

# 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](http://www.gsnv.org) • E-mail: [gsn@gsnv.org](mailto:gsn@gsnv.org)



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## CALENDAR OF GSN EVENTS

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Sept 3, 2014  
Wednesday

### 12TH ANNUAL "SILVER" SUMMER SERIES BBQ

**Guest Speaker: Leigh Freeman, Downing Teal. Title: "Enigmas, Critical Thinking and the Future of Mining"**, at Dan Kappes's home, 13045 Welcome Way, Reno, NV. 6:00 pm Drinks, 6:30 pm Potluck BBQ, 7:00 pm informal talk. **Sponsors for the evening are Kappes Cassidy & Associates, Mine Development Associates and CGS Mule.** BBQ meat and drinks will be provided. Please bring a side dish, salad or dessert to share! Also bring your own lawn chair. RSVP to Laura Ruud, [gsn@gsnv.org](mailto:gsn@gsnv.org) or 775-323-3500. Details on page 3.

Sept. 4, 2014  
Thursday

### SO. NEVADA CHAPTER MEETING (every 1st Thursday of the month)

The monthly meeting will be held at the Las Vegas Natural History Museum at 900 Las Vegas Blvd. N., Las Vegas, NV. Begins at 5:30 p.m. **Speaker: Joshua Bonde, UNLV. Title: "Paleogeography and Uplift History of the Sevier Retroarc Hinterland: What say the critters?"** Please contact Josh Bonde for more information [Joshua.bonde@unlv.edu](mailto:Joshua.bonde@unlv.edu). Details and abstract on page 7.

Sept 10, 2014  
Wednesday

### WINNEMUCCA CHAPTER MEETING (every 2nd Wednesday of the month)

The monthly meeting will be held at the Martin Hotel, 94 W. Railroad St., Winnemucca, NV. Refreshments at 6 pm, Appetizers at 6:30 pm, Talk at 7:00 pm. **Speaker: Warren Thompson, Premier Gold Mines Ltd. "Cove Gold Project, Lander County, Nevada – An Exploration Update, September 2014". Food & Drinks Sponsored by REDCOR DRILLING.** Please contact Pat Donovan at [pat.donovan@newmont.com](mailto:pat.donovan@newmont.com) for more information. Details & abstract on page 8.

Sept 18, 2014  
Thursday

### ELKO CHAPTER MEETING (every 3rd Thursday of the month)

The monthly meeting will be held at the Western Folklife Center, 501 Railroad St., Elko, NV. Refreshments/appetizers at 6 pm, Talk at 7 pm. **Speaker: Jim Faulds, State Geologist, NBMG. Title: "Favorable Structural Settings of Active Geothermal Systems in the Great Basin Region: Implications for Fluid Flow, Normal Faulting Mechanics, and Geothermal and Epithermal Mineral Exploration". Food & Drinks Sponsored by COEUR PRODUCTS.** For more info. please contact Jon Powell, [Jon.powell@newmont.com](mailto:Jon.powell@newmont.com). Details and abstract on page 9.

Sept 19, 2014  
Friday

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

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: Mark Cloos, University of Texas. Title: "Origin of the Supergiant Grasberg Porphyry Cu+Au Orebody in Papua, Indonesia (west New Guinea)". Sponsor for the evening is: BOART LONGYEAR.** Please contact Laura Ruud for dinner reservations [gsn@gsnv.org](mailto:gsn@gsnv.org). Details and abstract on pg. 3.

## G.S.N. SEPTEMBER MEETING SPONSOR



# BOART LONGYEAR™

## ***FROM THE PRESIDENT—Some Great Talks at GSN This Year*** ***Jon Price, G.S.N. President 2014-2015***

This month's talk by Mark Cloos about Grasberg, one of the world's giant copper-gold deposits, will be exciting. Mark is a stimulating and enthusiastic speaker. I had the pleasure of visiting Grasberg and Ertsberg over 20 years ago, when the pit was in its early stages. Jeff Rubin, a graduate student at the University of Texas at Austin, had asked me to serve on his dissertation committee, and I couldn't miss the chance to see the deposits. High rainfall, topographic relief, and lack of pre-development infrastructure and labor force complicated development of the mines. Realizing that the haul-truck drivers, who may not be able to see a geo in the pit when the fog rolls in, hadn't operated a piece of machinery more complicated than a bow-and-arrow six months before their training opened my eyes to operations in remote parts of the world. Fortunately there are still world-class ore deposits to be found in Nevada, where we can boast that we don't have such hazards as massive mudslides, malaria, crocodiles, ebola, cobras, grizzly bears, polar bears, desert death adders, or flying and driving thousands of kilometers to the nearest casino.



Photos of the Grasberg pit, January 1993.

Mark will be followed by a series of great speakers:

October 17 – James E. Faulds, NBMG – *Current Activities of the Nevada Bureau of Mines and Geology: Working toward a safer and enhanced economic future for Nevada* (first half); followed by: *Favorable Structural Settings of Active Geothermal Systems in the Great Basin Region: Implications for Crustal Fluid Flow and Geothermal and Epithermal Mineral Exploration* (second half)

November 21 – Stephen G. Peters, USGS, Reno – *Results of Three Recent Missions to the REE-, U-, F-, and P-bearing Khanneshin Carbonatite in Southern Helmand Province, Afghanistan*

December 17 – George Davis, Univ. of Arizona – on *The Beauty of the Geology of the Colorado Plateau*

January 16 - Paul Hohbach, Coeur, on silver deposits in the western US

February 20 – Alan Koenig, USGS, Denver – *Where the Trace Elements in Ore Deposits Live - Applications of a New Elemental Analysis Technique.*

March 20 –UNR-Department of Geological Sciences and Engineering Faculty – *A Sampling of Geoscience Research at UNR*

April 17 – likely UNR student posters and 5-minute presentations (TBD)

May 14-24, GSN 2015 Symposium.

