

# GEOLOGICAL SOCIETY OF NEVADA NEWSLETTER

Geological Society of Nevada, 2175 Raggio Parkway, Room 107, Reno, NV 89512  
(775) 323-3500 - Hours Monday -- Friday 8-3 Website: [www.gsnv.org](http://www.gsnv.org) • E-mail: [gsn@gsnv.org](mailto:gsn@gsnv.org)



February 2011, Vol. 26, No. 2

Published monthly except June and July

## CALENDAR OF GSN EVENTS

### GSN EXECUTIVE COMMITTEE

#### President

**Peter Vikre**

US Geological Survey

#### Vice President

**William (Bill) Howald**

Rye Patch Gold US Inc.

#### Secretary

**Steve Carroll**

Schlumberger Water Services

#### Treasurer

**Bob Kastelic**

Consulting Geologist

#### Membership Chair

**Dave Emmons**

Kinross Gold USA, Inc

#### Publications Chair

**Mary Stollenwerk**

ALS Chemex

#### GSN Office Manager

**Kathy Sestanovich**

**February 9  
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, speakers at 7:00 PM. Sponsor for the evening will be TonaTec Exploration, LLC, Steve Bills. Speaker for the evening will be James E. Faulds, Nevada Bureau of Mines and Geology. His talk is titled, "Characterizing Favorable Structural Settings of Geothermal Reservoirs in Extensional Regions: Enhancing Exploration Strategies". (see abstract on page 8). For more information contact Rebecca Morris at (775) 304-2661.

**February 17  
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 6:00 PM, talk at 7:00 PM. Speaker for the evening to be announced. Sponsor for the evening to be announced. For more information contact Joe Becker at (775) 778-4071.

**February 18  
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 CGS, Inc. Speaker for the evening will be Frederick T. Graybeal, *Exploration Management LLC*. His talk is titled "**Types of Silver-Rich Mineral Deposits and Their Metallogeny**". (see abstract on page 3). Dinner reservations must be made by 1:00 PM Wednesday, February 16. Contact Kathy Sestanovich at (775) 323-3500 or e-mail [gsn@gsnv.org](mailto:gsn@gsnv.org) for reservations.

**February 24  
Thursday**

#### **SOUTHERN NEVADA CHAPTER** *(Every Last Thursday of the month)*

The monthly meeting will be held at the Lilly Fong Geoscience building at UNLV, Room 105. Social hour begins at 6:45 pm and talk at roughly 7:15 pm. The speaker for the evening will be Vicki Meyers, UNLV Graduate Student, she will be presenting an overview of her master's thesis and the title of her talk will be "**Comparison of Two Vertebrate Fossil Assemblages: Panaca Local Fauna (Lincoln County, Nevada) and Hagerman Local Fauna (Twin Falls County, Idaho)**". (see overview on page 6). For more information contact Josh Bonde at 702-468-2500.

### GSN BOARD OF DIRECTORS

#### Chairman

**David Shaddrick**

#### GSN President

**Peter Vikre, Current**

#### Most Recent Past GSN President

**Mike Ressel**

#### Elko Chapter President

**Joe Becker**

#### So. Nevada Chapter President

**Josh Bonde**

#### Winnemucca Chapter President

**Rebecca Morris**

#### Class A, 2009-2012

**Lynne Volpi**

**Kim Craig**

#### Class B, 2010-2013

**David Caldwell**

**Marcus Johnston**

#### Class C, 2008-2011

**David Shaddrick (Chairman)**

**Camille Prens**

## GSN FEBRUARY MEETING SPONSORS



"EVERYTHING BUT THE MULE"  
ANYWHERE IN THE WORLD

# CGS, inc

GEOLOGICAL EQUIPMENT AND SUPPLIES

Mention this ad and receive 10% off  
your next order.  
Enter coupon code GSN10  
for online orders

Fax: (775) 358-8209  
<http://www.cgsmule.com>

1335 Greg Street, #103  
Sparks, Nevada 89431  
(775) 358-0923

# FROM THE PRESIDENT

Peter Vikre, *GSN President 2010-2011*

## Rocks and hard places

Reality checks that discomfort our heavily consumptive and entitled society are surfacing with disturbing frequency. In the world of U.S. mineral resources, one reality is preset – on the respect and relevance list, mineral resources are well south of politicians and tree stumps. Some reasons:

