NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

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NOVEMBER MEETING ANNOUNCEMENT

DATE: **Wednesday, November 28, 2001**

LOCATION: **Orinda Masonic Center, 9 Altarinda Rd., Orinda**

TIME: **6:30 p.m. Social; 7:00 p.m. talk (no dinner)**
Cost is $5.00 per person

RESERVATIONS: Leave your name and phone number at 925-736-6039 or at *danday94@pacbell.net* before the meeting.

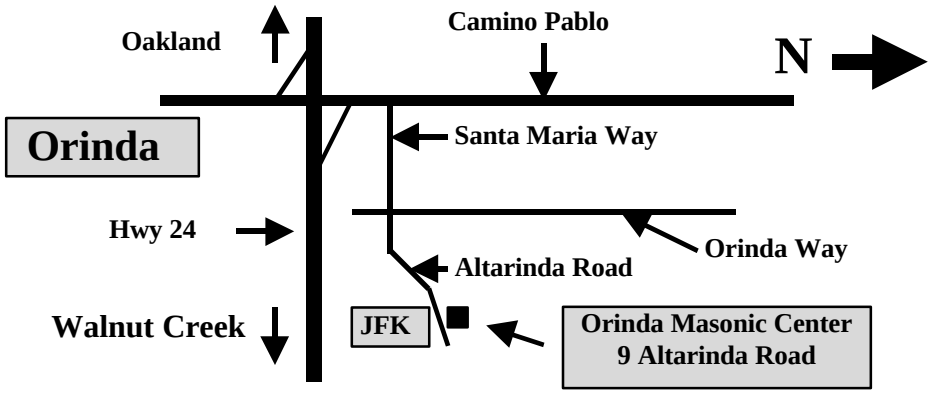
SPEAKER: **M.C. Erskine, Ph.D., Consultant**

The Colorado Plateau Tectonostratigraphic Unit

Redefinition of the Colorado Plateau in tectonostratigraphic terms suggests the hypothesis that the Colorado Plateau is a major regional blind thrust plate. The abundance of tectonically displaced Jurassic salt along Plateau margins further suggests a reason for the relative structural simplicity of the Plateau. This hypothesis is supported by the recognition that the sub-thrust sedimentary package of the Wyoming Thrust Belt is present at the same crustal elevation in drill holes in the region from Moroni to the Sevier River valley along the western Plateau margin. The depth to Jurassic salt horizons in this sub-thrust package is about 3.5 kilometers below sea level. The depth to the top of a low velocity layer in a reversed refraction seismic line from Hanksville to Chinle is also about 3.5 Kilometers below sea level. Balanced cross sections on listric normal faults in the well-exposed Grand Canyon region suggest a major regional detachment at about 3.5 kilometers below sea level. Paleomagnetic data suggest that the Plateau has moved northward 160 km $\pm$ 36km relative to North America since the Triassic. The thrust hypothesis usefully suggests tectonic models for many of the margins of the Colorado Plateau plate.

Mel C. Erskine, Ph.D, has more than 35 years of professional experience as an economic geologist and geophysicist, including nine years as President and chief scientist of Eureka Resource Associates, Inc., a consulting firm specializing in resource exploration and exploration research. Clients have included major oil companies, geothermal companies, banks, other financial institutions, and legal firms, including the U.S. Department of Justice. He has published papers, given seminars and led field trips

Continued on the back page of the newsletter



on topics that include regional tectonics; geophysical and remote sensing interpretations; exploration economics and philosophy. He has developed geological models for the interpretation of remote sensing, geophysical and geochemical data in mineral exploration, hydrocarbon exploration and geothermal exploration. Mel received his B.S. in Mining Geology from the Colorado School of Mines, and an M.S. in Geochemical Exploration and Ph.D. in Geophysical Exploration from the University of California, Berkeley. He is Past President of the NCGS, was 1998-1999 President of the Pacific Section AAPG, and has been active as a councilor, delegate, and committee member of the AAPG. Mel is a member of the Geological Society of America, the American Geophysical Union, the Geothermal Resources Council, the Pacific Section SEPM, and is a Life Member of the Bay Area Geophysical Society.

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Would you like to receive the NCGS newsletter by e-mail? If you are not already doing so, and would like to, please contact **Dan Day** at danday94@pacbell.net to sign up for this service.

NCGS 2001-2002 Calendar

Wednesday November 28, 2001
Mel C. Erskine, Consultant
The Colorado Plateau Tectonostratigraphic Unit
Orinda Masonic Center

Monday, January 14, 2002 AAPG Distinguished Lecture
William Zempolich, ExxonMobil, The Hague, Netherlands
The Kashagan Discovery: An Example of the Successful Use of a Multidisciplined Approach in Reducing Geologic Risk
Chevron Park, San Ramon

Saturday, January 26, 2002 NCGS Field Trip
Dr. Gary Greene, California State University Moss Landing Marine Laboratory
Monterey Bay Aquarium Research Institute and Moss Landing Marine Laboratory Field Trip
Cost and logistics to be announced
Please be alert to details posted in future NCGS newsletters

Wednesday January 30, 2002
Roger Ashley, USGS Menlo Park
Lode Gold Deposits of the Sierra Nevada and Their Environmental Impacts
Orinda Masonic Center

Wednesday, May 15, 2002 AAPG Distinguished Lecture
James Harrell
Archaeological Geology in Egypt: Ancient Oil Wells and Mummy Bitumen, Earliest Geological Map, First Paved Road, Pyramid Temple Pavements, and the Sphinx Age Controversy
Orinda Masonic Center

Monterey Bay Aquarium Research Institute and Moss Landing Marine Laboratory Field Trip

Saturday, January 26, 2002

Leader: Dr. Gary Greene, California State University Moss Landing Marine Laboratory

Dr. Gary Greene of the California State University Moss Landing Marine Laboratory will be leading an NCGS Field Trip tour of the new Moss Landing Marine Laboratory facility and the Monterey Bay Aquarium Research Institute in Moss Landing, California. This morning excursion will be followed by a trip to Point Lobos in the afternoon, weather permitting. ***The trip costs and logistics are still being finalized, so please be alert to field trip announcements in future NCGS newsletters.*** Dr. Greene will prepare a guidebook of information about MBARI and MLML for trip participants.

