



GEOLOGICAL SOCIETY OF NEVADA NEWSLETTER

Geological Society of Nevada, 2175 Raggio Parkway, Room 107, Reno, NV 89512
(775) 323-3500 - Hours Tuesday -- Friday, 8 a.m. to 3 p.m. Monday by appointment.

Website: www.gsnv.org • E-mail: gsn@gsnv.org



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CALENDAR OF GSN EVENTS

May 4, 2017
THURSDAY

SO. NEVADA CHAPTER MEMBERSHIP MEETING (1st Thursdays)

The monthly meeting will be held at the Las Vegas Natural History Museum at 900 N. Las Vegas Blvd. Pizza/drinks at 5:30 pm, Talk at ~6:15 pm. **Speaker: Joshua Bonde, UNLV. Title: To Be Announced. Food & Drinks Sponsored by: GEOTEMPS, INC.** Contact Paul Dockweiler for more information: paul.dockweiler@mmla1.com. Details about meeting & field trip on page 6.

May 6, 2017
FIELD TRIP!

May 10, 2017
WEDNESDAY

WINNEMUCCA CHAPTER MEMBERSHIP MEETING (2nd Wednesdays)

The meeting will be held at the Martin Hotel, 94 W. Railroad St., Winnemucca, NV. Refreshments/appetizers at 6 p.m. Talk at 7:00 pm. **Speakers: Andy Jansen, Newmont. Title: "Twin Creeks Mine Update: Underground development of the Vista Shear Zone follows thirty years of surface mining" and Angela Prindle, Newmont to discuss Newmont's sustainability efforts. Food & Drinks Sponsored by: JUST REFINERS.** For more info please contact Jim Carver @ jcarver@silverstandard.com. Details & abstract on page 7.

May 18, 2017
THURSDAY

ELKO CHAPTER MEMBERSHIP MEETING (3rd Thursdays)

The monthly meeting will be held at the Western Folklife Center, 501 Railroad St., Elko, NV. Refreshments begin at 6 p.m. Talk begins at 7 p.m. **Speakers: Michael Harp and Robert Edie, Gold Standard Ventures Corp. Title: "Dark Star Gold Deposit, Railroad District, Elko County, Nevada". Food & Drinks Sponsored by: TIMBERLINE DRILLING.** For more info please contact Mark Travis at: mark.william.travis@gmail.com. Details on page 8.

May 19, 2017
FRIDAY

GSN MEMBERSHIP MEETING (3rd Fridays)

The monthly meeting will be held at the Reno Elks Lodge, 597 Kumle Lane., Reno, Nevada. Drinks @ 6 p.m., Dinner @ 7 p.m., Talk at 7:45 p.m. **Speaker: Derick Unger, NuLegacy Gold Corp. Title: "Iceberg and Avocado Gold Deposits—Carlin-type Deposits in the Cortez Trend, Eureka County, Nevada". Drinks Sponsored by: NULEGACY GOLD CORPORATION.** Cost for Dinner—\$25. GSN Students are free. Please make reservations for dinner with Laura Ruud at: gsn@gsnv.org or call 775-323-3500. Details on page 3.

June 17, 2017
SATURDAY
GOLF
TOURNEY!!

GSN Golf Tournament The GSN's 23rd Annual Golf Tournament will be held on Saturday, June 17, 2017. "Shotgun Start" will be at 1:00 p.m. at the Washoe Golf Course, Reno, NV. **American Assay Laboratories** is the main sponsor again this year! Registration form can be found on page 11.

June 23, 2017
GSN PICNIC!

ALL GSN MEMBER PICNIC—Personally hosted by GSN's Board Members & Directors! Rancho San Rafael Park, Peavine Pavilion, Reno. Details on pg. 6.

G.S.N. MAY MEETING SPONSOR!



FROM THE PRESIDENT
Alan R. Coyner, GSN President 2016-2017
MAY 2017

Greetings to all our GSN members wherever you may be! This is my final newsletter column as your President. I would like to thank the other members of the Executive Committee for their help this past year: **Kelly Cluer** - Vice-President, **Steve Weiss** – Secretary, **Bob Kastelic** – Treasurer, **Molly Hunsaker** – Membership Chair, and **Dave Boden** – Publication Chair. On behalf of all our members I want to thank each of them for their service. In June I pass the torch to **Kelly Cluer** who will lead us forward into the 2017-2018 year. I am sure he will do a fine job and congratulations to **Richard Bedell** who will ably serve as your Vice-President next year. Of course, a special thank you to **Laura Ruud**, our ever-capable Office Manager, for all the time she devotes to making sure everything at GSN runs smoothly.

The April meeting at the Reno GSN was our **Annual Student Poster Meeting** and we had the pleasure of reviewing nine different projects from our Mackay School of Earth Sciences and Engineering students. All of the posters were of very high quality and the members had a lot of fun interacting with the students about their research topics. Congratulations to **Ian Pierce**, **Patrick Quillen**, and **Chelsea Canon** who were awarded the first, second and third prizes. Also, the **GSN Foundation** awarded **Field Camp Scholarships** to eleven students to help support their work at field camp this summer. Training in field methods continues to be an integral part of the Mackay geology program and our Foundation continues to recognize this importance through their scholarship program. I want to thank **GEOTEMPS** for their continued support of our annual student poster meeting.

GSN Reno will wrap up the 2016-2017 year with our Spring Field Trip on May 6 and 7 and a presentation at the May 19 meeting by **NuLegacy Gold** on their work at the **Iceberg and Avocado gold deposits** on the Cortez trend.

I have mentioned in several of my columns that our organization was founded in 1957 and we will mark our **60th anniversary on December 6th** of this year. I also mentioned that we would like to recognize our **oldest member** and the **member that has belonged to the GSN for the greatest number of years**. I definitely enjoyed hearing from many people and had to chuckle a little bit about some of you that thought being in your seventies and joining in the 1970's might qualify you. While admirable they don't hold a candle to the individual that can claim both titles. He is one of our founding fathers. **David "Burt" Slemmons** is 94 years old this year and served as our first Vice-President in 1957. He is one of 22 members that have been named **Honorary Lifetime Members**. Honorable mention goes to our octogenarians including **Peter Hahn**, **William L. Wilson**, **Ted Theodore**, **Lew Gustafson**, **Don Noble**, and **Neville Rhoden**. There may be several others I have missed but I thank them all for their contributions to GSN.