1. Mineral resources have been historically abundant, and still are. In the U.S. several generations now have consumed natural resources at will, and minerals consumption has been virtually unrestricted. Plentiful domestic natural resources, and less regulation to impede their production and use, initiated the consumption explosion. Over past decades domestic resource depletion, quality decline, and production restrictions have been offset by diplomacy and semi-trillion dollar annual defense expenditures that secure production sites and transportation routes world-wide. Deprivation derived from natural resources is an unknown concept to many; ephemeral wartime and embargo shortages were eclipsed by resurgent consumption, and all but forgotten.
2. Mineral resources have been historically cheap, and still are. Rural America was electrified by rapid production of relatively low-cost Cu from open pit porphyry Cu mines, which became a geologic legacy of unlimited cheap metal. That 1900-20 Cu cost \$3/lb.; since 1920 until recently the Cu price averaged ~\$1.30/lb (2006 dollars; Long, 2008). Cost percentages of mineral resources in large consumer durables like cars and houses are small to tiny, far exceeded by labor, transportation, and middleman costs, and by market fluctuations. Mineral resources are a larger cost component of infrastructure (buildings, roads, and bridges) but those costs have lifetime disguises in the form of rent, mortgages, taxes, and borrowing from future generations. Even to the few cognizant consumers, minerals consumption is a fixed, one-time to infrequent cost.
3. Mineral resources uses are largely oblivious to consumers. Consumers cannot avoid encountering mineral products on a daily basis, beginning with the cement that stabilizes their houses, and that they drive and walk on. Other everyday mineral essentials are the Fe, Ti, Mo, V, and Cr of steel that comprises the cars they drive over bridges to the office buildings they work in. Those mineral applications are durable; unlike other natural resources and derivatives such as gasoline and even water, they are not purchased, or knowingly purchased, on a regular basis. Consumer exposure to most high-unit value mineral resources, like the non-ferrous and specialty metals, is more limited in that these metals are used in relatively small quantities and end uses are often hidden (e.g., Cu wiring and plumbing; i-phones). Low-unit value mineral resources end life in landfills as worthless as other trash; high-unit value mineral resources may be recycled but most small mineral products are destined for dumpsters. To virtually all consumers minerals are vapid and without personality.

4. The entire U.S. mineral resources economy is a few GNP percentage points, and metals production is decimal dust. In part, this lowly economic stature enables vilification of mine or element *du jour*, from the remotest production site to landfill, by a society conditioned to news media fear. Vast sums have been spent removing “toxic” elements and minerals from human habitation sites and work places with toxicity phobia trumping actual health risk, or even any attempt to determine risk/benefit. A second apparent consequence is the great devaluation of mineral resources science and education, a trend that severely threatens the technical capacity to supply minerals. There has been no government mineral resource imperative for many decades, but the society government purports to sustain demands limitless resource consumption, the elements of which originate at mines.

In short, mineral resources are “there” in the same place day after day, they are disguised both economically and physically, most are quiet and infrequently require attention, many are disposable, and all are wholly taken for granted.

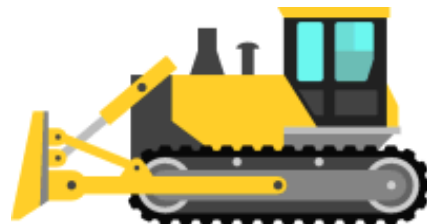
Sermon delivered to the choir; pity party is over.

## February dinner meeting presentation

At the February dinner meeting Fred Graybeal will present a comprehensive classification of Ag deposits and provide perspectives on Ag metallogeny.

**BetTer Times** ahead,

Peter Vikre



***Thanks to Timberline Drilling  
For Hosting the January Meeting***

---

# *GSN February 18, 2011 Membership Meeting*

---

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

GSN CAN NO LONGER GUARANTEE DINNER SEATING WITHOUT ADVANCE RESERVATIONS.  
Please call 775-323-3500, Fax 775-323-3599 or e-mail [gsn@gsnv.org](mailto:gsn@gsnv.org) by 1:00 PM, Wednesday, February 16, 2011.  
Social Hour: 6:00 PM – Dinner: 7:00 PM – Speaker: 8:00 PM  
**\$17.00 per person**

Location: Elks Lodge, 597 Kumle Lane, Reno, NV  
Directions: across (W) from the Reno-Sparks Convention Center  
(S. Virginia Street, behind the Les Schwab Tire Center)

**Prepaid dinner reservations will only be accepted for the current monthly meeting.  
Cancellations must be received two days before the meeting in order for your money to be refunded.**

Download the prepayment form from the GSN website: <http://www.gsnv.org/membership.html>

---

## **Types of Silver-rich Mineral Deposits and Their Metallogeny**

Frederick T. Graybeal  
*Exploration Management LLC,*  
37 Wynwood Road,  
Chatham, NJ 07928  
[ftgraybeal@aol.com](mailto:ftgraybeal@aol.com)

### **Abstract**

Thirty percent of silver is mined from deposits in which silver is the principal economic metal. Seventy percent of silver is mined from a diverse suite of deposits as a co- or by-product with other metals. These deposits occur in four genetic groups: (1) volcanogenic massive sulfide (VMS); (2) sedimentary exhalative (SEDEX); (3) lithogene; and, (4) magmatic-hydrothermal (MH). Differences between the four groups relate to source rocks, metal associations, process and timing of mineralization, and tectonic setting. Each group may be subdivided on ternary diagrams based on relative metal contents.

VMS deposits rarely contain more than 500 Moz Ag. Grades average 33 g/t Ag. Variable Ag-Pb-Zn-Cu-Au±Sn concentrations are derived both from shallow plutons and by leaching of the volcanic rock pile in regions of thin or no continental crust and the mineralization is syngenetic. Higher silver grades occur in areas of abundant felsic volcanic rocks.

SEDEX deposits rarely contain more than 500 Moz Ag. Grades average 46 g/t Ag. Silver, lead, and zinc are leached from sedimentary and volcanic rocks filling rift-related basins and deposited in relatively consistent proportions as syngenetic to diagenetic massive sulfides. Gold is typically absent.

