November 2016 Motherlode Monitor Newsletter

2017 Membership Time

It is time to renew your membership for 2017 or join the Sierrans as a new member. Please find Individual/Family Membership and Corporate Membership Forms attached for your use. Forms can also be found at www.sierrans.org. We look forward to building our membership further in 2017 and look forward to having you on board!! Become a voice for the resource industries and associated service industries in the Sierra Nevada Mountains.

Upcoming Events

December 5-9, 2016 American Exploration and Mining Association (AEMA) 2016 Annual Meeting, Exposition, and Short Courses - Nugget Casino Resort, 1100 Nugget Avenue, Sparks, NV.

AEMA will be holding their 122nd annual meeting, exhibition, short courses, and other events. Find information at www.miningamerica.org.

December 5, 2016, 6 p.m., Grass Valley Field Trip Participants Reception and Pre-tour Overview, AEMA Event - Nugget Casino Resort, 1100 Nugget Avenue, Sparks, NV.

Participating AEMA members, who plan to attend the Grass Valley Field Trip scheduled for December 6th (see below) are to meet for a reception and pre-tour overview.

December 6, 2016, 6:45 a.m. Grass Valley Field Trip, AEMA Event - Commencing and ending at the Nugget Casino Resort, 1100 Nugget Avenue, Sparks, NV.

The Sierrans are hosting a field trip to the Grass Valley Historic Mining District and Yuba Goldfields on December 6th for participating AEMA members. The field trip is an event that is part of the American Exploration and Mining Association 2016 Convention in Sparks, NV. Participants are to depart from the bus entrance on the ground floor of the Nugget Casino Resort a 6L=:45 a.m.

The tour will feature dredge mining and reclamation activities in the Yuba Goldfields, a traditional Cornish Miners' lunch at the historic Holbrooke Hotel in Grass Valley, and a tour illustrating historic hardrock mining technology at the North Star Power House and Pelton Wheel Museum in Grass Valley.

The noon luncheon at the Holbrooke Hotel for the tour group includes a performance by the Cornish Choir (led by Eleanor Kenitzer). The menu comprises vegetarian or beef pasties, salad, and pie served with coffee, iced-tea, or water.

Members of the Sierrans are invited to attend the lunch and museum tour at their own cost of $20.00 per person. RSVPs are required by November 28, 2016 and should be sent to Pat Nelson at plnelsonco@gmail.com or Dave Watkinson at dwatkinson@sierrans.org. Alternatively, call Dave at (530) 271-0679 Ext 101. Payment may be made in cash or check to Dave before December 1, 2016.

December 14, 2016, 10:00 a.m., Sierrans' Board of Directors Meeting – 431 Crown Point Circle, Suite 150, Grass Valley, CA.

The Sierran Board will meet to discuss the Sierrans 2017 Business Plan and budget.

Sierrans for Responsible Resource Development
P.O. Box 404, Grass Valley, CA 95945
Phone: (530) 271-0679
www.sierrans.org

December 14, 2016, 12 noon, Sierrans 'Membership Meeting, Mercury Deposits of the California Coast Ranges and Their Environmental Impacts, Bill Motzer of Todd Groundwater - Scheduled at 431 Crown Point Circle, Suite 150, Grass Valley, CA. Please RSVP to Dave Watkinson at dwatkinson@sierrans.org or (530) 271-0679 Ext 101 by December 7th if you plan to attend. Lunch will be provided with a suggested donation of $5 per person if you wish to participate in the lunch.

Mercury (Hg) deposits occur throughout California's Coast Ranges: e.g., *New Idria* (the largest producer), *New Almaden* (west of San Jose), and *Clear Lake* in the Mayacamas Mining District (the second largest). The major ore is red *cinnabar* [mercury sulfide: HgS] although a black variety (polymorph), *metacinnabar*, also occurs. Ores were deposited from hydrothermal ("hot spring") activity, generally along active faults and associated extension fractures in Jurassic to Cretaceous [~200 to ~100 million year old (Ma)] Franciscan Complex host rocks. These were altered by the hot waters producing a *silica carbonate* rock. Hydrothermal activity is younger than the host rocks, ranging from Miocene (~23 Ma) to Pleistocene (~2.6 Ma). Ore deposits typically occur as masses, veins, and disseminations ranging from ≤1,300 to ≥600,000 tonnes (t), grading from ≤0.23 to ≥0.65% Hg. Coast Range Hg sources may be from underlying petroliferous sedimentary rocks.