In a letter to Robert Hooke in 1676 Isaac Newton wrote "If I have seen a little further it is by standing on the shoulders of Giants." Each of us in our own way owes something to those who have gone before us. To that small group that gathered in December of 1957 we owe a debt of gratitude to what has evolved into the greatest state-based geological organization in the United States. What will GSN be like in 60 more years? I don't know for sure, but I am confident there will be a GSN as long as there is a group of dedicated individuals committed to the promotion and advancement of the geological sciences, especially as they relate to Nevada.

***The G.S.N. wishes to thank GEOTEMPS, INC. for sponsoring
the APRIL 21, 2017 MEETING SOCIAL HOUR in RENO!!***

GSN MONTHLY MEETING, MAY 19, 2017

SPEAKER: Derick Unger, NuLegacy Gold Corp.

**TITLE: “Iceberg and Avocado Gold Deposits—Carlin-type Deposits
in the Cortez Trend, Eureka County, Nevada”**

Social Hour begins @ 6:00 pm; Dinner @ 7:00 pm; Talk @ 7:45 pm

Location: Reno Elks Lodge, 597 Kumle Lane, Reno NV (across from the Convention Center)

DINNER COST—\$25.00 per person.

Reservations due by 5:00 p.m. on WEDNESDAY, MAY 17, 2017

For dinner reservations, please e-mail gsn@gsnv.org or call 775-323-3500

(Please remember you will be invoiced \$25 if you do not cancel your reservation by May 18)

ICEBERG AND AVOCADO GOLD DEPOSITS—CARLIN-TYPE GOLD DEPOSITS IN THE CORTEZ TREND, EUREKA COUNTY, NEVADA

Roger C. Steininger, Tom Roman, Derick Unger, Garrett J. Frey, and Bryan Kellie

Abstract:

NuLegacy Gold Corporation’s exploration program at Red Hill, Nevada, has discovered two Carlin-type gold deposits, the Iceberg and Avocado deposits. Iceberg is a near-surface oxidized gold system and the newly discovered Avocado deposit is a sulfide-bearing gold system that shows evidence of hypogene oxidization below 400 m. Through detailed outcrop mapping, geophysical surveys, and rock and soil sampling programs, NuLegacy has identified several other promising gold targets on its 98.5 km² property in the Cortez Trend.

The surface at Iceberg is primarily alluvium and Tertiary volcanics overlain by Miocene Northern Nevada Rift basalts. Drilling has encountered a stratigraphic sequence underlying the Rift basalts consisting of an apparent Eocene accumulation of tuffaceous sediments, ash and volcanoclastic rocks.

Stratigraphically below the volcanics are the Devonian Horse Canyon and Wenban formations. The Horse Canyon Formation is a Cortez-area unit consisting of interlayered mudstone, calcareous siltstone, debris flows and minor limestone. The Wenban Formation is a sequence of limestones, turbidites and silty limestone to siltstone/mudstone. All the Devonian units are intruded by felsic dikes of unknown age.

Gold mineralization at Iceberg has been traced along a north-northwest–trending corridor at least 3 km long, several hundred meters wide and several tens of meters thick in at least three horizons: in the Tertiary volcanics, at the Horse Canyon–Wenban contact zone and deeper in the Wenban. Gold in the upper two horizons is oxidized, whereas some of the deeper mineralization is associated with pyrite.

NuLegacy has an extensive 2017 exploration program planned to expand the Iceberg and Avocado deposits, and test new exploration targets.

“FACES OF GSN”

RICHARD M. PERRY

I'm flattered that GSN asked me to do "Faces of GSN", as my path was not the normal one for a geologist. I'll skip the early years and start in 1979 when I met my wife Lisa in the geology department at Cal State Chico. We both graduated with geology degrees in 1981 and went to work in the exploration industry in Reno. My first geology job was working for Bruce Imswiler at NICOR Minerals. After a year of field work, I concluded exploration geology would be a tough road if I ever hoped to have a family.

Lisa and I were married in the little white church in Sierraville, CA, in 1982. Later that year, I started a graduate degree at the Mackay School of Mines. I explained my desire to be a mine geologist to my advisors, Larry Larson and Dan Taylor, who guided me into a curriculum including classes in economic geology and mining engineering. My capstone project in reserve estimation was kriging the Happy Camp deposit, and my thesis was an exploration study of the Mt. Tobin mercury district in Pershing County.

After graduating, my first mine geology assignment was in Goldfield with Blackhawk Mines. Blackhawk controlled the main district in 1984 and was mining some small pits and dumps and processing the agglomerated ore on leach pads. My job was grade control, surveying, and supervising the crushing, haulage and agglomeration crew. At age 25, this gave me my start in production mining. The operation soon played out and the market for geologists was dismal, so I took a job with Ashland Chemical marketing water treatment chemicals and equipment. After training, they sent me to Elko, which was just starting to boom in 1985. I worked for Ashland for five years on mill start-up teams at Barrick, Newmont, Placer and Freeport.

In 1990, I joined Freeport as the Assistant Superintendent at the Big Springs mill north of Elko. Big Springs was the first successful whole-ore roaster in Nevada, but had experienced start-up issues with solution chemistry, my specialty at the time. I later transferring to Jerritt Canyon as the mill superintendent and worked for Paul Lahti and Scott Barr, two important mentors in my career.

Newmont was building their first whole-ore roaster in 1994 and needed an experienced operator, so I joined the Newmont team at Gold Quarry. These were challenging times at Newmont, with the transition from oxide ore to mining refractory ores below the water table. By then, Lisa and I had three young daughters, all born in Elko, keeping us busy on weekends camping, fishing and hunting.

Newmont had new projects coming on-line everywhere at the time, and often dispatched staff from Nevada to assist. After two stints in Uzbekistan and some time in Peru, I was sent to Indonesia as the start-up general manager at the Batu Hijau mine in 1998. Batu was a large mid-grade porphyry copper deposit discovered by Newmont geologists on the island of Sumbawa. At \$2 BUSD in capex, the project included an open-pit mine, concentrator, power plant, port facility, town site, and schools. Newmont was in a downturn in Nevada at that time, allowing us to recruit around 20 experienced operators, engineers, geologists and technical specialists out of Nevada operations. These Nevadans, along with many Australian expats and Indonesian nationals, successfully hired and trained a work force of 3000+ and transplanted an operating culture. By the time my three year stint was over, Batu Hijau was fully permitted and successfully mining and processing 120,000 tons per day of copper ore, producing two percent of world copper production.