The final GSN summer event, the "Silver" Summer Series Bar-B-Q on September 3<sup>rd</sup> (honoring either Doug Silver, the Comstock Lode and the Silver State, or the Lone Ranger's horse), should live up to the Silver Standard. Leigh Freeman has given us an intriguing subject for his presentation on Dan Kappes' back porch: "Enigmas, Critical Thinking and the Future of Mining."

### **CALL FOR VOLUNTEERS**

GSN needs help preserving its old records, particularly past minutes of the executive committees, financial records, and newsletters. We recently began off-site (cloud) backup of the digital files (everything on the GSN office computer), which covers much of the recent information, but we figure sorting through the paper files and selecting those to preserve is a two-week (80-hour) job. As a GSN member, if you are able to help with this volunteer task, please let me (jprice@unr.edu) or Laura Ruud (gsn@gsnv.org) know.

If you haven't already volunteered for a task during or leading up to the Great GSN 2015 Symposium this coming May, please contact Molly Hunsaker (mollymhunsaker@aol.com) or Don Harris (Donald.Harris@AlliedNevada.com).

Finally, if you are interested in serving GSN as an officer and Executive Committee member, please let Tommy Thompson (ThompsonTommyt@aol.com), who chairs the Nominating Committee, know. Officers include the President, Vice President/President-Elect, Secretary, Treasurer, Membership Chair, and Publications Chair. Many thanks!

# *GSN September 3, 2014 "Silver" Summer Series BBQ*

## **12th Annual "Silver" Summer Series BBQ with Guest Speaker:**

**Leigh Freeman, General Manager, Downing Teal Inc.**

**Title: "Enigmas, Critical Thinking and the Future of Mining"**

**Date/Time: Wednesday, September 3rd—Drinks @ 6:00 pm, BBQ/Potluck Dinner @ 6:30 pm, Talk @ 7:00 pm**

**Where: Dan Kappes's Home, 13045 Welcome Way, Reno, Nevada**

**DIRECTIONS TO DAN'S HOUSE (Please Carpool if you CAN!):**

Take U.S. 395 to Damonte Ranch Exit. Head west on Arrow Creek Parkway, turn right (north) on Thomas Creek Rd. Turn right on Welcome Way at the 4-way stop sign. Dan's house is downhill from the corner, the first house on the left (except for the corner house) 13045 Welcome Way. Call if you get lost – Dan's Cell phone is: 775-848-1981 and home phone: 775-622-1117.

**Things to Bring Along: A Side Dish or Dessert to share and a Lawn Chair!**

**Leigh Freeman Biography:** BS Geological Engineering, Montana Tech of The University of Montana in Butte, Montana. Over the course of his eclectic career he has served in technical, managerial and executive positions with junior and senior mining and service companies. Mr. Freeman is General Manager and Principal in Downing Teal Inc, a global recruiting company serving the natural resource industries. He serves on the industry advisory board for a number of mining programs in the Western US. He is also involved with the National Academy of Sciences and National Academy of Engineers working on critical mining issues.

## *GSN SEPTEMBER 19, 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](mailto:gsn@gsnv.org) by 4 p.m. on WEDNESDAY, SEPT. 17, 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)

## **Origin of the Supergiant Grasberg Porphyry Cu+Au Orebody in Papua, Indonesia (west New Guinea)**

**CLOOS, Mark, Department of Geological Sciences, Jackson School of Geosciences,  
University of Texas at Austin, Austin, TX, USA 78712**

ABSTRACT:

The Ertsberg Mining District is located in the highlands of west New Guinea, an island long recognized as the product of a Cenozoic arc-continent collision. Geologic studies in the Central Ranges of the Papua Province of Indonesia (near Puncak Jaya, 4884 m) have revealed timing relationships, which combined with mechanical considerations, led to a re-fined model for the tectono-magmatic effects of collisional orogenesis and the formation of the spectacular Grasberg porphyry-type Cu-Au deposit. Northwards dipping subduction of the oceanic end of the Australian plate began prior to 20 Ma at a Mariana-type subduction zone. The top of the accretionary/pre-collision complex became widely emergent at ~12 Ma. Underthrusting of thick Australian crust-capped plate caused collisional jamming at ~8 Ma as evident from the detachment and southward displacement (10-20 km) of the basement-cored Mapenduma anticline. (cont. on page 6)

# “FACES OF GSN”

## Roger C. Steininger Ph.D., Chair GSN Foundation

The original request for this article suggested that I include some pictures. After a lengthy consideration (about 2.8 seconds) I concluded that would be like those obituaries that include a high school graduation picture of the recently departed. Who would recognize me as a young geologist, or care? Consequently, only one recent photograph is included, and even that might be excessive.

### The roots of Roger the geologist

I matured, well maybe, in Detroit which was a hotbed for developing geologists, which explains my lack of interest in glacial geology. Our family home was on a moraine, drumlin, esker, or one of those gravel filled features. The question often asked of me, as I suspect many of you, is what caused my interest in geology? To be truthful, I have no clue. Of course that is only one item on the long list that I don't have a clue about. Maybe the iron ore ships that we raced on the Detroit River when I was rowing crew, maybe the Cranbrook Institute museum's mineral collection, or more likely trips west with my parents where I saw real rocks. After attending far too many universities I finally found one that would grant me a Ph.D., which they have been trying to recall ever since. It was at Colorado State University where my friend Tommy Thompson was a faculty member and my advisor that I completed my formal education in 1986.

### Outside interests, yes I have a life beyond geology

My non-geological interests are varied, with family at the top of the list. LuAnne and I have been together for almost 50 years, officially 48 last May. We have a son, daughter-in-law and grandson in Reno, and a daughter and grandson in Albuquerque.