Lithogene silver-rich deposits are all epigenetic. They form during compaction, dewatering, meteoric water recharge, and metamorphism of rift basin-related clastic sedimentary and interbedded volcanic rocks. Individual deposits may contain more than 500 Moz Ag at grades >300 g/t Ag. Ores are characterized by four well-defined metal associations, including Ag, Ag-Pb-Zn, Ag-Cu, and Ag-Co-Ni-U. Leaching, transport, and deposition of metals may occur both in specific sedimentary strata and other rock types adjacent to a rift. Multiple, mineralizing events with durations of 10-15 m.y. and separated by up to one billion years may occur in a single rift basin sequence. Gold is typically absent.

MH silver-rich deposits are epigenetic and related to Cordilleran igneous and volcanic suites. Six MH districts each contain more than 1,000 Moz Ag with grades of veins >600 g/t Ag. Mineralization styles include veins, massive sulfides in carbonate rocks, and disseminated deposits. Most deposits are epithermal (<300°C) with low sulfidation alteration assemblages. All large (>500 Moz) and high-grade MH deposits are confined to regions of relatively thick continental crust above Cenozoic consuming plate margins on the eastern side of the Pacific Rim where magmas are relatively evolved. Silver-rich MH deposits are less abundant and rarely contain more than 100 Moz Ag above consuming plate margins both on the western side of the Pacific Rim and in the Tethyan Eurasian Belt where the continental crust is thinner or absent and magmas are more primitive.

Specific metal associations in SEDEX and lithogene deposits may reflect confinement of fluid flow to, and derivation of metals from, specific source rock types. Variable metal associations in VMS and MH deposits may reflect derivation of metals from a diverse suite of rocks by convecting hydrothermal systems and processes related to the generation of magmas.

Discoveries of silver-rich deposits have accelerated during the past decade driven by a 5.5-fold increase in the average monthly silver price. Methods that led to discovery include reconnaissance using straightforward ore guides (Navidad in Argentina), a reexamination of old exploration data (Escobal in Guatemala; Corani in Peru), and the sophisticated use of ore deposit models (Juanicipio-Valdecañas in Mexico). High silver prices also allow consideration of a porphyry silver exploration model.

# Thank you to our generous donors

## **GSN FOUNDATION**

**PLATINUM LEVEL DONORS \$1,000+**  
Charles G. Weakly

**GOLD LEVEL DONORS \$500-\$999**

**SILVER LEVEL DONORS \$100-\$499**  
Lew Gustafson  
Peter R. Olander

**BRONZE LEVEL DONORS \$1-\$99**

Perseo Anaya  
Barry Bourne  
Elliott Crist  
Raymond E. Irwin  
Al Lander  
Melissa Mateer  
JoAnn Newbury  
Roger A. Newell  
Donald C. Pietz  
Kenneth C. Raabe  
Hendrik G. van Oss

## **STUDENT DINNER FUND**

Gassaway Brown  
Al Lander  
Melissa Mateer  
Lawrence J. O'Connor  
Leslie K. Rumph  
Michael J. Turner  
Charles G. Weakly

## **STUDENT FIELD TRIP FUND**

Gassaway Brown  
Peter J. Clark  
Tony Eng  
Al Lander  
Nancy Richter  
Hendrik G. van Oss  
Charles G. Weakly  
Terry L. White



### **GSN MEMBERSHIP**

When was the last time that you thought about the value of your GSN Membership? The most valuable part of GSN is the intangible part. Meeting up with colleagues, potential employees, potential employers, making new friends, attending the presentations, and finding out what is going on in our fast paced industry doesn't have a direct dollar value. The free drinks aren't really free as they are paid for by our generous sponsors. Even the dinners don't pay for themselves. Over \$32,000 a year is paid to produce the newsletter, membership directory, dinner deficit, the convenience of taking credit cards, filing tax returns, liability insurance, having a phone, and running the office. The cost of administrative services and promoting GSN are above and beyond this amount. In addition, the dedication of GSN volunteers makes the organization run. Take a few minutes to think about the role that GSN plays in your career and take time to thank all of the volunteers and sponsors that provide the venue for your GSN experience.

## FACES OF GSN

*Ann S. Carpenter, Reno, Nevada  
Remote Energy Solutions*

I came to Nevada in the mid-1960s, the one sister in a rag-taggle band of 6 brothers. My parents moved us from a happy and wild upbringing in Anaconda, Montana to the quiet (in the 1960s) streets of Reno, in search of a more stable home-base in The Biggest Little City in the World. My father, a doctor in private practice in Anaconda, figured out that he could not raise 7 kids in a mining town under strike (Anaconda smelter, 9 months); he noted that no one gets sick when they aren't working. So off to Reno we moved, and my parents successfully raised all 7 rambunctious kids. My roots in Montana provided a tie to mining from the start; and I moved to a state dominated by world-class geology and ore deposits and wide-open spaces ... all of which I enjoyed with my family from a very early age.

Upon graduating from high school in Reno, my parents insisted that I go 'away to school', for a multitude of reasons! I chose Bozeman, Montana as it was a pseudo return to roots. Upon returning to Montana I realized I had become a desert rat—and wrestled with the blanket of trees found everywhere; one had to hike long and high to get out of the cover and into the views. I figured early in my studies that I was not destined for forestry. I

wandered into geology in my first elected science course (Geology 101), taught by Dr. Steve Custer who had an interesting teaching style rooted in his dual geology and theater degrees from Berkeley, CA. I was hooked from day one, and haven't looked back since. And why would I; seriously interesting work whereby companies pay you to hike, do science, interact with truly spectacular cultures and people, and travel the world!

