW-13a); 566.1-601.7 meters @ 0.347 opt Au (NE-13a) and 610.8-640.4 meters @ 0.491 opt Au (NW-13a). *Press Release:* December 11

Golden Predator Mines Inc. announced that it received a Water Pollution Control and Reclamation Permit from the state for the Springer Project. (total resource = 3,350,000 tons @ 0.458% WO3) *Press Release:* December 9

Golden Predator Mines Inc. announced that it would reorganize its mining assets into two companies; Golden Predator Mines Inc. to hold the precious metal properties and Emerging Metals Corp. to hold the remainder. *Press Release:* December 19

Newmont Mining Corp. announced that it acquired an option to earn a 100% interest in the Buena Vista Property from Gryphon Gold Corp. for \$20,000/year payments. *Press Release:* December 9

Kinross Gold Corp. announced that it acquired 12,500,000 shares (to hold 34.4%) of Victoria Gold Corp. for \$2,125,000. *Press Release:* December 19

Antler Peak Gold Inc. announced that it acquired an option to purchase a 100% interest in the Esmeralda Property from Metallic Ventures Gold Inc. for \$2,000,000 and by assuming the reclamation liabilities. (resource = 192,100 tons @ 0.410 opt Au inferred) *Press Release:* December 16

Molycor Gold Corp. announced that recent drill results at the Davis Project include 87.42-91.65 meters @ 0.102 opt Au (DM08-01); 64.22-66.26 meters @ 0.104 opt Au (DM08-02); 26-29.96 meters @ 0.105 opt Au (DM08-03) and 114.39-115.15 meters @ 0.110 opt Au (DM08-04). *Press Release:* November 24

Rye Patch Gold Corp. announced that recent drill results at the Wilco/North Basin Project include 83.8-91.4 meters @ 0.011 opt Au (WR-87); 97.5-117.3 meters @ 0.020 opt Au (WR-87) and 350.5-388.6 meters @ 0.076 opt Au (WR-87). (resource = 8,091,000 tons @ 0.018 opt Au measured) *Press Release:* November 25

Silver Standard Resources Inc. announced that recent drill results at the Maverick Springs Project include 675-830 feet @ 1.9 opt Ag, 0.007 opt Au (MR-181); 745-925 feet @ 8.1 opt Ag, 0.009 opt Au (MR-182); 645-740 feet @ 2.8 opt Ag, 0.022 opt Au (MR-183) and 725-765 feet @ 3.0 opt Ag, 0.011 opt Au (MR-184). (resource = 30,000,000 tons @ 0.020 opt Au inferred) *Press Release:* December 11

Staccato Gold Resources Ltd. announced that it terminated its interest in the Cobb Creek, Long Peak and Dixie Flats properties. *Press Release:* December 5

Western Uranium Corp. announced that recent drill results at the Kings Valley Project include 84.1-114.9 meters @ 0.206% U3O8 (KV-63). (resource = 2,978,000 tons @ 0.081% U3O8 inferred) *Press Release:* December 22

Boart Longyear Ltd. announced that it acquired Eklund Drilling Co. for undisclosed terms. *Press Release:* November 1



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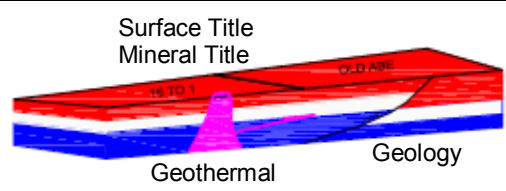
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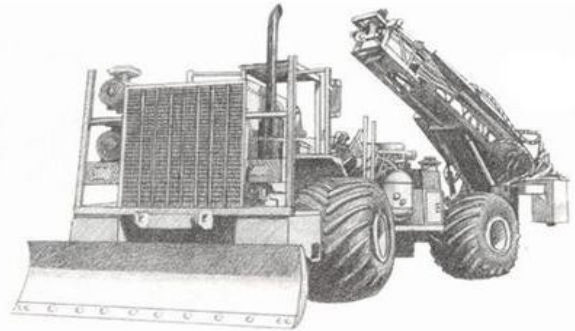


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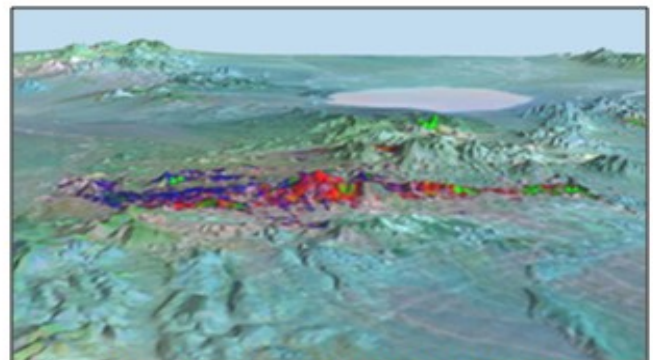


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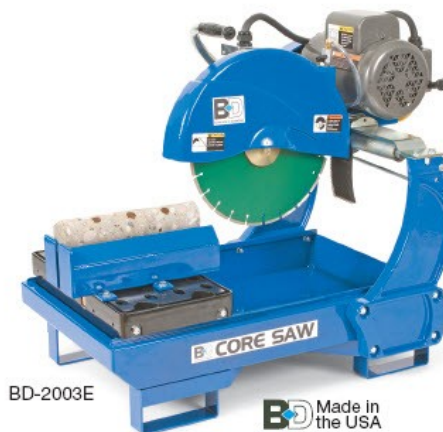
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