Having always been interested in American history, during one of our industry's downturns, I took several history classes at UNR. This resulted in my joining the Nevada Historical Society, and starting work on a family history. The Historical Society has a large collection of mining related periodicals and newspaper articles which have never been indexed. I have taken on the indexing project which should keep me occupied the remainder of my life, and then some. For those interested in Nevada mining districts this might be a good place to start your research. The Civil War has always been a fascination for me and while working on my family history I discovered that my great grandfather Otto fought with the 187<sup>th</sup> Pennsylvania Volunteers at Cold Harbor and Petersburg. On a recent trip to Petersburg tracing Otto's footsteps I no sooner got out of the car when I was accosted by a lady (I think) who wanted to know if I was a "Confederate or Yankee"? They are still fighting the war there. My interest in history has also lead to serving on the board and as treasurer of the Historic Reno Preservation Society. If you have an interest in the area's history you might check out HRPS as there are monthly talks on local history that are open to the public.

The Boy Scouts of America has always been important in my life, having been involved in scouting as a youth, a Scoutmaster for my son's troop, and just recently spending a week at Philmont, the national Boy Scout ranch in New Mexico. Philmont has a program for geologists to volunteer to spend a week teaching geology. The week was spent at the French Henry historic mining area teaching gold panning and leading tours of an underground gold mine. This was one of the more rewarding weeks of my life.

As many of you know I have been writing the Exploration Review column in the SEG Newsletter for many years, next year will make the total 20. Although not trying to take the place of the "One Eyed Prospector" it has been a pleasure taking groups to task over outrageous public comments and questionable actions. This is becoming harder in recent years as our industry has contracted and the regulators have become more restrictive as to what can be publically released.

GSN is an important part of my professional life. Over the years I held several offices, helped edit a couple of the GSN Symposium volumes, and produced a history of the Society. What I am most proud of is serving as Chair of the GSN Foundation during a period when we built our endowment to over a half million dollars while distributing over \$35,000 yearly to support various education programs.

Finally, I continue my involvement at Colorado State by serving on the Dean's Advisory Council for the (Cont. on page 5)

(Steininger, cont. from page 4)

Warner College of Natural Resources. LuAnne and I have also endowed a scholarship in Economic Geology at CSU.

### My Career

I have had several extremely fortunate opportunities that have greatly enhanced my career, starting with my first “permanent” employment. Stewart Wallace, one of the giants of geology, hired and mentored me for a position at the Climax Molybdenum mine. This was early in the development of the geological understanding of the Climax-type molybdenum deposits which put me in a position to contribute to that understanding while being associated with an extremely talented group of geologists. Working at a large mine taught me how to look at mineral deposits from the outside in, and vice versa, an approach that I have carried with me and extended to other types of mineral deposits. After four years at the mine I was transfer to Golden, CO to conduct molybdenum exploration in Colorado and eventually project development in Canada. During that period I had the opportunity to evaluate, and in many cases, work on most every major molybdenum deposit in North America. That gray stuff (molybdenite) still flows through my veins.

My career took another favorable turn although it didn't seem so at the time. About 1980 the molybdenum market took a drastic downturn and I could see the handwriting on the wall. A move to Reno and joining Amselco resulted in my being involved in the initial stages of the great Nevada gold rush. I learned a lot about Nevada gold deposits in those early years, an education that served me well throughout my career. In 1987 I followed another dream and I started a consulting practice that continues today. The fun part of this opportunity was the association with several successful companies and being part of a few discoveries.

In 2009 I had a bright idea that the time was right to start a Nevada orientated exploration company so I called a financial associate. My thought was that he would float the idea past a few investors and get back to me. Instead he called having organized the seed money and NuLegacy Gold was born, which went public in 2010. We are now exploring the Iceberg gold deposit in the northern Simpson Park Range.

### Looking Back

As I approach the end of my professional career this article caused me to reflect on my life as a geologist and what I have learned. My first exposure to Nevada was my master's thesis in the Kinsley mining district where I learned to love Nevada and was determined to live here one day. Now that I am here, becoming part of a vibrant geological community has been a reward I had not expected, but one that has become very important in my life. Many of my close friends have come from my association with GSN and the Nevada mining community. I can also attest to having met a lot of “characters” in this business which I also treasure. Spending a lot of time in the field is the best graduate school I have ever attended.

As I transition to a less active professional life I look forward to continuing my volunteer activities and probably devoting more time to them. I also want to do some writing about aspects of our profession. And of course, work more aggressively on lowering my golf handicap.



Roger and his buddies Aiden and Rylan at Disneyland.

***Thanks to ALS MINERALS AND BOART LONGYEAR  
For Hosting the Winnemucca & Elko Chapters' August BBQs!***

(Cloos Abstract, cont. from page 3)

Subterranean plate rifting between 8 to 3 Ma generated magma by adiabatic decompression melting of asthenosphere upwelling into the gap along with varied amounts of melting in the extended lithospheric continental mantle.

Near the Ertzberg District, intrusions into the strata forming km-scale folds were mostly small dikes and plugs emplaced between 4.4-2.6 Ma. Most of these plutons are distinctly potassic ranging from medium to high K trachyandesites to trachytes with a groundmass rich in orthoclase. The Grasberg Igneous Complex (GIC) was emplaced between left-lateral strike-slip faults that trend subparallel to the regional structural grain of folded strata.

The Grasberg Cu-Au orebody, an extraordinary porphyry copper-type system ( $\sim 2 \times 10^9$  tons of ore grading at 1 wt.% Cu and 1 g/t Au), was formed at  $\sim 3.0$  Ma. The GIC is a cone-shaped body tapering from  $\sim 1800$  m diameter at surface elevation of  $\sim 4000$  m to  $\sim 800$  m diameter at a depth of 1 km. The GIC is the upper part of a low-relief, maar-type, caldera complex that had three distinct magmatic pulses. Deep-seated ( $> 6$  km depth) bubbling along the walls of a stock charged the cupola at the top with copper-rich fluids. Concurrent strike-slip fault movements created extension fractures that episodically tapped and discharged the ore-forming fluids. Where strike-slip fault offsets cause pull-apart movements to occur with sufficient recurrence (decades to perhaps a century or so), the episodic draining of a fluid accumulation acts as a safety valve. This "throttling of the cupola" prevents the accumulation of fluid to the point that the system would detonate explosively. Giant deposits, such as the Grasberg system, formed where the bubbling front extended from the stock into an underlying batholithic chamber with a magma volume on the order of  $1000 \text{ km}^3$  and the top is at depths of 10 to 15 km.