After graduating from Montana State, I started my geologic career first with the US Forest Service, taking a job with the Mountain City Ranger District in 1980. I chose to retire from the stability of a government job, instead seeking out the variability of the mineral development industry—landing interesting, challenging and exciting work here in the US and overseas, with the Majors as well as with Junior exploration companies. I have had the pleasure of working in a broad spectrum of capacities in exploration and mining—from “boot leather to the boardrooms”, advancing mineral development in a broad diversity of settings throughout the world. I started an energy-focused company in 2008, Remote Energy Solutions, bringing innovations and energy solutions to the mining sector. As well, I remain very committed to the mineral development field, having served in the NWMA leadership; Board seats in mineral and geothermal companies; and advocacy focused work with the Women's Mining Coalition.

Back to high school; I had 13 'best friends'—9 guys and 4 girls—in high school, with whom I remain friends, and one who I had the dang good fortune to marry: Tom Carpenter, geophysicist extraordinaire and gravity dude. We have made our home in Reno since the late 1980s, after a truly raucous 1988 wedding and reception at Piper's Opera House in Virginia City, Nevada. Old mining camps continue to this day to be very important staples in our lives.

I cannot remember what year I became a GSN member (I am over 50 and memory seems to be a fleeting commodity). But I believe it was in the mid-1980s, and I have had the great pleasure of benefiting from this fine Society ever since. As well, I have served as an officer, serving in the shadows of some very brilliant people; as GSN Foundation Chair working closely with the very talented and dedicated DD LaPointe and too many others to list; and as part of two Symposiums, assisting in various capacities. It is a pleasure to be a part of the GSN and associated with such fine people throughout its membership.

Tom and I continue to make our home at the base of the mountains up the Mount Rose Hwy, just 15 short minutes to the local ski area, Mount Rose, where we see regular GSNers such as Eric Ruud and family, John Cleary, and a long list of others. Skiing is a major part of our lives (as long as our bodies hold out, that is), as illustrated by the sno-cats in the 'back 40' of our home—beacons of stylish landscape art for friends and neighbors in the 'hood' to visually enjoy. Although we don't have kids of our own, we have a very large and fun extended family in the Reno area stretched out between the Carpenters and Shonnards (my maiden name) from Carson City to the North Valleys.



# GSN Southern Nevada Chapter Meeting February 24, 2011

## "Comparison of Two Vertebrate Fossil Assemblages: Panaca Local Fauna (Lincoln County, Nevada) and Hagerman Local Fauna (Twin Falls County, Idaho)"

*Vicki Myers*  
UNLV Graduate Student

Bio and Paleo Project

Vicki Meyers received her bachelors in geology from the University of Wyoming, in 2007 where her undergraduate study involved a comparison of pterosaur tracks in Wyoming and Arizona. She lived in Wyoming for 37 years before coming to UNLV in Las Vegas. Vicki is a Masters candidate in the UNLV Department of Geoscience working with Dr. Stephen Rowland. She will be defending her thesis in March and graduating in May. This is her second year as secretary of the GSN Southern Nevada Chapter. Vicki presented a poster at the 2010 SVP Conference and gave a talk at the 2010 Desert Symposium at Zzyzx Research Center on her research.

Vicki's paleontology project involves a comparison of two Pliocene vertebrate faunas from Nevada and Idaho. Her project has included a study of the sediments and collecting specimens from the Panaca Formation in Meadow Valley to compare to the well-known Hagerman faunal assemblage in Idaho. She led the field crew for two summer internships at Hagerman Fossil Beds National Monument in Idaho to learn about the geology and vertebrate fauna from the Glens Ferry Formation. She is using the vertebrate fauna and strata to interpret the paleoecology and paleoenvironment in Meadow Valley. The bird material, along with the sediments tells an interesting story of freshwater communities in a xeric environment approximately 5 million years ago.

---

### *Upcoming Events*

**Feb. 14  
Monday** SME NORTHERN NEVADA CHAPTER (A Member Society of AIME)  
Monday, February 14<sup>th</sup>, 2011  
Social Hour 6 PM  
Dinner 6:45 PM and Technical Session, at 7:30 PM  
Circus - Circus Hotel and Resort, Mandalay Room in Convention Center  
Members \$22/person and Non-Members \$25/person payable at the door

RSVP Required by noon, THURSDAY, February 10<sup>th</sup> 2011  
Call Neville Rhoden at (775) 746-4856  
or email: [hrhoden61@gmail.com](mailto:hrhoden61@gmail.com)

Sponsored by: AquA Hydrogeologic Consulting LLC  
[www.aquagroundwater.com](http://www.aquagroundwater.com)

Copperstone Project Joe Fabrizio,  
American Bonanza Gold Corp.

For more information go to SME's website:  
[www.smennv.org](http://www.smennv.org)

**Feb. 18  
Friday** GSN Board of Director's meeting

1:00 PM - 3:00 PM

NBMG Great Basin Science Sample and Records Library at The Desert Research Institute Campus  
2175 Raggio Parkway  
Reno, Nevada 89512

Upstairs conference room



# ROCK TALK

## **The Passing of the DeLaMare? Setting the Record Straight.**

Thank you for the opportunity to set the record straight regarding the article that was published in last month's GSN newsletter marking "the passing of the DeLaMare" – I was quite concerned when the Director of the Mackay School brought the article to my attention. Let me be crystal clear: the Mackay collection is alive and well. Absolutely nothing is being "dispersed among the storage facilities at Stead"; in fact, the library is well on its way toward realizing its full potential.