Hg production from these deposits was rather straightforward: mined cinnabar from either run of mine or crushed ore was roasted at ~600 ^{o}C in a rotary cylinder-kiln liberating elemental gaseous Hg, which condensed as liquid Hg in columns and stored in metal flasks. Roasting also generated volatile SO_2 and possibly some residual gaseous Hg^0 and $HgCl_2$ subsequently vented through stacks to the atmosphere. Calcine wastes were deposited in loose piles in waste dumps; calcines contained unreleased metacinnabar and introduced impurities such as Fe, Se, and Zn that impeded metacinnabar conversion back to cinnabar upon cooling.

Except for the Almaden Quicksilver County Park and its historic trail, few old Hg mines are readily accessible or open to the public. Prior to European discovery and mining, the Ohlone people used red cinnabar from the New Almaden Hg deposit for pigment and paint. For more than 125 years, from 1845 until 1976, it became a busy mining center with seven mines producing nearly 38.1 million kg of valuable liquid Hg used for amalgamating fine placer and lode gold, Civil War explosives, Victorian glass, medicines, thermometers, and 20th century battery cells. From the 1850s through the 1880s, Hg used to recover fine gold (as Hg-Au amalgam) washed out of hundreds of Mother Lode placer deposits. On an industrial scale, this occurred when hydraulic placer-gold mines are reported to have washed about 1.15 billion m^3 of sediment into San Francisco Bay accompanied by an estimated 45 million kg of unrecovered and escaped Hg-Au amalgam.

Additional global environmental Hg sources include geogenic (natural) occurrences from volcanoes and sedimentary rock, sediments, and soil erosion into surface waters (i.e., streams, rivers, lakes/reservoirs) at about ~2,700 to 6,000 t/yr and anthropogenic sources (i.e., coal plants, waste incinerators, and chlorine and cement plants) at about 2,000 to 3,000 t/yr.

In the New Almaden area, mine wastes have contaminated the Guadalupe River basin and lower San Francisco Bay with elemental mercury (Hg^0) and Hg^{II}) being biologically converted to toxic mono-methylmercury (MeHg), which also forms under anoxic (reducing) conditions in creeks, lakes, and reservoirs draining other Coast Range Hg deposits. Although MeHg occurs in ng/L (parts per trillion) concentrations in these surface waters, it may be biomagnified about 100,000 times in the food chain with fish tissues in the mg/kg (parts per million) range.

Hg speciation analyses aids in determining Hg solubility, transport, and potential bioavailability, particularly from abandoned calcine wastes. X-ray absorption spectroscopy (XAS) and extended X-ray absorption fine structure (EXAFS) spectra techniques have been useful where samples have total Hg concentrations greater than 100 mg/kg. Coupled with XRD and electron microprobe studies, these techniques are non-destructive and element-specific, relatively sensitive at low concentrations, and require minimal sample preparation. Determining Hg from geogenic and anthropogenic sources requires Hg speciation analysis and measurement of stable Hg isotope ratios (e.g., Δ^{199}Hg and δ^{202}Hg). A recent study in the New Idria Hg mining area indicated that Hg detected in poplar tree leaves was probably from calcine waste.

Dr. William E. (Bill) Motzer, is a Senior Geochemist with Todd Groundwater. He is a registered California Professional Geologist (PG) and Certified Hydrogeologist (CHG), with PG registrations in five other states. Bill has extensive experience in conducting surface and subsurface water quality chemistry and environmental forensic investigations. He was formerly a minerals exploration/mining geologist with projects from Alaska to Mexico that included searching for hot spring-type mercury/gold deposits. Bill is a recognized expert in water quality and forensic geochemistry, with particular expertise in stable and other isotopic "fingerprinting" and age dating techniques, water quality/contaminants, and emerging contaminant geochemistry. He has conducted numerous environmental projects, including mine litigation support, throughout California and other western states.

Bill is a past President of the San Francisco Bay Branch of the Groundwater Resources Association of California (GRA), past Vice President for the Society for Environmental Geochemistry and Health (SEGH), past Chair of the Northern California Section for the Society for Mining, Metallurgy & Exploration (SME), and contributing editor to the California Section of the American Chemical Society's (ACS) on-line newsletter – the Vortex (www.calacs.org).