**BIOGRAPHY:** Mark Cloos is a Professor in the Department of Geological Sciences at the University of Texas at Austin. He received his B.S. in Geology from the University of Illinois at Urbana-Champaign in 1976 and a Ph.D. from the University of California, Los Angeles in 1981. His teaching career at the University of Texas began in 1981 and centers on courses in structural geology and tectonics. His research interests focus on the geologic evolution of convergent plate margins on which he co-developed the subduction channel model that accounts for the great diversity of margin behavior from highly accretionary to tectonically erosive. Major field projects are underway in the California Coast Ranges and the highlands of west New Guinea, with numerous publications concerning accretionary subduction, arc-continent collisional tectonism, and porphyry copper orebody formation.



# Geological Society of Nevada



## Southern Nevada Chapter Meeting

**DON'T MISS OUR NEXT MEETING !!**

GSN is proud to present a talk by Dr. Joshua Bonde

## Title Paleogeography and Uplift History of the Sevier Retroarc Hinterland: What Say the Critters?



**Abstract:** Paleogeographic studies of the Sevier retroarc hinterland have not typically focused on vertebrate paleontology. Our study focuses on two Sevier-related units of east-central Nevada, the Lower Cretaceous Newark Canyon Formation (NCF) and the Upper Cretaceous-Eocene Sheep Pass Formation (SPF). The NCF is interpreted by previous researchers to represent deposits of a piggy-back basin. We report new evidence for a diverse vertebrate fauna in the NCF, including freshwater sharks, gar, turtles, crocodiles, and dinosaurs. Of particular significance are the geographically sensitive, smaller taxa such as turtles. The turtle genus *Glyptops* is found in the NCF as well as in the coeval Cedar Mountain Formation (CMF) of the Sevier foreland, suggesting there were no significant biogeographic boundaries between the two regions. The presence of sharks, also common in the CMF, strengthens the argument for biotic exchange. Finally, crocodylians have very constrained ecological requirements of humidity and temperature and their presence in the NCF further suggests the Sevier hinterland had not attained broad, regional uplift by the end of the Early Cretaceous. Although common sediment gravity-flow deposits suggest a topographically complex region, the organisms argue against significant elevational disparity between hinterland and foreland depocenters. The Sheep Pass Formation is interpreted as a synconvergent, extensional, carbonate lake basin. The SPF does not record a diverse vertebrate fauna, however the taphonomy of preserved frogs indicates cool lacustrine conditions. The frogs are commonly preserved fully articulated. For a frog carcass to sink without bloat and subsequent disarticulation, water temperatures must be low to inhibit respiration of gas-producing bacteria. The interpretation of a cool lacustrine environment is substantiated by previous work on the mollusk assemblage and the occurrence of ginkgo leaves. Thus the most parsimonious explanation for a temperate lake during a period of global climactic optimum is regional tectonic uplift. The paleontological record suggests that regional uplift of the Nevada plains was entirely a Late Cretaceous event potentially reaching its zenith by the Maastrichtian.

The Meeting will be **September 4th at 5:30pm** at the Las Vegas Natural History Museum (900 Las Vegas Blvd N.)

Free Food and refreshments.

**ALL ARE WELCOME!**

For more information contact Josh Bonde ([Joshua.Bonde@unlv.edu](mailto:Joshua.Bonde@unlv.edu))

# **G.S.N. WINNEMUCCA CHAPTER SEPTEMBER MEETING**

**Wednesday, September 10, 2014**

**The Martin Hotel, 94 W. Railroad Street, Winnemucca, Nevada**

**6:00 p.m. - Refreshments; 6:30 p.m. Appetizers; 7:00 p.m.—Talk begins**

**FOOD & DRINK SPONSOR: REDCOR DRILLING**



## **Cove Gold Project, Lander County, Nevada**

### **Exploration Update, September 2014**

**By Warren Thompson, Premier Gold Mines USA, September Winnemucca Chapter GSN**

#### **Abstract**

The Cove Gold Project is located along the prolific Battle Mountain/Eureka gold trend in the Fish Creek Mountains, approximately 35 miles south of Battle Mountain, Lander County, Nevada.

Echo Bay Mines, Ltd. conducted mining at McCoy Cove from 1987 to 2001, producing 3.3 million ounces of gold and >110 million ounces of silver from skarn, polymetallic sulfide veins and Carlin style carbonate replacement deposits. In 2003, Newmont acquired the mining claims and actively began closure reclamation while conducting very limited exploration drilling. Victoria Resources (US) Inc. (Victoria) entered into an exploration lease agreement with Newmont in 2006; subsequently in 2007, renewed exploration drilling northwest along the Cove anticline redefined Echo Bay's Beta Zone as the deeper Helen Zone. In June 2012, Premier Gold Mines USA (Premier) purchased the entire Victoria claim position at Cove and continued surface exploration drilling. Premier facilitated a different exploration philosophy visualizing a stratabound mineralization host over a structural intersection "plunge tube" host. In August of 2014, Premier entered into an agreement with Newmont to purchase 100% of the entire McCoy Cove 31,000 acre land package. This purchase will allow the entire McCoy Cove district to be explored exclusively by Premier exploration staff.

The mineralization at the Cove Gold Project is hosted in Triassic carbonate and siliciclastic sedimentary rocks that define an overlap sequence deposited over the Late Permian Golconda Allochthon. Late Mesozoic compressive stresses formed NW-striking, low-amplitude thrust fault propagation folding and NS-, NNE-, and NW-striking, deep-seated, normal fault structures. Granodiorite was intruded to the south of the project area during the Jurassic. Continued intrusive activity occurred in the Middle to Late Eocene, using the existing structural fabric to emplace the Brown stock. Long-lived, pulsing, porphyry-style, igneous and coeval hydrothermal activity in the Cove area gave rise to proximal economic gold skarns, gold/silver base metal veins, and more distal Carlin-type, disseminated, carbonate replacement gold deposits. Post-gold mineralization igneous activity in the area includes Oligocene felsic welded ash-flow tuffs, culminating with more recent spatter cones localized over the basin-bounding range-front faults.