But we need your help.

When I arrived a little under a year ago, the library's collections resembled an active dig more than a single gem - and the gems were spread throughout the four stories of the building, buried under the combined weight of print journals that could be more efficiently accessed online. There was no room for future growth of the collection, no room for the customers of the library, and none of the tools that the students, staff and researchers need to actively participate with their communities of practice in the reality of today's digital world. We have been actively working to correct that, and that work continues: the next time you visit the library, you'll want to touch bases with me or another staff member – things are moving around as we go forward.

We have a tremendous opportunity in DeLaMare; the research libraries of the Mackay School, Physical Sciences, and Engineering offer a powerful tool as we join forces to work on problems of common interest. Projects currently underway include geographers, geologists and mining engineers working together in the active exploration of Nevada's geothermal resources; atmospheric physicists joining forces with mining engineers to solve the problems of diesel exhaust in mines at depth; biologists and engineers bringing bioengineering tools to bear on the problems of ore extraction and waste management - and they share the library in common. We've begun to explore the art of the possible.

In DeLaMare Library I see a neutral common ground where students, faculty and staff can work elbow-to-elbow with members from their communities of practice: Geologists, Engineers, and others coming from outside of the University to access the unique collections of DeLaMare. How can we help one another? When you visit the library, take a look at the hardworking students trying to earn an education. To be able to compete and survive in a fast-changing digital landscape, they need our help. Please take the time to engage in a conversation; you'll find my desk in the atrium of the library.

Tod Colegrove, Ph.D., MSLIS  
Head of DeLaMare Library

---

## **Rock Talk is a new section in the GSN Newsletter for members**

The GSN Newsletter is adding an editorial section called "Rock Talk" on a trial basis. The purpose of the section is to provide a forum for GSN members to express opinions and geological experiences that would be of interest to members. Topics should be related to geology, mining, and exploration, and could include travel and field experiences or other items of interest to geologists.

The decision to publish letters will be made by the Executive Committee. Letters are limited to 250 words and interesting photos will also be considered for publication. The writer must include his/her name, telephone number, and email address. Letters may be edited for clarity. Letters should be submitted to [gsn@gsnv.org](mailto:gsn@gsnv.org) with "Rock Talk" in the subject line. They can also be mailed or FAXED to the GSN office.

GSN hopes that this new section will provide a forum for communicating interesting items to the more than 1,000 members worldwide.

**GSN Winnemucca Chapter Meeting  
February 9, 2011**

**CHARACTERIZING FAVORABLE STRUCTURAL SETTINGS OF GEOTHERMAL RESERVOIRS  
IN EXTENSIONAL REGIONS: ENHANCING EXPLORATION STRATEGIES**

*James E. Faulds*  
Nevada Bureau of Mines & Geology  
University of Nevada, Reno, Nevada, 89557  
[jfaulds@unr.edu](mailto:jfaulds@unr.edu)

ABSTRACT

Exploration of geothermal systems is commonly hampered by the risk of unsuccessful drilling. A major problem in selecting well sites is that the favourable settings of known systems are generally not adequately characterized. This is particularly important in amagmatic regions, where faults are the dominant control on geothermal fluids and obvious magmatic heat sources are lacking.

To better characterize the structural controls on geothermal systems in extensional settings, we have analyzed numerous fields in the relatively amagmatic Basin and Range (USA) and Aegean (western Turkey) extensional provinces. Methods include detailed geologic mapping, structural analysis, gravity surveys, and studies of surficial geothermal features (e.g., travertine, sinter, springs, fumaroles). Our findings suggest that many fields occupy a) discrete steps in normal faults; b) intersections between normal and transverse oblique-slip faults; c) overlapping oppositely dipping normal fault zones, d) terminations of major normal faults, and e) transtensional pull-aparts. These settings are typically associated with steeply dipping faults, commonly involving subvertical conduits of highly fractured rock along Quaternary fault zones oriented approximately perpendicular to the least principal stress. General topographic features indicative of these settings include: 1) steps in range-fronts, 2) interbasinal highs, 3) series of relatively low, discontinuous ridges, and 4) lateral terminations of mountain ranges. Surficial features, such as tufa towers, travertine spring mounds, and sinter deposits, are also associated with many systems. These structural, topographic, and surficial features may indicate blind geothermal systems, which have no surface thermal waters or steam.

We have successfully applied our findings to exploration of several geothermal fields in the Basin and Range province, including Desert Peak, Desert Queen, Salt Wells, and Astor Pass. Further characterization is needed, however, of favorable structural settings and other critical parameters (e.g., geophysical and geochemical signatures) to substantially reduce the risks of geothermal exploration.