On the family front, living in the jungle in a different culture with little news from the outside world was great, but it was nice to get to civilization in Australia, New Zealand or Singapore. Our daughters attended an international school on the mine site. It profoundly changed us, and was the defining assignment in my career. We found Indonesians to be very gracious and welcoming people and made many friends. (continued on page 5)



(R. Perry, cont. from page 4)

Newmont returned us to Elko in 2001, where I took on the role of VP of Newmont North American operations. NA Operations included the Nevada mines, two mines in Ontario, and a joint venture in Mexico. My assignment was to develop a plan to bring new projects on-line sequentially as gold prices improved, while maintaining a 2.5 million ounce per year production profile. In my first year, gold prices dipped below \$300/oz., and the focus was on cost control. By 2003 prices were improving, Newmont completed the Franco-Normandy merger which added the Midas Mine, and shortly thereafter the Turquoise Ridge JV was added by committing processing capacity at Twin Creeks. As gold prices climbed, we took plans for the Chuckar mine, pit laybacks at Twin Creeks and Gold Quarry, a flotation plant at Quarry, Leeville, and Phoenix to the Newmont Board. Except for Phoenix, all were in production by late 2005, when I left Newmont.

Lisa and I decided we wanted our kids to finish school in Elko, so we made the decision not to chase another mining job or move to Denver. After de-stressing for a few months, I spoke with Alan Biaggi at the State DCNR about opportunities and in 2006 joined the State Engineer's office in Elko doing water rights investigations and executing a maintenance program at South Fork Dam. After serving on the planning commission for a term, I was elected and served as an Elko City Councilman. When Alan Coyner announced his retirement as the Administrator for the Division of Minerals, I applied for the job. With all our kids now graduated and both sets of parents near Reno, it made sense. The Commission on Mineral Resources appointed me Administrator in November 2013. So after twenty-something years in Elko, we moved west to Carson City. The move brought me back to GSN, where I had first been a member in 1981. The Division of Minerals has public safety, regulatory, policy and economic development functions within State government. I am honored to work for the State of Nevada, and to be back amongst friends at GSN.



Nevada Reclamation Awards

The Nevada Excellence in Mine Reclamation Award Committee

is seeking nominations for
**outstanding mining or
exploration projects**

in Nevada which exhibit excellent mitigation
of the environmental impacts from mineral
industry activities.

For more information, please contact the
Nevada Division of Minerals at: **775-684-7040**

Or mail your submission to:
Nevada Division of Minerals:
400 West King Street Ste 106, Carson City, NV 89703

or by email to:
ndom@minerals.nv.gov

Deadline for the 2017 award year is: **August 4th, 2017**



The basis of the award is reclamation success, but areas of innovation for the protection of air and water quality, offsite mitigation, wildlife habitat enhancement, cultural preservation and cooperative partnerships will also be considered.

GSN SO. NEVADA CHAPTER MONTHLY MEETING

THURSDAY, MAY 4, 2017

**Location: Las Vegas Natural History Museum
900 Las Vegas Blvd. North**

Time: Food, Drinks begin @ 5:30 p.m.; Talk begins about 6:15 p.m.

Speaker: Joshua Bonde, UNLV

Title: To Be Announced

Food and Drinks Sponsored by:



**ALSO, GSN SO. NV CHAPTER FIELD TRIP, SATURDAY, MAY 6, 2017!
Come Learn about Nevada's Pleistocene Past!**

This trip will be a half day walking tour of Nevada's proposed new Tule Springs State Park. We will be meeting at the Shadow Ridge High School Parking lot at 10:00 am. From there we will consolidate vehicles and head into the park. We will discuss the geology of the North Las Vegas Valley, see some historical sites, and some recent sites!

When: Saturday May 6th, meet at 10:00 am

Where: Meet at Shadow Ridge High School 5050 Brent Ln., Las Vegas, NV

What: Geologic Tour of proposed Tule Springs State Park

Cost: \$20 general/ \$10 student (Includes: Boxed Lunch from Jason's Deli and a field guide) Please RSVP with either Paul Dockweiler or Josh Bonde no later than 4/29 so we can make sure to have our lunch order in on time. In your RSVP please note your lunch choice of sandwich of: turkey, ham, roast beef, vegetarian.



**Your G.S.N. Board of Directors
are personally sponsoring the annual**



**"GSN ALL MEMBERSHIP PICNIC"
At the PEAVINE PAVILION
RANCHO SAN RAFAEL PARK, RENO, NEVADA**

FRIDAY, JUNE 23, 2017, 4:00 p.m.—7:00 p.m.

Please join us and fellow GSN Members for an evening of BBQ, Drink & FUN!

**Please R.S.V.P. to the GSN office by Monday, June 19, 2017
gsn@gsnv.org**



**MINE DEVELOPMENT
ASSOCIATES**

**Thank you to Mine Development Associates
for donating the beer!**

GSN WINNEMUCCA CHAPTER MONTHLY MEETING

WEDNESDAY, MAY 10, 2017

Location: THE MARTIN HOTEL

94 W. Railroad Street, Winnemucca, Nevada

Time: 6:00 p.m.—Appetizers/Drinks; 7:00 p.m.—Talk begins

Speaker: Andrew Jansen, Newmont Mining

Topic: Twin Creeks Mine Update

**and it's a 2-Fer! Speaker #2: Angela Prindle, Newmont Mining
will speak about Sustainability Efforts at Newmont**

Food and Drinks Sponsored by:



Twin Creeks Mine Update

Underground development of the Vista Shear Zone follows thirty years of surface mining

Andrew Jansen

Newmont Mining Corporation, Twin Creeks Mine Operations

Abstract

The Twin Creeks Mine operated by Newmont Mining Corporation is located in Humboldt County, Nevada, approximately 45 miles northeast of Winnemucca. Since 1987, nearly 16 million ounces of gold have been produced from the Mega pit, West pit and Vista pits. Carlin-type mineralization is hosted in late Cambrian through Cretaceous age rocks comprised of Cambrian-Ordovician Comus Formation in Roberts Mountains thrust contact with overlying Valmy Formation basaltic rocks and related siliciclastic sediments. Rocks of the Valmy and Comus Formations are unconformably overlain by coarse clastic and carbonate rocks of the Pennsylvanian-Permian Battle and Etchart Formations, which in turn are overridden by diverse rocks of the Havallah Formation along the Golconda thrust. Cretaceous dacitic dikes with associated hornfels are abundant in the northern half of the mine property.

Carlin-type mineralization is spatially related to north and northeast-trending structures, the northeast structures being truncated by the northerly system, which offset Quaternary gravel. All faults appear to be pathways for gold-bearing fluids. Passive replacement styles of mineralization are common in Comus and Etchart Formation carbonates while brittle deformation with fracture/fault controlled mineralization is prevalent in Valmy Formation units.