Recent exploration drilling by Premier has led to discovery of the 2201 zone that is hosted within the Dixie Valley conglomerate beneath the Cove pit. The 2201 zone is similar to the polymetallic sulfide veins that produced gold and silver from the Cove pit. The gold and silver within the 2201 zone is hosted both in a stratabound sense within dolomitic sandstone and in high-grade quartz+VG+polymetallic sulfide veins that appear to be smaller imbricate thrust faults refracting upward from the Cove thrust.

With the acquisition of the entire McCoy Cove gold/silver system, Premier now has a trident of known deposit types for which to explore within the district: skarn, distal disseminated polymetallic sulfide, and distal Carlin style carbonate replacement. The potential for deeper porphyry-related deposit types can be anticipated as Premier consolidates and further understands the complexities of the district.



# **G.S.N. ELKO CHAPTER SEPTEMBER MEETING**

**THURSDAY, SEPTEMBER 18, 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: Coeur Products**



**SPEAKER: James Faulds, State Geologist & NBMG Director**

**TITLE: "Favorable Structural Settings of Active Geothermal Systems in the Great Basin Region: Implications for Fluid Flow, Normal Faulting Mechanics, and Geothermal and Epithermal Mineral Exploration"**

## **ABSTRACT:**

### **FAVORABLE STRUCTURAL SETTINGS OF ACTIVE GEOTHERMAL SYSTEMS IN THE GREAT BASIN REGION: IMPLICATIONS FOR FLUID FLOW, NORMAL FAULTING MECHANICS, AND GEOTHERMAL AND EPITHERMAL MINERAL EXPLORATION**

**James E. Faulds**

Nevada Bureau of Mines and Geology, University of Nevada, Reno, NV 89557, [jfaulds@unr.edu](mailto:jfaulds@unr.edu)

Active amagmatic geothermal systems of the Great Basin, USA are used to generate electricity and have temperatures overlapping formation of some epithermal mineral deposits (up to and >200°C). We recently completed an inventory of structural settings of known geothermal systems (426 total) in the extensional Great Basin region. Of ~250 categorized fields, step-overs or relay ramps in normal fault zones are the most favorable setting, hosting ~32% of the systems. Such areas have overlapping fault strands, increased fracture density, and thus enhanced permeability. Other common settings include a) normal fault tips (25%), where horse-tailing generates closely-spaced faults and increased permeability; b) fault intersections (22%), where multiple minor faults typically connect major faults and fluids can flow readily through highly fractured, dilational quadrants; and c) accommodation zones (9%), where oppositely dipping normal fault systems intermesh in belts of multiple fault tips and intersections. 3D modeling indicates subvertical conduits of high fracture density in these settings. The primary segments of major faults only host ~1% of the geothermal fields. Quaternary faults lie within or near most fields.

The paucity of geothermal systems along primary fault segments may result from reduced permeability in thick clay gouge and periodic stress release in major earthquakes. Step-overs, terminations, intersections, and accommodation zones represent critically stressed areas, where fluid pathways more likely remain open in breccia-dominated fracture networks. Because stress is not relieved by major earthquakes, abundant microseismicity characterizes fault interaction areas, which precludes pervasive healing of fractures and thus facilitates fluid flow. Increased pore-pressure may also provide a positive feedback mechanism that promotes more frequent but lesser magnitude earthquakes. The association of some young (<5 Ma) epithermal mineral deposits in normal fault footwalls (e.g. Florida Canyon, Wind Mountain, and Hycroft-Lewis) with active geothermal systems in the hanging walls suggests recurrent activity and/or longevity for some hydrothermal systems. These data are relevant to understanding the mechanics of normal faulting and in guiding both geothermal and mineral exploration.

## G.S.N. BABY ANNOUNCEMENT!!

Happy and healthy baby girl Harper Kay Key was born on July 25th, 2014 at 6:53 am, weighing in at 7 lbs. 2 ozs. to Thomas and Erica Key. The parents, both geologists in Elko, are overjoyed and only moderately sleep deprived. CONGRATULATIONS!



## NEWS FROM THE GEOLOGICAL SOCIETY OF NEVADA FOUNDATION

### GSN-UNR SCHOLARSHIPS

Two scholarships have been awarded this year from the GSN Endowment.

The two recipients are Kimberly N. Banathy a junior from Fernley and Brandon Patrick Rasmussen a sophomore from Reno. Both are majoring in geology.

Roger C. Steininger  
Chair-GSN Foundation



## **2nd Annual Great Basin Rendezvous Friday through Sunday morning, September 26-28, 2014**

A gathering of Great Basin geologists, their families, and friends for a weekend of geology, friendship, great food and libation. Come join your fellow geologists and their families to Camp Lamoille in the beautiful Ruby Mountains of Elko County.

**Hosted by: Nevada Mineral Exploration Coalition, Great Basin Rendezvous 2014 Committee**  
(Warren Thompson, Dave Shaddrick and our contributors)

**Special guest John Tyson, Nevada Journalist, will entertain Saturday Night**

[View More Information About the Event](#)

[Registrar Form Online Here](#) or, send an email to [jnewbury.consulting@yahoo.com](mailto:jnewbury.consulting@yahoo.com)

### Saturday Activities:

- **Dr. Chris Henry** - Detachment faulting of the Ruby Mtn. Metamorphic Core Complex from Angle Lake campsite
- **Dr. Mike McFarlane** - Pleistocene Glacial Geology of the Ruby Mountains
- Driving tour around Ruby Mountains to Harrison Pass and Ruby Marshes

### Food/Beverage Contributors:

Redcor—All beverages  
National—Friday Beef BBQ  
Enviroscientists, Inc.—Saturday Breakfast  
Envirotech Drilling—Saturday Pig Roast

### Rent/Expenses Contributors:

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Chris Henry  
Eric and Laura Ruud

## **GSN SUMMER BBQS HELD IN ELKO AND WINNEMUCCA**

As tradition goes the GSN does not hold lectures during the summer months. That doesn't mean that GSN members don't get together though! The Elko Chapter's officers organized BBQs in June, July and August this summer in the backyard of the Duncan Little Creek Gallery backyard. The BBQs were generously sponsored by AMEC, Enviroscientists, Inc. and ALS Minerals. These "meetings" are a great chance for the geo-community to get together, eat some great food, drink some beer and have a relaxing evening outside. Thanks to the Officers and the generous sponsors who made these events fun and memorable!