**WINNEMUCCA CHAPTER  
FEBRUARY MEETING SPONSOR**



**Steve Bills**  
General Manager

Cell: 801.310.1628  
Office: 801.446.2400  
FAX: 801.446.3940

1645 North 500 West  
Mapleton, UT 84664

Email: [steve@tonatec.com](mailto:steve@tonatec.com)  
[www.tonatec.com](http://www.tonatec.com)

**Thanks to Major Drilling America, Inc.  
for Sponsoring the Winnemucca Chapter's January Meeting**



**PAID ADVERTISEMENTS**

DRIFT EXPLORATION DRILLING INC,S  
 NEW MAXIDRILL  
 SAFE HANDS FREE PIPE HANDLING  
 40 000 LBS PULLBACK  
 500 PSI/1150 CFM COMPRESSOR

THIS UNIT IS CAPABLE OF  
 1500' . DRILL WILL BE IN  
 NEVADA THE 1<sup>ST</sup> OF  
 SEPTEMBER 2010



**GSN Newsletter  
 Monthly Advertising Rates**

Business Card Size (3 <sup>1</sup> / <sub>2</sub> x 2")	\$50.00
Quarter page (3 <sup>1</sup> / <sub>2</sub> x 4 <sup>3</sup> / <sub>4</sub> "	150.00
Half Page (4 <sup>3</sup> / <sub>4</sub> x 7 <sup>1</sup> / <sub>2</sub> "	300.00
Classified ads (per line) (up to business card size)	10.00

For an advertising form, call the GSN office at 775-323-3500, fax 323-3599, email [gsn@gsnv.org](mailto:gsn@gsnv.org), or download the form from the GSN website:

<http://www.gsnv.org/membership.html>

Digital or text ads must be received by the 20<sup>th</sup> of the month to appear in the following month's newsletter.

There will be a 10% discount on all orders for 10-months or more.

**The Sign of Service  
 The Symbol of Quality**



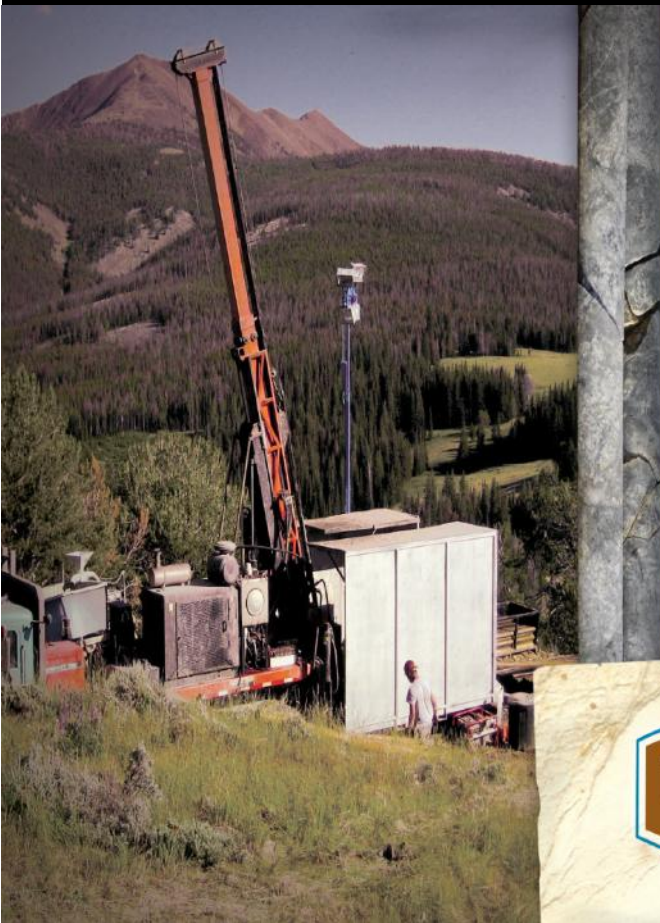
- Grouts•
- Drilling Fluids•
- Well Cleaning Chemicals•

**Local Contacts:**

**Dave Colburn** (775) 385.0602    **Gene Mapel** (775) 742.6294  
**Kirby Donald** (503) 702.5731    **Lanie McMillon** (775) 340.2231  
**Jack Farrar** (407) 790.0205    **Ron Peterson** (801) 712.0939  
**Doug Keller** (801) 349.7314    **Jack Sowers** (425) 501.5230

**Baroid Industrial Drilling Products**  
 Product Service Line, Halliburton

P.O. Box 1675 Houston, TX 77251  
 (877) 379.7412 or (281) 871.4613  
[www.baroidip.com](http://www.baroidip.com)



## A CORE DIFFERENCE

- Support for active mine operations and mine development projects.
- Underground and surface drilling capabilities.
- Maximum returns on client investments
- Uncompromised safety and stewardship.
- Unparalleled customer service



Coeur d'Alene, Idaho – 208.665.7211  
 Elko, Nevada – 775.777.1100  
[www.timberline-drilling.com](http://www.timberline-drilling.com)



*Serving Mining in Nevada Since 1992*

**General Engineering Contractor**  
 Drill Pads  
 Road Building  
 Reclamation  
 Earthwork

Office: 775-753-5832  
 Mobile: 775-778-1681  
 Mobile: 775-934-1315  
[www.legarza.com](http://www.legarza.com)

NV License #35480  
 CA License #804120



Fire Assay, ICP-OES/MS,  
 XRF, LECO, Custom Prep,

Chris Ioannakis, Managing Director, Analytical Services

**Corporate Office**  
 1500 Glendale Avenue  
 Sparks, NV USA 89431-5902  
 Telephone: (775) 356-0606  
 Fax: (775) 356-1413

**Elko Office**  
 2320 Last Chance Road  
 Elko, NV USA 89801-4852  
 Telephone/Fax : (775) 738-9100

E-mail: [AALADMIN@aallabs.com](mailto:AALADMIN@aallabs.com)

**We provide the tools,  
 supplies and support  
 to help you do the  
 job right!**

Safety  
 Signs  
 SWPPP  
 Sales  
 Support  
 Rentals

1055 Glendale Ave.  
 Sparks, NV 89431  
 Tel: 775.355.3424  
[www.GraniteConstructionSupply.com](http://www.GraniteConstructionSupply.com)



# North American Exploration

Providing service to the Mining industry since 1964



With over 45 years of experience, we will complete any exploration project, Anytime! Anywhere!