As surface mining reaches greater depths, the need for underground resource evaluation becomes imperative. One underground resource currently in development is the Vista Shear Zone, which is accessed from the bottom of Vista Pit Phase 6. Gold mineralization is hosted in Valmy Formation basalts along a northeast-striking shear zone that juxtaposes two contrasting styles of mineralization. Initially, quartz-base metal mineralization consisting of bull quartz, pyrite, sphalerite, pyrrhotite and galena occurs in veins up to 2 feet in thickness (historically referred to as the Galena Vein). Later movement and brecciation of the Valmy basalt, base metal veins and Cretaceous dikes introduces Carlin-type "sooty" sulfide, gold-bearing mineralization.

Although the paradigm shift from surface to underground mining is nothing new to Carlin-type deposits, the Vista Shear Zone is an example of the continuous exploration potential within the district and marks a new and exciting chapter in the evolution of Twin Creeks.

GSN ELKO CHAPTER MEMBERSHIP MEETING

THURSDAY, MAY 18, 2017

**Location: The WESTERN FOLKLIFE CENTER
501 Railroad Street, Elko, Nevada**

Time: Refreshments @ 6:00 p.m., Dinner @ 7:00 p.m.

Speaker: Michael Harp and Rob Edie

Title: Dark Star Gold Deposit, Railroad District, Elko County, Nevada

Food and Drinks Sponsored by:



Abstract:

**Dark Star Gold Deposit, Railroad District, Elko County, Nevada
Michael T. Harp and Robert J. Edie
Gold Standard Ventures Corp.**

The Dark Star deposit occurs in a linear, north-northeast striking horst in the footwall of two major faults that bound the east and west flanks of the deposit. The west flank of the horst is bounded by the West Fault, which is a west dipping, north-northeast striking, thrust fault that was reactivated during Eocene extension with normal, down to the west displacement. The eastern flank of the horst is bounded by the Dark Star Fault, a steeply east dipping, north-northeast striking, dike filled normal fault. Eocene volcanic rocks of the Indian Well Formation are present in the hanging wall of this fault along the east side of the horst. The center of the horst is dissected by the Ridgeline Fault, a steeply east dipping, north-northeast striking, normal fault. The Ridgeline Fault is an important control on gold grades with higher grade gold mineralization present in its hanging wall. The highest grades in the deposit occur at the intersection of the Ridgeline fault with cross cutting west-northwest faults.

Gold is hosted in Pennsylvanian-Permian carbonate and siliciclastic rocks, which Smith and Ketner mapped as undifferentiated Tomera and Moleen Formations. Re-logging by Gold Standard geologists of 65 historic RC drill holes and logging of 51 core and RC holes drilled by Gold Standard in 2015 and 2016 defined three informal local carbonate-dominant rock units. The uppermost rock unit varies in thickness from 0 to 95 m and is a silty limestone-dominant rock package with interbeds of coarse calcareous sandstone, coarse debris flow conglomerate, and minor silty mudstone. The middle unit is up to 160 m thick and is a thick bedded debris flow conglomerate composed of chertified biomicrite clasts with a silty limestone to calcarenite matrix and abundant fossil fragments. It also contains minor interbeds of bioclastic limestone, calcarenite and silty limestone. The lower unit is a silty limestone with interbedded bioclastic limestone, calcarenite, and minor beds of calcareous sandstone and debris flow conglomerate. West of the Ridgeline Fault, the Penn-Perm rock units dip 30° to 35° to the west. The West Fault is a thrust that placed Mississippian siliciclastic rocks over the Penn-Perm carbonate rocks and acted as a cap to the system, focusing gold at this contact. A broad, open synform occurs in the hanging wall of the Ridgeline fault with higher grades localized in the axis of the fold. Rhyolite and granodiorite dikes or sills were intruded along some major structures and lithologic contacts.

Mineralization is well developed in the coarse debris flow conglomerate of the middle unit, which is constrained between two silty limestone dominant units. Gold bearing fluids were channeled along the contact of the upper silty limestone unit with the underlying debris flow conglomerate unit. The silty mudstone at the base of middle conglomerate unit is stratigraphically above the lower silty limestone and acted as an aquitard forming a base to the stratiform gold system. Hydrothermal alteration of the upper silty limestone and middle conglomerate units includes weak to moderate silicification, decalcification, argillization and oxidation. Zones of crackle to collapse brecciation are common and occur near faults. These breccia zones are not directly associated with higher grades in the deposit. Alteration of the lower silty limestone unit is characterized by decalcification, weak oxidation, argillization, and minor silicification. The Dark Star gold deposit is overwhelmingly oxidized and cyanide soluble recoveries average 88%. Gold values are generally consistent throughout the deposit with higher grade gold focused at the top and base of the middle conglomerate unit. Some of the best oxide intercepts include:

DS16-08: 126.2m of 4.07 g/t Au from 165.2 to 291.4m

DS16-03B: 101.2m of 1.54 g/t Au from 101.5 to 202.7m

DS15-13: 97.0m of 1.56 g/t Au from 149.0 to 246.0m

Harp, M.T., Edie, R.J., Jackson, M.R., Koehler, S.R., Norby, J.W., Whitmer, N.E., Moore, S., and Wright, J.L., 2016, New Discovery within the Dark Star Corridor, Railroad-Pinon District, Elko County, Nevada (abst): Association for Mineral Exploration British Columbia, Mineral Exploration Roundup 2016, Vancouver, abstract volume, p. 44.

Thank you to our generous sponsor for the So. Nevada Chapter meeting in APRIL



Thank you to our generous sponsors for the Elko Chapter meeting in APRIL



Thank you to our generous sponsors for the Winnemucca Chapter meeting In APRIL



borehole geophysics / hydrophysics



NEW FROM NBMG!!

Nevada Mineral and Energy Resource Exploration Survey 2015/2016

Authors: Michael W. Ressel and David A. Davis
Year: 2017

Series: Exploration Survey ES-2016

Version: previously issued as "Nevada Exploration Survey" by Nevada Division of Minerals; second issue of the new NBMG series

Format: 16 pages, color

Download/purchase: <http://pubs.nbmng.unr.edu/NV-exploration-survey-2016-p/es2016.htm>

The Nevada Bureau of Mines and Geology (NBMG) carried out an online survey of companies exploring for new metal, industrial mineral, and geothermal resources in Nevada. The Nevada Commission on Mineral Resources and the Nevada Division of Minerals commissioned and provided partial support for the survey. The impact of mineral and energy production from existing resources on the Nevada economy is well known. However, the impact of exploration activities, which focus on discovering new resources, is poorly understood due to limited data. Exploration activities are burdened with high risk as substantial investments are not guaranteed to result in mineable resources. Indeed, only rarely do exploration programs result in successful resource extraction, and then only after many years of capital investment and development activities. Despite this, exploration success is imperative for the continued well-being and sustainability of natural resource industries in Nevada.