The GSN Winnemucca Chapter's officers also organized a BBQ this summer. Held on August 14th, the group of about 60 GSN members gathered at Vesco Park to enjoy a fabulous rib dinner catered by the Martin Hotel and co-sponsored by ALS Minerals and Boart Longyear. Again it was a nice, relaxing get-together with good conversation and old friends taking a break from their busy schedules to hang out.



Mary Stollenwerk and Laura Ellis of ALS Minerals (assisted by officers Juan Contreras and Emily Sudholt) hand out raffle prizes to participants at the Winnemucca Chapter BBQ. In this photo Kim Craig is the lucky winner of a beer mug!



Part of the ALS Minerals BBQ crew at the Elko Chapter BBQ on August 21st. Laura Ellis, Melissa Boerst, Dan Smith and Mary Stollenwerk were having a good time

**THANK YOU TO THE WINNEMUCCA CHAPTER  
AUGUST 2014 SUMMER BBQ SPONSOR**



**THANK YOU TO THE ELKO CHAPTER  
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**Thanks to  
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ELKO Chapter BBQ in JUNE!**

**Thanks to  
ENVIROSCIENTISTS, INC.  
for sponsoring the  
Elko Chapter BBQ in JULY!**

# Activity Update

Mike Brady, July 2014

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

## NEVADA

Pilot Gold Inc.(78%) announced that recent drill results at the Kinsley Mountain Project include 274.9-313.0 meters @ 5.59 gpt Au (PK158C); 360.3-390.8 meters @ 3.81 gpt Au (PK141C) and 292.9-305.4 meters @ 8.35 gpt Au (PK151C). *Press Release:* July 10

Ely Gold and Minerals Inc. announced that it acquired an option to earn a 100% interest in the Cathedral Well Property from Eurasian Minerals Inc. for \$100,000 over 3 years. *Press Release:* July 7

Gold Standard Ventures Corp. announced that recent drill results at the Railroad-Pinion Project include 40.2-60.9 meters @ 1.78 gpt Au (PIN14-06); 10.7-47.3 meters @ 1.23 gpt Au (PIN14-08); 138.7-153.9 meters @ 0.42 gpt Au (PIN14-09) and 108.2-173.7 meters @ 0.90 gpt Au (PIN14-11). *Press Release:* July 17

Sniper Resources Ltd. announced that it would purchase a 100% interest in the Weepah Property from Columbus Gold Corp. for 7,647,500 shares now and additional shares at a later date. *Press Release:* July 2

Scorpio Gold Corp.(70%) announced that recent drill results at the Mineral Ridge/Wedge Project include 28.96-32.0 meters @ 0.45 gpt Au (MR14860); 35.05-38.1 meters @ 0.38 gpt Au (MR14903); 9.14-16.76 meters @ 0.37 gpt Au (MR14906) and 21.34-24.38 meters @ 0.74 gpt Au (MR14911). (resource @ Mineral Ridge = 4,230,000 tonnes @ 1.47 gpt Au indicated) *Press Release:* July 8

NuLegacy Gold Corp. announced that recent drill results at the Iceberg Project include 57.9-73.2 meters @ 1.85 gpt Au (RHB-24). *Press Release:* July 8

Nevada Copper Corp. announced that construction of the main shaft at the Pumpkin Hollow Project has now reached a depth of 364 meters progressing at a rate of 2-2,5 meters/day. (resource = 485,840,000 tonnes @ 0.45% Cu, 0.03 gpt Au measured+indicated) *Press Release:* July 16

Waterton Precious Metals Fund II announced that it increased its takeover offer for Chaparral Gold Corp. to \$0.55/share (was \$0.50/share). (reserve @ Gemfield = 14,300,000 tonnes @ 1.10 gpt Au proven+probable) *Press Release:* July 18

Mantra Capital Inc. announced that it signed the agreement with Bravada Gold Corp. to purchase a 100% interest in the Wind Mountain Property for \$5,200,000 over 3 years. (resource = 53,824,000 tonnes @ 0.34 gpt Au indicated) *Press Release:* July 8

Canamex Resources Corp. announced that recent drill results at the Bruner Project include 32.76-49.14 meters @ 0.82 gpt Au (B-1423); 27.3-83.72 meters @ 3.44 gpt Au (B-1424); 14.56-67.34 meters @ 6.97 gpt Au (B-1425) and 12.74-36.4 meters @ 2.36 gpt Au (B-1426). *Press Release:* July 7

*Thank you to our  
generous donors in August!*

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### **STUDENT DINNER FUND**

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### **STUDENT FIELD TRIP FUND**

**Denise Emmons  
Deniz Lucas  
Chuck Thorman**



**Welcome back to the GSN for Fiscal Year 2015!** It is time to renew your membership dues for the current fiscal year 2015! You can do this online at our website by following this link: <http://gsnv.org/membership/join-gsn.php> or by filling out the form below and returning it to the GSN by Fax (775-323-3599) or mail to 2175 Raggio Pkwy., Reno, Nevada 89512  
Thank you in advance for not waiting until the last minute! Laura appreciates it!



## GEOLOGICAL SOCIETY OF NEVADA 2015

**2175 Raggio Parkway, Room 107, Reno, NV 89512 USA**  
**Phone (775) 323-3500 • Fax (775) 323-3599 • gsn@gsnv.org • www.gsnv.org**

Offices are located at NBMG's Great Basin Science Sample & Records Library at The Desert Research Institute  
 Walk-in Office hours: Tuesday through Friday, 8:00 AM - 3:00 PM. Mondays - Call or email for appointment.