**801-544-3421**

North American Exploration, Inc.  
447 North 300 West, Suite #3  
Kaysville, Utah 84037  
Email: [nae@nae-xploration.com](mailto:nae@nae-xploration.com)



The Global Leader in Analytical Data Service for the Mining Industry.

## WE SPECIALIZE IN:

- Assaying and geochemical analyses for mining and mineral exploration projects
- ISO 9001:2008 and 17025:2005 accredited analysis methods
- Updated Webtrieve™ on-line and state-of-the-art web data access system
- Digital mineralogy services with MLA
- New lower detection limits for geochemical studies

Contact us to discuss a cost effective solution to your exploration analysis requirements.

[ClientServicesUSA@alsglobal.com](mailto:ClientServicesUSA@alsglobal.com)  
**775-356-5395**

## USA LOCATIONS

Elko | Reno | Winnemucca | Fairbanks

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

**RIGHT SOLUTIONS RIGHT PARTNER**



At Timberline Drilling, Inc. we have a fleet of drills to meet every need. We specialize in both underground and surface core drilling in support of active mining operations, mine development projects and exploration.

Timberline Drilling, Inc. - Corporate  
Martin Lanphere: 208.755.1938  
[mlanphere@timberline-drilling.com](mailto:mlanphere@timberline-drilling.com)

Timberline Drilling, Inc. - Mexico Operations  
Paul Elloway: 52.662.151.0426  
[pelloway@wwemexico.net](mailto:pelloway@wwemexico.net)

Timberline Resources Corp.  
Randy Hardy: 208.664.4859  
[hardy@timberline-resources.com](mailto:hardy@timberline-resources.com)

Visit Us At:

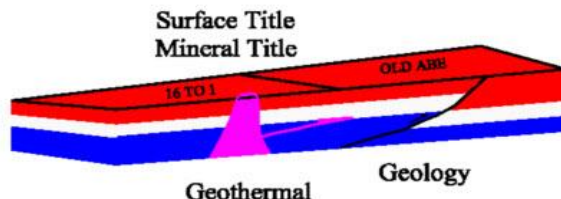
[www.timberline-drilling.com](http://www.timberline-drilling.com)

for detailed information on all of our available drill rigs.

## G.I.S. Land Services

Greg Ekins M.S. R.P.L. #32306 President  
Mineral Landman - Commissioned Abstractor  
"From Courthouse Records to Final Map"

Mineral Title, Geothermal Title,  
National Instrument (NI) 43-101 Title Review,  
Due Diligence  
3D AutoCad; ArcMap and MapInfo GIS



A professional firm of  
Landmen, Geologists, Draftsmen and Technicians  
Providing Abstracts of Title, Land Status and  
Exploration Geology Services  
Utilizing AutoCad - ArcMap - MapInfo - PowerPoint  
[www.gislandservices.com](http://www.gislandservices.com)

241 Ridge St., Suite 250  
Reno, NV 89501

Ph: 775-746-8803 Fax: 775-746-8802  
email: [greg@gislandservices.com](mailto:greg@gislandservices.com)



**DIVERSIFIED DRILLING, LLC**



*Providing Drilling Services To The Mining/Metals Industry Since 1980*

3650 Grant Creek Road  
 Missoula, Montana 59808  
 Phone: (406) 542-1010 Fax: (406) 542-5065  
[www.diversifieddrilling.com](http://www.diversifieddrilling.com)



**Carlin Trend Mining  
 Supplies & Service**

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

369 5th St., Elko, NV 89801  
 (775) 778-0668, Fax: (775) 778-0687, [carlintrend@frontiernet.net](mailto:carlintrend@frontiernet.net)

Geological Consulting - Claim Staking - Soil Sampling  
 Geology & Drafting Supplies - AutoCad & GIS  
 Temporary Employees In All Fields

**Exploration & Mining Analytical Services**



**INSPECTORATE**

**INSPECTORATE AMERICA CORP.**

605 BOXINGTON WAY, SUITE 101  
 SPARKS, NV 89434-8929  
 Phone: 775.359.6311 \* Fax: 775.359.2944  
<http://www.inspectorate.com>

Carmen Arbizo-Business Development Mgr  
[Carmen.Arbizo@Inspectorate.com](mailto:Carmen.Arbizo@Inspectorate.com)  
 Mobile: 775.219.8657

Richard Thorneloe-General Mgr  
[Richard.Thorneloe@Inspectorate.com](mailto:Richard.Thorneloe@Inspectorate.com)  
 Mobile: 775.691.5832

Dave Williams-Vice President  
[Dave.Williams@Inspectorate.com](mailto:Dave.Williams@Inspectorate.com)  
 Mobile: 775.848.8025

Chuck Whipple-Quality Assurance/Client Service Mgr  
[Chuck.Whipple@Inspectorate.com](mailto:Chuck.Whipple@Inspectorate.com)  
 Mobile: 775.830.4242