A goal of this survey was to gather data to better assess the impact of exploration on Nevada's economy. The survey's focus was to collect data on company expenditures in Nevada and the number of employees involved in exploration in 2015 and 2016. Expenditures were subdivided by various categories and participants were asked to rate the relative importance of external factors on their exploration programs. The survey requested participation from 296 companies presumed to explore for mineral and geothermal resources in the state. Of these, responses from 86 companies were obtained, another 23 responded that they no longer explored in Nevada, and 54 non-responding companies were researched using public domain sources for their 2015 and 2016 Nevada expenditures.

The results verify that Nevada exploration activities were substantially curtailed as a result of the continued global decline in commodity prices since peak activity during 2011–2012, when the last survey was undertaken. Major findings are included in this publication.

Exploration survey 2015/2016 flyer:

<http://nbmg.unr.edu/docs/es2016flyer.pdf>



GSN'S 23rd ANNUAL GOLF TOURNAMENT

WASHOE GOLF COURSE, RENO, NV—SATURDAY, JUNE 17, 2017



Sign up Today!!



The GSN's 23rd Annual Golf Tournament will be held on **Saturday, June 17, 2017**. We are pleased to have **American Assay Laboratories** as the main sponsor this year! "Shotgun Start" will be at 1:00 p.m. at the Washoe Golf Course, Reno, NV.

Registration form can be found on Page 11 and also on the GSN Website: www.gsnv.org .

Members can sign up alone or as a two-, three-, or foursome. Each GSN Member is allowed ONE guest. The Registration fee will include 18 holes of golf, dinner, and drink coupons. The GSN Foundation will be selling Mul-ligan's for \$5 each or 5 for \$20 with a limit of five per person. The Foundation will also be selling raffle ticket for \$5 each or 5 for \$20. We always have great prizes donated for the raffle! All proceeds raised will benefit the GSN Foundation. Please join us for a great time and thank you for supporting the GSN Foundation.



Some fun pictures from 2016!





Attention GSN Golfers!!



GSN's 23rd Annual Golf Tournament is Saturday, JUNE 17, 2017

We are pleased to have American Assay Laboratories as the sponsor of the Golf Tournament!

"Shotgun Start" will be at 1:00 PM at the Washoe Golf Course, 2601 Foley Way, Reno, Nevada.

The \$50 Registration fee will include 18 holes of golf, cart, BBQ dinner, prizes, snacks, soda, water and Great Basin beer!! All golfers please be at the course by 12:15 pm to ensure a timely start. Shotgun Start: 1:00 p.m. A fabulous BBQ Dinner will be served at the Washoe Golf Course as soon as all Golfers are done. Each GSN Member may bring one Guest for Golf. The G.S.N. will sponsor up to 4 GSN Student Members (comped for golf and dinner).

The GSN Foundation would appreciate any items that companies or individuals would like to donate to the raffle!

The GSN Foundation will sell raffle tickets for \$5.00 each or 5 for \$20.00. You can now pre-purchase as many as you like! Mulligans will be sold for \$5.00 each or 5 for \$20.00, no more than five Mulligan's per person. You can pre-purchase below!
All Mulligan and Raffle Ticket sales will go directly to the GSN Foundation!

Please provide the following information for each golfer and guest:

Golfer Name: Email: Phone:

Teamed With:

Golfer Name: \$20-BBQ Guest Name :

Golfer Name: \$20-BBQ Guest Name :

Golfer Name: \$20-BBQ Guest Name :

\$20-BBQ Guest Name :

Pre-Purchase Foundation Raffle Tickets \$5/ea or 5/\$20 (enter how many):

Pre-Purchase Foundation MULLIGANS \$5/ea or 5/\$20 (Max 5 each - enter how many):

Total Amount Included with this form:

\$50.00 fee per player includes golf, snacks, drinks, dinner and prizes.

\$20.00 fee to be paid for dinner & drinks only (those not golfing - BBQ Guest)

Payment Type: Check# Visa Master Card American Express Discover

Card Number: Exp. Date: 3-Digit Security Code:

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G.S.N. Student Poster Night

By Elizabeth Zbinden

It has become a tradition now to invite students from the Earth Sciences to enter a poster competition showcasing their projects at the April meeting in Reno. This year we had a well-rounded set of nine posters from departments and programs throughout geosciences and geoenvironment. They included class projects and individual projects at the bachelor's, master's, and doctoral levels presented by:

1. **Camille Amdall** - "A seismic survey across a suspected fault in Mason Valley, Nevada."
2. **Chelsea Canon** - "Using Arrastras as Evidence of Early Mexican Mining Activity in Nevada."
3. **Naci Umut Duru** – "Effects of Reduced Sulfur Species on the Effectiveness of Gold and Silver Cyanidation."
4. **Laura O'Connor** - "Identifying and Quantifying Major Heat Sources in Underground Mines using a Continuous Climatic Monitoring System." (co-authors: Pedram Roghanchi, Charles Kocsis, and Andrew Powell)
5. **Ian Pierce #1** - "Slip rate of the West Tahoe Fault and the age of glacial deposits near Lake Tahoe, California."
6. **Ian Pierce #2** - "Characterizing the Quaternary expression of active faulting along the Olinghouse, Carson, and Wabuska lineaments of the Walker Lane."
7. **Patrick Quillen** - "Buffalo Canyon: An Oligocene Greisen-Like Reduced Intrusion-Related Gold Deposit in the Union Mining District, Nye County, Nevada."
8. **Brandon Rasmussen** – "Altered Basalts from Hawaii as an Analog for Alteration on Mars."
9. **Darren Roach** - "Classifying Quality of Downtown Lots in Reno, Nevada for Urban Greenspace Using Skyview Factor." (co-authors: Joshua Bertain, Zac Ormsby, Jason Wurtz, Teresa Campbell, and Justin White)

And the prizewinners were: First Prize: Ian Pierce (poster #1); Second Prize: Patrick Quillen; Third Prize: Chelsea Canon.

The new twist this year is that we did not have an after-dinner speaker. Instead, there was after-dinner time to return to the posters and continue the before-dinner discussions. That turned out very well. Attendees took good advantage of the extra time to view posters they hadn't gotten to earlier.