The Geological Society of Nevada (GSN) is a non-profit, educational organization whose principal objective is to promote the advancement of geological sciences, especially as they relate to Nevada. GSN supports the dissemination of information through meetings, field trips, publications and academic endeavors. Membership is open to geologists, geophysicists, geochemists, engineers, educators, students, prospectors or anyone else with an interest in the geological sciences and/or the goals of the GSN. The organization is based in Reno with additional Chapters in Elko, Winnemucca and Southern Nevada.

The membership year begins on January 1. Annual dues of \$50.00 (\$25.00 for full time students) are due prior to December 31. The GSN conducts a Field Trip in the Fall and one in the Spring of each year. Monthly meetings are held September through May in Reno, Elko, Winnemucca and Las Vegas. If you would like to receive email announcements from Elko, Winnemucca or Las Vegas please check a box.

Please help support the GSN Foundation, the Student Dinner Fund, or Student Field Trip Fund when renewing. Foundation dollars are used for the Kindergarten through 12th grade Field Trip Earth Science Grant Program, Nevada Mapping Grants and University of Nevada and UNLV scholarships, and Field Camp Grants.

**MEMBERSHIP APPLICATION**     Renewal     New    Date: \_\_\_\_\_

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I authorize GSN to send to me, via email: GSN announcements, publications updates, employment opportunities, etc.

Yes  No

**Optional Chapter Affiliation** (to be eligible for chapter voting and emails from those Chapter Officers)

- Elko Chapter     Southern Nevada Chapter     Winnemucca Chapter

Regular Membership Dues 2015 - Email newsletter \$50.00 (**International & Domestic**) \_\_\_\_\_

Regular Membership Dues 2015 - Hardcopy newsletter via postal service \$70.00 (**Domestic Only**) \_\_\_\_\_

Student Membership Dues 2015 - Email newsletter only \$25.00 (Nevada students' dues paid for by Geotemps, Inc.) \_\_\_\_\_

- Donations:**.....  I wish to donate to the **GSN Student Dinner Fund** \_\_\_\_\_
- (Foundation Donated Funds will be used for unrestricted grants and scholarships unless otherwise specified below:)  I wish to donate to the **GSN Student Field Trip Fund** \_\_\_\_\_
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# ROCK TALK

## US Midwest poised for a copper and iron ore mining rebirth

By Cecilia Jamasmie | June 15, 2014 (Reprinted from Mining.com)

Mining for iron ore and copper in the US Upper Midwest is expected to stage a major comeback, as demand for both commodities locally and from foreign markets such as China continues to rise.

There are at least six mines proposed or already started in the area comprised by Michigan, Minnesota and Wisconsin. According to AP, there are also four new operations in Minnesota that are using advanced technology to extract iron ore from waste rock mined long ago.

Canadian Highland Copper Co. (TSX-V:HI) is one of the companies planning a new mine — the Keeweenaw project—close to Lake Superior. The Michigan's Upper Peninsula area, known as "copper country," was an economic pillar for the US about a century ago. Over 11 billion pounds of native copper was produced between 1854 and 1976 in a district that is barely 160km long and less than 7km wide.

But the copper boom fell onto hard times as production shifted elsewhere and prices declined. By 1995 the last copper mine in Michigan's Upper Peninsula had closed, leaving more than 1,000 people jobless.



As usual, some have raised concerns about possible environmental damages, especially to the nearby lakes, such as Lake Superior (photo).\*



Another project in the area is Lundin's (TSX:LUN) Eagle Mine, a nickel and copper operation, previously owned by Rio Tinto (LON:RIO), which is scheduled to begin production this fall. According to the Lake Superior Community Partnership's site, Eagle mine is expected to bring \$4 billion into Marquette County over its eight-year lifespan, permanently employing 300 people and creating 1,200 indirect jobs.

As usual, some have raised concerns about possible environmental damages, especially to the nearby lakes.

Opponents claim there has never been a metallic sulfide mine that has not polluted water resources where water was present, and all the proposed mines are sulfide, says Stratus Consulting scientist Ann Maest, Ph.D., whose research found that 90% of the time "when you have a combination of sulfide mining and water resources there is a high likelihood you will have water quality problems."

"These proposed mines would be among the largest in the US, and in some cases in the world. And they would be located in some of the country's most treasured and unique freshwater ecosystems. The trouble is, sulfide mining and water just don't mix," writes Meleah Geertsma from the Natural Resources Defense Council.

Among the issues that concern locals, environmentalists and scientists, there is the question of whether the Michigan Department of Environmental Quality (MDEQ) properly assessed the potential for a mine collapse.

One of the ore bodies is located directly under the headwaters of the Salmon Trout River, says Geertsma, adding that a slump "would likely result in creation of acid mine drainage that would flow down the river and eventually to Lake Superior."

But companies say they've learned from past mistakes and will leave a very small footprint this time around.

The Michigan Court of Appeals is currently hearing arguments in a case against the construction of Eagle mine, but has not made any decision yet.

*\*This article was originally featured with the image of a lake that was not Lake Superior.*

# G.S.N. FALL FIELD TRIP IN THE PLANNING STAGES!!

Mark your calendars for October 24-26, 2014

The G.S.N.'s Fall Field Trip is taking shape and will be heading to southern Nevada & eastern California this year! The plans right now are for the group to meet up in Las Vegas on Friday, October 24, 2014 in the afternoon and travel to Primm, NV where we will have dinner, a tentative speaker and stay overnight. Then on Saturday, October 25th the field trip participants will head to the Castle Mountain Mine (California) for a tour by GSN member, Peter Olander which should be really interesting. Sunday, October 26th takes us to the other side of Las Vegas and will feature an overview of the geology at the Valley of Fire State Park and Josh Bonde's dinosaur field research area inside the park. Josh is the current GSN So. Nevada Chapter President and now a professor at UNLV. Josh was a Student Member of GSN while he was attending UNR!