Brian Park-Li-Lab Manager  
[Brian.ParkLi@Inspectorate.com](mailto:Brian.ParkLi@Inspectorate.com)  
 Mobile: 775.691.5834

**MINIMIZING RISK EVERY DAY**  
**ISO 9001:2000 Certificate #30406**



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

RC Drilling, Core Drilling Surface & Underground  
 Contractors License # 59509

6120 Pedrolí Lane Tel 403-652-5530  
 Winnemucca N.V. 89445 Fax 403-652-5578  
 Email [infodriftdrilling@platinum.ca](mailto:infodriftdrilling@platinum.ca)



**Global Geophysical Services**

**Surveys:** IP/Resistivity,  
 EM, Gravity, MT, TEM, CSAMT,  
 Magnetics

**Consulting:** 2D & 3D Inversion,  
 Project Design, Modelling

**Leaders in Deep  
 Exploration**

**Deep Earth Imaging Technology**



**Minesite Imaging:** Exploration,  
 Delineation, Condemnation

[www.QuantecGeoscience.com](http://www.QuantecGeoscience.com) 1.775.827.2611

Canada • USA • Botswana • Peru • Chile • Argentina • Australia



Environmental Services  
for the Mining Industry

- Baseline Studies
- Environmental Permitting
- Monitoring & Compliance
- Reclamation & Closure Plans
- Investigation & Remediation

**Elko Location**  
775.738.8766

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

creating solutions for today's environment



**Eric O. Ruud**  
Manager, Southwest USA  
Region & Mining Sector

**Geobruigg North America, LLC**  
Geobruigg Protection Systems  
1500 Glendale Avenue  
Sparks, Nevada 89431  
USA

Phone (775) 626-7474  
Fax (775) 626-7479  
Mobile (775) 843-3424

[info@us.geobruigg.com](mailto:info@us.geobruigg.com)  
[www.geobruigg.com](http://www.geobruigg.com)  
[eric.ruud@geobruigg.com](mailto:eric.ruud@geobruigg.com)

## Big Sky Geophysics

Clark Jorgensen, M.Sc.  
Geophysicist

*Field Work  
Processing  
Interpretations*

P.O. Box 353 Phone/Fax +1 (406) 587-6330  
Bozeman, Montana 59771 Mobile +1 (406) 580-9718  
USA [clark@bigskygeo.com](mailto:clark@bigskygeo.com)

For more details, my background, and case studies,  
visit my webpage at [www.bigskygeo.com](http://www.bigskygeo.com)

## Jo Beth Allen Professional Graphics

*CAD Drafting/Geologic Data Maps  
Digitizing/Presentation Graphics  
PowerPoint/Plotting/Printing  
Geologist*

1055 Joshua Drive  
Reno, Nevada 89509

Phone: 775-324-7960  
Fax: 775-324-7583

[jobeth@yellowsub.net](mailto:jobeth@yellowsub.net)

## HARD ROCK WHEELS, INC.

4WD Pickup Rentals

Howard J. Adams  
14756 Pine Knolls Lane  
Reno, Nevada 89521  
(775) 852-2622  
Fax (775) 852-2075  
[hardrockwheels@yahoo.com](mailto:hardrockwheels@yahoo.com)

Taiga Ventures  
2700 S. Cushman St.  
Fairbanks, Alaska 99701  
(907) 452-6631

## AERO TECH MAPPING

PHOTOGRAMMETRIC SPECIALISTS



*Providing superior quality mapping productions in a timely manner, while building strong working partnerships.*

- » Digital Imagery & Airborne GPS
- » Digital Topographic Mapping
- » Digital Terrain Models (DTM)
- » Digital Ortho Photography
- » Mining Specialists
- » Mining Updates & Reclamation
- » Volumetric Calculations & Environmental Monitoring

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

**Reno Office**  
Gary Poland  
Phone 775-853-0900  
Fax 775-853-6899  
[garypoland@atmreno.com](mailto:garypoland@atmreno.com)

**Las Vegas Office**  
Leo Torres  
Phone 702-228-6277  
Fax 702-228-6753  
[leotorres@atmlv.com](mailto:leotorres@atmlv.com)

**Phoenix Office**  
Lyle Slater  
Phone 623-242-7656  
Fax 623-242-8939  
[lslater@atmaz.com](mailto:lslater@atmaz.com)



Sierra Environmental Monitoring  
Analytical Testing Services

Water	Hazardous Waste (RCRA)
Wastewater	Mining Industry
Brines	Specialized Testing

Email: [jnava@sem-analytical.com](mailto:jnava@sem-analytical.com)  
Tel: 775-857-2400

Website: [sem-analytical.com](http://sem-analytical.com)



## ADVANCED SURVEYING AND PROFESSIONAL SERVICES

SERVING ALL OF  
RURAL NEVADA

PO Box 56  
Goldfield, NV 89013  
1-775-485-9993, 1-775-482-4163  
[asaps@frontiernet.net](mailto:asaps@frontiernet.net)  
Kevin D. Haskew, PLS #10111

# GEOLOGICAL SOCIETY OF NEVADA



[gsn@gsnv.org](mailto:gsn@gsnv.org) • [www.gsnv.org](http://www.gsnv.org)  
Telephone (775) 323-3500 Fax (775) 323-3599  
2175 Raggio Parkway, Room 107  
Reno, NV 89512  
USA