Thank you to all the students who participated! We always enjoy learning about hot new research questions being investigated, and what creative approaches the students have taken towards answering those questions.



Chelsea Canon explaining her arrastra study to Alan Wallace



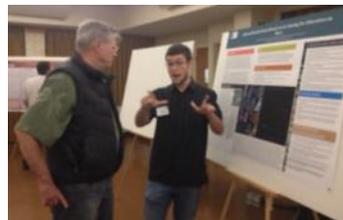
Presenters (l to r): Brandon Rasmussen, Camille Amdall, Ian Pierce, Elizabeth Zbinden (in back), Patrick Quillen, Chelsea Canon, Umut Duru, Laura O'Connor, and Darren Roach



Ian Pierce draws a crowd of Ed Hanley, Tom Temkin, and Larry McMaster with his study of the West Tahoe Fault



Judge Elizabeth Zbinden presented the checks to our 1st, 2nd and 3rd Place Winners!



Ed Hanley gets the story about altered basalts from Brandon Rasmussen



Patrick Quillen discusses Buffalo Canyon with Chris Henry



Laura O'Connor discusses heat sources in underground mines with Earl Abbott

GSN Foundation Hands out Field Camp Grant Awards

On Friday, April 21st at the GSN meeting in Reno, eleven Mackay Students were the recipients of grants to help them with the costs of their field camp tuition this summer. As many of you may remember, Field Camp eats into your ability to earn summer money for the regular school year and costs a lot! The GSN Foundation is happy to be able to help curb the costs of this very valuable course in their academic careers. Thank you again to the generous members who donated to the Foundation this year and especially to those who designated their donations to the Field Camp Grants in memory of Bruce Miller.

The winners pictured below (in alphabetical order) are: Domenic Aguilar, Mary Branigan, Dylan Carstens, Larissa Cunningham, Keiichiro Hasebe, Andrew Pavlu, William Stark, William Taylor, Erin Warnock, Leighton Werschky and Lianza Yap. Also picture are GSN Foundation Board Members Robert Thomas and Pamela Klessig who presented the checks on behalf of the Foundation.



BABY ANNOUNCEMENT!

Two of our GSN Members, Kristin Benchley and Caleb Stroup, welcomed a beautiful baby girl on March 16, 2017! Nia Lu Benchley Stroup weighed 8 lbs. 13 oz. and was 20" long when she was born. Congratulations to the proud, elated, and (I'm guessing) exhausted parents!



Thank you to our generous donors in APRIL!!

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G.S.N. Student Dinner Fund

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Activity Update

Mike Brady, MARCH 2017

www.activityupdate.com

NEVADA

West Kirkland Mining Inc.(75%) announced that recent drill results at the Three Hills Project include 162-165 meters @ 0.6 gpt Au (TH17R-01); 93-139 meters @ 0.6 gpt Au (TH17R-02); 134-146 meters @ 0.5 gpt Au (TH17R-03) and 143-146 meters @ 0.6 gpt Au (TH17R-04). (resource = 9,906,000 tonnes @ 0.58 gpt Au measured+indicated) *Press Release:* March 16

Logan Resources Ltd. announced that it acquired an option to earn a 100% interest in the Angel Wing Property from Pilot Gold Inc. for \$500,000 in cash and shares. *Press Release:* March 16

Stakeholder Gold Corp. announced that it acquired an option to earn a 60% interest in the Goldstorm Property from Mountain View Gold Inc. for \$40,000 cash, 6,000,000 shares and \$1,500,000 in exploration expenditures over 2 years. *Press Release:* March 8

Radius Gold Inc. announced that it acquired an option to earn a 100% interest in the Aurora/Bald Peak Property from Ely Gold + Minerals Inc. for \$35,100 cash and \$25,000/year payments. *Press Release:* March 6

Gold Resource Corp. announced that recent drill results at the Gold Mesa Project include 9.14-21.33 meters @ 2.42 gpt Au (GMA-084); 6.1-19.82 meters @ 1.31 gpt Au (GMA-088); 7.62-10.67 meters @ 6.25 gpt Au (GMA-096) and 9.14-16.76 meters @ 2.26 gpt Au (GMA-102). *Press Release:* March 21

Gold Resource Corp. announced that recent drill results at the Mina Gold Project include 18.29-20.18 meters @ 1.39 gpt Au (MGAT-02); 0-12.19 meters @ 2.01 gpt Au (MGAT-03); 12.19-15.24 meters @ 1.16 gpt Au (MGAT-04) and 6.1-30.18 meters @ 1.97 gpt Au (MGAT-05). (resource = 890,700 tonnes @ 3.51 gpt Au inferred) *Press Release:* March 23

Premier Gold Mines Ltd. announced that based on recent drill results at the McCoy Cove Project, resources aggregate 614,000 tonnes @ 11.57 gpt Au indicated and 3,378,000 tonnes @ 12.17 gpt Au inferred. (was 430,000 tonnes @ 10.47 gpt Au indicated and 880,000 tonnes @ 8.08 gpt Au inferred) *Press Release:* March 21

Canamex Resources Corp. announced that it acquired an additional 30% interest (to hold 100%) in the

Bruner Property from Patriot Gold Corp. for \$1,000,000 in cash and shares. (resource = 10,300,000 tonnes @ 0.72 gpt Au indicated) *Press Release:* March 20

Gold Standard Ventures Corp. announced that it acquired an additional 20,900 acres of claims immediately south of the Pinion Project from private interests for \$501,000 cash. *Press Release:* March 23

Logan Resources Ltd. announced that recent drill results at the Brik Project include 1.52-35.05 meters @ 1.11 gpt Au (BK1601); 19.81-36.58 meters @ 0.44 gpt Au (BK1602); 94.49-108.2 meters @ 0.47 gpt Au (BK1603) and 0-28.96 meters @ 0.46 gpt Au (BK1604). *Press Release:* March 1

Entrée Gold Inc. announced that it would spin-off its Ann Mason, Nevada and Lordsburg, New Mexico properties into a new company called Mason Resources Corp. (resource @ Ann Mason = 1,400,000,000 tonnes @ 0.32% Cu, 0.03 gpt Au measured+indicated) *Press Release:* February 28

Desert Star Resources Ltd. announced that it acquired an option to earn a 100% interest in the Iron Butte Property from private interests for \$1,000,000 cash and 1,500,000 shares over 6 years. (resource = 30,500,000 tonnes @ 0.62 gpt Au inferred) *Press Release:* March 6