Keep your eyes open for details and a registration form coming within the next month. This will be a field trip you don't want to miss!



Photo from Castle Mountain Mining webpage.



Valley of Fire National Park from flickr.com

## OTHER UPCOMING EVENTS

**4 SEPTEMBER Nevada Petroleum & Geothermal Society, Reno, Nevada.** *Speaker: Dick Benoit, Geothermal Resource Consultant. Topic: "Long-Term Performance of the Nevada Flash-Type Geothermal Projects".* 6:30 PM, Ramada Reno Hotel; 1000 East 6th Street, Reno, NV 89512. *Please RSVP by Tuesday, September 2 with the following link:*  
[https://docs.google.com/forms/d/17R8-dWy4pRakNS\\_geGkPDhWT8HOplcRSXT0QlBk6xuY/viewform](https://docs.google.com/forms/d/17R8-dWy4pRakNS_geGkPDhWT8HOplcRSXT0QlBk6xuY/viewform)

**8 SEPTEMBER Northern Nevada Section of SME:** *Speaker: John Dobra, University of Nevada - Reno. Title: "Another Look at Non-Renewable Resource Exhaustion".* Circus-Circus Mandalay Room, Reno NV. *Happy Hour @ 6 pm, Dinner @ 6:45 pm, Talk @ 7:30 pm. Dinner \$30; Non-member \$35. Students Free. September Bar Sponsor: CDM Smith.* Please RSVP by 5 pm on Wednesday, September 3, 2014. Send RSVP to Brooke Miller [775-303-2835](tel:775-303-2835) or [NNevSME@gmail.com](mailto:NNevSME@gmail.com)

**23 SEPTEMBER—Federal Lands Minerals Permitting,** Atlantis Casino Resort, 3899 So. Virginia St., Grand 7, Reno, NV 89502. Harrison, Temblador, Hungerford & Johnson LLP and Lilburn Corporation will provide a day-long seminar covering various aspects of federal minerals permitting. The day-long course will cover:

The body of federal law that governs mining and exploration on federal lands.

The permitting and acquisition process for common locatable, saleable and solid leasable minerals.

The environmental review process, and coordinating with state and local agencies.

Specific problems and emerging issues.

**Click on this link to register:**

<http://events.r20.constantcontact.com/register/event?oeidk=a07e9ho39sy03372520&llr=u5ozotfab>

**26-28 SEPTEMBER—NMEC is hosting their 2nd Annual Great Basin Rendezvous** at Camp Lamoille near Elko, NV. Contact Dave Shaddrick, [Dave@dshaddrick.com](mailto:Dave@dshaddrick.com) or Warren Thompson, [wthompson@premiergoldmines.com](mailto:wthompson@premiergoldmines.com) for more information. [Registrar Form Online Here](#) or, send an email to [jnewbury.consulting@yahoo.com](mailto:jnewbury.consulting@yahoo.com)

**27-30 SEPTEMBER—SEG 2014: Building Exploration Capability for the 21st Century.** Visit [www.seg2014.org](http://www.seg2014.org) for details and to register online.

**14-24 MAY 2015, GSN SYMPOSIUM 2015: NEW CONCEPTS AND DISCOVERIES.** J.A. Nugget, Sparks, Nevada. Pre- and Post-Field Trips, Short Courses, Exhibits and Technical Program. For more information please contact Molly Hunsaker, [mollyhunsaker@2015GSNsymposium.org](mailto:mollyhunsaker@2015GSNsymposium.org) or visit the website [www.gsnv.org/2015-symposium](http://www.gsnv.org/2015-symposium).



**Tonopah September 26-28**  
**Regional Field Trips**  
**Helping to Support the Tonopah Historic Mining Park**



The Tonopah Historic Mining Park (THMP) invites the Northern NV, Southern NV, and the Southern CA chapters of SME, along with the Geologic Society Nevada (and friends) to Tonopah for a weekend of tours and presentations September 26-28. Tours will include one at the Round Mountain Gold mine; and a Belmont-Tybo mining district driving tour. A general tour of the Solar Facility may also be offered (confirmation pending).

The Tonopah Historic Mining Park is open from 9am to 5pm daily, and maps are provided for walking tours. As well, a Polaris driving tour of the Park is available, although it requires reservations: please call (775) 482-9274 and reserve a tour if you're interested.

Evening presentations Friday and Saturday are to include one on the Historic Characters in the Area, and updates on mine development projects including Gemfields and 3 Hills-Hasbrouk Mnt.

For those interested, a bus will leave from Reno at 1:00p from Grand Sierra Resort; meet at the North parking lot near the large swing at 12:30pm; planned arrival in Tonopah—5:30p. All others will travel by personal vehicles to Tonopah.

**AUCTION**

An Auction (Silent and Live) will be conducted on Saturday night, helping to raise funds for the Tonopah Historic Mining Park Foundation, toward on-going preservation and restoration work at the Park. Items for Auction include mineral specimens, gold and silver coins, and mining artifacts.

Please contact Ann Carpenter [ann.carpenter57@gmail.com](mailto:ann.carpenter57@gmail.com); or Bill Wahl [williamwahl@hotmail.com](mailto:williamwahl@hotmail.com) for more information or to have the registration form emailed to you.

**REGISTRATION DUE NO LATER THAN SEPTEMBER 11, 2014! Contact Ann or Bill today!**

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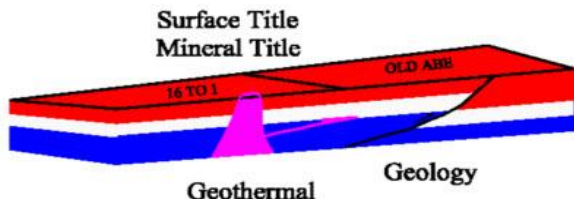




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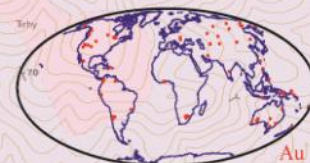
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# GEOLOGICAL SOCIETY OF NEVADA



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