Todd Groundwater was founded in 1978 by Dr. David Keith Todd, an internationally recognized expert in groundwater hydrology and author of the widely respected textbook Groundwater Hydrology (now in 3rd Edition). Todd Groundwater specializes in planning, development, management, and protection of groundwater. They are a certified Small Business Enterprise (SBE) and a certified Women's Business Enterprise (WBE).

January 4, 2017, 12 noon, Sierrans Annual General Meeting, 12 Noon – 431 Crown Point Circle, Suite 150, Grass Valley, CA.

The Sierrans Annual General Meeting will be held on January 4, 2017. This will include election/re-election of 50% of our directors as per our bylaws. Any members interesting in becoming a director of the Sierrans should contact David Watkinson at dwatkinson@sierrans.org or (530) 271-0679 prior to December 15th, 2016. At this meeting, we will review our progress for 2016 and look at where we want to go for 2017.

SME Northern California Chapter Revived

The Society of Mining, Metallurgical, and Exploration Engineers recently revived its Northern California Chapter (there are now Northern and Southern California Chapters). David Watkinson and Alberto Ramirez attended an SME dinner in Oakland. Tim Arnold, President of the SME spoke about activities the SME has taken on in 2016. Any members interested in joining the SME Northern California Chapter should contact Kevin Moran at kmoran@alightinc.com.

Notice of Public Workshops Dredge Mining

The California State Water Resources Control Board has posted notice of four public workshops to solicit input on what actions the State Water Board should take to protect water quality from suction dredge mining. The location and times of the meetings are:

Tuesday, January 17, 2017 1:00 p.m. to 5:00 p.m. The Falls Event Center 4105 W Figarden Drive Fresno, CA 93722

Wednesday, January 18, 2017 1:00 p.m. to 5:00 p.m. Elks Lodge 2055 Elks Drive San Bernardino, CA 92404

Wednesday, January 25, 2017 1:00 p.m. to 5:00 p.m. Redding City Chambers 747 Auditorium Drive Redding, CA 96001

Monday, February 6, 2017 1:00 p.m. to 5:00 p.m. Joe Serna Jr. - CalEPA Headquarters Bldg. Byron Sher Auditorium 1001 I Street, Second Floor Sacramento, CA 95814

Please find the notification attached for information about these hearings.

Sierrans' Calendar

The Sierrans' for Responsible Resource Development 2017 Historical Calendar, featuring historic resource industry photos, is now available. The calendar, which will be sold for $7 each for members and $10 each for non-members (tax included).

The calendars will also be marketed wholesale at $7 each as a re-sale opportunity for local vendors and other non-profit groups.

If you are interested in ordering one or more calendars, contact Pat Nelson or David Watkinson at plnelsonco@gmail.com or dwatkinson@sierrrans.org respectively. They will be available for purchase at membership meetings or can be purchased through our website. They make great Christmas gifts.

Robert Shoemaker Memorial Plaque

Bob Shoemaker (1925-2016) was inducted into the National Mining Hall of Fame in Leadville CO on September 24th. The Sierrans are working with Bob's daughter, Jan, to place a memorial plaque in the North Star Powerhouse and Pelton Wheel Museum in 2017. A draft of the plaque is attached. It would be 30 inches wide by 24 inches tall.

The Sierrans have contact the City of Grass Valley, who own the museum, to obtain permission to locate the plaque there. The Sierrans have also contacted the Nevada County Historical Society to coordinate and work with them, as they are the operators of the Museum.

A number of organizations Bob was associated with are being contacted to potentially donate funds to the pay for the plaque and its installation. Any excess funds raised would be donated to the Museum.

Please donate to this cause. Donations can be sent to the Sierrans for Responsible Resource Development Charitable Fund at:

Sierrans Charitable Fund
P.O. Box 404
Grass Valley, CA 95945

The Sierrans Charitable Fund is a 501(c)(3) tax exempt non-profit organization. All donations are tax deductible.

Contact Us

Contact us at motherlodemonitor@sierrans.org or by mail at the address in the footer of Page 1 of this newsletter.

Draft of Memorial Plaque
For
Robert
Shoemaker