Corvus Gold Inc. announced that recent drill results at the North Bullfrog/Western Zone Project include 47.24-184.4 meters @ 0.45 gpt Au (NB17-332); 88.39-190.5 meters @ 0.38 gpt Au (NB17-333); 76.2-155.45 meters @ 0.31 gpt Au (NB17-334) and 64.01-92.96 meters @ 0.49 gpt Au (NB17-335). (resource @ North Bullfrog = 26,180,000 tonnes @ 1.0 gpt Au measured+indicated) *Press Release:* March 14

Noram Ventures Inc. announced that recent drill results at the Clayton Valley/Zeus Project include 0-15.24 meters @ 0.130% Li (CV2-21); 1.22-12.19 meters @ 0.135% Li (CV2-22); 0-13.72 meters @ 0.104% Li (CV2-23) and 0-6.61 meters @ 0.112% Li (CV2-27). *Press Release:* March 27

GSN 2017-2018 ELECTION RESULTS

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David Shaddrick, Rubicon Resources

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Treasurer: Andrew Smith, Silver Standard Resources Inc.
Membership Chair: Chad Peters, Premier Gold Mines USA
OR Membership Chair: Kyle Larson, Extradocs Exploration, LLC
(TIE VOTE! RACE TO BE DECIDED AT THE NEXT MEETING WITH PISTOLS @ 20 PACES!)

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Vice President: Nathan Eck, Barrick Gold Exploration Inc.
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Secretary: Chelsea Raley, Barrick Gold Exploration, Inc.
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Please thank your outgoing Officers who have served the G.S.N. so well!

GSN President—Alan Coyner

Immediate Past-President—Elizabeth Zbinden

GSN Elko Chapter:

Allie Phillips—V.P.; Nathan Wright—Secretary; Christine O’Neill—Membership Chair

GSN Winnemucca Chapter:

Jim Carver—President; Peter O’Byrne—Treasurer; Curtis Johnson—Membership Chair

Thank you for volunteering your valuable time to GSN!

SCIENCE

Fracking isn't contaminating groundwater, study finds

Published April 25, 2017 [Fox News](#)

New research claims that fracking isn't contaminating groundwater. (Reuters, File)

A major anti-fracking argument by environmentalists may not have the facts to back it up, a new study conducted by Duke University found.

Fracking has not contaminated groundwater in northwestern West Virginia, according to the [peer-reviewed study](#) published this month in a European journal.

"Based on consistent evidence from comprehensive testing, we found no indication of groundwater contamination over the three-year course of our study," explained Avner Vengosh, the professor of geochemistry and water quality at Duke's Nicholas School of the Environment.

The growing industry could help create as many as 3.5 million jobs by 2035, according to the U.S. Chamber of Commerce.

While the study concluded that fracking didn't contaminate groundwater, the researchers did say accidental spills of fracking wastewater could be dangerous to surface water in the area.

"However, we did find that spill water associated with fracked wells and their wastewater has an impact on the quality of streams in areas of intense shale gas development," Vengosh added.

"The bottom-line assessment," he continued, "is that groundwater is so far not being impacted, but surface water is more readily contaminated because of the frequency of spills."

To complete the research, water samples from 112 drinking wells in northwestern West Virginia were evaluated during a three year period. Twenty of the water wells were sampled prior to drilling or fracking started in the area in order to obtain a baseline for later comparisons.

Tests demonstrated the presence of saline groundwater and methane in both the pre-drilling and post-drilling well water samples. But the samples had a chemistry slightly but distinctly different from the methane and salts found in fracking fluids and shale gas. The findings indicated that the elements occurred naturally in the region's permeable rock and weren't related to the result of recent shale gas operations at the site.

The study appears in the journal *Geochimica et Cosmochimica Acta* published by Elsevier.



OTHER UPCOMING EVENTS

2 May 2017 Arizona Geological Society meeting, Speaker: Robert Glennon. Title: America's Water Crisis and What to Do About It.. 6 p.m. to 9 p.m. at the Sheraton, 5151 E Grant Rd. (& Rosemont), Tucson, AZ Click on the link for more info and online registration: [Robert Glennon presents America's Water Crisis and What To Do About It](#)

4 May 2017 Nevada Petroleum & Geothermal Society, Reno, Nevada monthly meeting. Cocktails at 6:30 PM, Dinner at 7:00 PM, Ramada Reno Hotel; 1000 East 6th St., Reno NV 89512. **Speaker: Dr. Bridget Ayling, Professor, Director Great Basin Center for Geothermal Energy, UNR, Reno, NV. Topic: Engineered Geothermal Systems: The Habanero Project (Australia) and the Fallon FORGE project (USA).** Please make reservations by Tuesday, May 2, 2017 by using the following link: <https://docs.google.com/forms/d/e/1FAIpQLSfImr0IcRQg335rGH4-EDOpM6u-qPQuHuuLkSKXIdrJGpvFA/viewform>

8 May 2017 SME Northern Nevada Section Monthly Meeting. Circus-Circus Mandalay Room, Reno NV. **The meeting will feature a presentation by Rocky Pray, Project Manager for Newmont – Long Canyon Project.** Happy Hour @ 6 pm, Dinner @ 7 pm. Send RSVP by 5 PM, Wednesday, May 3rd to Sarah Lightner [775-746-7147](tel:775-746-7147) or NNEvSME@gmail.com

15, May 2017 DREGS (Denver Region Exploration Geologists), Speaker: James Franklin, Title: "Ring of Fire and Beyond—A New Metallogenic Super-Domain". Social 6 p.m., Presentation 7 p.m. at Berthoud Hall, Room 241, CO School of Mines, Golden. For more info. contact James Piper at geopros@q.com

17 June 2017 GSN Golf Tournament. See details in this newsletter on page 10 and Registration form on page 11.

23 June 2017 GSN Board Hosted Picnic for All Members, Rancho San Rafael Park. 4-7 p.m. More information will be emailed to members in June!

17 July 2017—GSN Reno Aces Night SPONSORED BY NATIONAL EWP! Reno Aces Ballpark, 6 p.m. BBQ, 7 p.m. Gametime. Details and sign up sheet will be emailed to all members as we get closer to this event.

Obituary: Arloa Rae Woolford

Monday, March 06, 2017 1:00 AM



Arloa Rae Woolford, 79 of Winnemucca, Nevada passed away on February 25, 2017 at her home. She was born January 23, 1938 in Elko, Nevada daughter of Wilbur (Tim) V. Timmons and Edna G (Wilkerson) Timmons of Midas, Nevada.

She graduated from Humboldt County High School in Winnemucca, Nevada and attended St. Mark's School of Nursing and Westminster College in SLC, Utah for two years, transferring to UNR for one year. She also attended Valley College in Los Angeles for one year and took several special community college classes including Russian, Geology and various computer classes.

On April 23, 1960, she married Lynn James Woolford in Winnemucca, Nevada. They lived most of their married life in Canyon Country, California. For over 23 years, she traveled to locations throughout the world as part of a military project her husband was involved in. She worked for the U.S.A.F as the office administrator in Winnemucca (the radar systems), and later with the Department of Transportation in their Right of Way Division in Carson City. She also worked for the Flying Tiger Airlines in their power plant office maintaining the required FAA paperwork on all parts of each engine. From 1965 until 1980, she remained at home raising three sons, but was active in community activities. She moved back to Winnemucca, Nevada in 1983 to manage several properties/duplexes and had a private road named after her parents "Timmons Way". She and Lynn divorced in 1993. She went to work for Icarus Exploration Co. (now Grand Teton) as Mine Administrator for a small gold and silver operation in Northern Nevada in 1988. She remained their maintaining the property and continual monitoring for necessary environmental reports until 1996.

Arloa was very active in the community of Winnemucca and was voted Winnemucca Chamber Woman of the Year for 2 different years. She was very active in Women in Mining participating at both the National level and local level. She was very dedicated and had a deep passion to the Nevada Mining Association. She was a leader in the Education and Foundation Programs and was President of the Foundation from May 1993 until the time of her death. She was a member of the Nevada Mining Association Education Committee since 1989 and served most of those years as 6-8 Grade Coordinator. Arloa was also awarded the Women in Mining National Distinguished Award in 1995 (given to a member who has gone above all duties to promote National Women in Mining and who has shown leadership in helping with educating their members as well as the public about mining and minerals and have promoted the industry in other ways). She played a huge part in the Nevada Mining Association and was awarded the National Mining Hall of Fame Prazen Award in 2014. Arloa travelled across the country promoting Mining and its importance and was a leader in their Education Programs. She did teacher workshops and taught school children about the numerous careers in mining. The Women in Mining Education Foundation was selected as the recipient of the 2013 Minerals Education Coalition Partnership while she was President of the Education Foundation. She has been a member of the Winnemucca Chapter Women in Mining since 1988 and served as Secretary, Treasurer, National Representative and 2 years as National Vice President. Since the WIM Education Foundation was formed, she organized and taught at regional and national science teacher conventions beginning in Las Vegas in 1993. This involved the planning, financing and logistics of organizing a workshop in whichever city the National Science Teacher Association had picked for their convention. She was instrumental in writing and printing a brochure on cyanide, "The Good, The Bad and The Truth", that has been distributed to schools, businesses, libraries as well as Chamber of Commerce offices throughout the West. She further was responsible for the development of new hands-on activities for students including the "Minerals Through Geography" game that was copyrighted. She was also very active in the Nevada Mining Association, Nevada Eastern Star (Silver State Chapter No. 6 of Winnemucca affiliated with them in 1984) and Rainbow Programs International Order serving as Grand Deputy for this area for 10 years. She joined Eastern Star June 14, 1969 at Old West Chapter #642 in Newhall California. Arloa was involved in many activities in Winnemucca including the annual Mule Races, Rodeo and TriCounty Fair & Stampede. She served on the Regional Planning Commission for 4 years and the county Ag District Board for 5 years and the Rodeo Board from 1985-1989. Arloa was recognized in 1992 by Governor Bob Miller of Nevada as a leader in minerals education.

Arloa is survived by her three sons: Tim (Kathy) Woolford of Washoe Valley, Nevada, Al (Kathy) Woolford of Platteville, Wisconsin and Mark (Danielle) Woolford of Bakersfield, California. Arloa was active in their sport, school activities, and served for 3 years as treasurer for a large athletic organization as well as coach for their cross-country and track teams. She also volunteered in their schools. She is also survived by her 7 grandchildren: Jarod and Derek Woolford, Adrienne (fiance Matt Riley) and Kassondra Woolford (fiance Phil Burton), Chloe, Samuel and Lucas Woolford. She is further survived by 3 great grandchildren: Allison, Landon and Tucker Riley. Arloa was preceded in death by her parents Wilbur (Tim) V. Timmons and Edna G (Wilkerson).

A memorial service has tentatively been set for Saturday, June 10th in Winnemucca, Nevada. Arloa wished to be cremated.

Online condolences may be expressed to the family at www.sonomafuneralhome.com. In lieu of flowers, a memorial will be established for an educational scholarship with Women in Mining.

Arloa loved educating people about Mining and how important Mining is. She was an avid San Francisco 49ers fan. She enjoyed spending time with her family and friends and was very dedicated to her community. When she could, Arloa would watch her grandchildren in their sports (soccer, motocross) and music events (concerts). She was an avid reader enjoying just about all types of books but especially historical novels. She also enjoyed working in her flower garden.

She will be sadly missed by all who knew her.

Looking to purchase a used ASD Terra Spec instrument.

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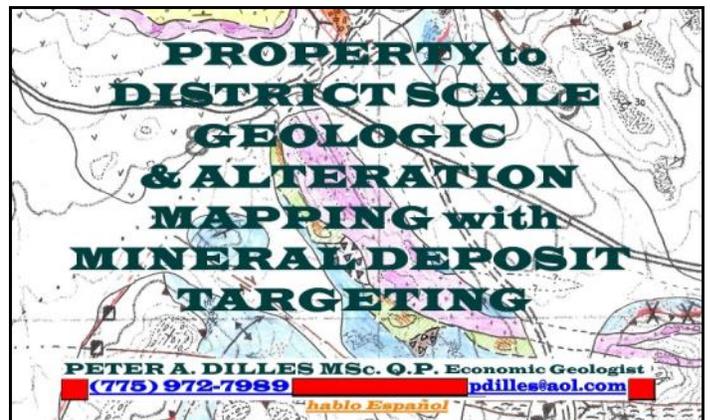
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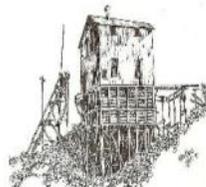
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MORE TRAVELLING GSN BACKPACK PHOTOS (submit your photos anytime!):

BOTSWANA ELEPHANTS, SEPTEMBER 2016

(submitted by Opal Adams)



SOUTH YUBA RIVER AND HIKING TRAIL, APRIL 23, 2017

(submitted by Laura Ruud)