Brazilian Deep Water Turbidite Hydrocarbon Reservoirs Described at October 12th AAPG Distinguished Lecture

Brazilian sedimentologist **Dr. Carlos H. L. Bruhn** of Petrobras E&P, Rio de Janeiro, gave an excellent summary of turbidite hydrocarbon reservoirs in the Campos Basin, Brazil, at the October 12th Allan P. Bennison AAPG Distinguished Lecture. His presentation ***"Contrasting Types of Oligocene/Miocene Giant Turbidite Reservoirs From The Deep Water Campos Basin, Brazil"*** detailed the five kinds of turbidite deposits that form this major offshore oil field.

Turbidites constitute 88% of Brazil's proven petroleum resources and a total oil-in-place volume of about 20 billion barrels, with 5 billion barrels in reserves. The bulk of these turbidite reservoirs occur in the Upper Oligocene-Lower Miocene section in the Campos Basin located 150 kilometers off the southeastern Brazilian coast. They are part of the Middle Eocene to Recent regressive succession that forms a progradational pattern along the eastern Brazilian margin. Because most of their hydrocarbon resources lie in deep water, the Brazilians have become experts at deep water basin exploration, drilling, and reservoir production.

The conditions for offshore basin formation along the eastern South American coast began with the Jurassic-Cretaceous breakup of Gondwanaland. The initial early Cretaceous turbidites were lacustrine deposits, but by Oligocene-Miocene times the turbidites were marine. The Campos Basin reservoirs were discovered in the mid-1980's, and were originally thought to be homogeneous turbidite fans. Data provided by over 300 wells and extensive 3-D seismic surveys, however, revealed a much more complex picture. The reservoirs are now known to be heterogeneous and architecturally elaborate.

Dr. Bruhn has categorized the turbidite reservoirs into five major types based on stratigraphic framework, grain size, sandbody geometry, and depositional setting. They are 1) trough-confined gravel/sand-rich channel complexes; 2) unconfined sand-rich lobes heavily dissected by younger, mud-filled channels; 3) unconfined sand-rich lobes; 4) trough-confined sand-rich lobes; and 5) sand/mud-rich channel fills and splays. The reservoirs are associated with third and fourth order marine regressive sequences. Trapping is accomplished by stratigraphic pinch-outs and faulting, and the coarse-grained sandy bodies are controlled by deeply incised canyons. The turbidites formed in a bathyal environment similar to modern water depths, and are associated with cyclically interbedded mudstones and marls. The sand bodies themselves are low in clay, and have high porosities (27 to 32%) and permeabilities (1 to 2 darcies). The lack of clay suggests a weathered granitic source rock and the angular grain shapes indicate very little reworking.

Type 1 reservoirs are best developed in the Albacora field, and the other four types are illustrated by examples from the Barracuda, Marlim, and Marlim Sul fields. The type 1 trough-confined, canyon-controlled channel fills of interbedded mudstone and sandstone with high energy climbing ripple sets and rip-up clasts are deposited on an overbank facies of less dense marls (muddy limestone) and foraminifera muds. These deposits occur on steepened slopes caused by salt dome uplift, and the principle trapping mechanism is upslope pinch-out of these discontinuous channel fills. The fill complexes are up to 80 meters thick and can be grouped into six unconformity-bounded channel systems.

The unconfined, sand-rich type 2 lobe deposits, heavily dissected by younger mud-filled channels, are well-represented in the Barracuda field. These reservoirs have been compartmentalized by faulting. Type 3 unconfined sand-rich lobes of the Marlim and Marlim Sul fields are up to 125 meters thick. The former has three filling sources. The reservoirs are tapped by horizontal drilling and for maximum recovery efficiency, require pressurized water injection above or below mudstone breaks to mobilize the heavy (API 18 to 22) oils. Hence, reservoir development requires accurate knowledge of mudstone seal continuity. These lobate deposits fill interslope areas between underlying salt diapirs.

The type 4 trough-confined, sand-rich lobes are oriented approximately perpendicular to the type 3 lobes, parallel to the continental slope. These turbidites were diverted by diapiric uplifts into tectonically less stable areas, and cut into the type 3 deposits. The final stage of turbidite activity is the type 5 sand/mud-rich channel fills and splays that followed a sea level rise ending the deposition of Oligocene-Miocene turbidites. These reservoirs were also compartmentalized by faulting.

The described Oligocene-Miocene turbidite reservoirs typically comprise lowstand system tracts of distinct third and fourth order sequences bounded by unconformities and/or non-erosive surfaces. Many boundaries can be correlated with eustatic third order sea level falls at 30 m.y., 28.4 m.y., 26.3 m.y., 25.5 m.y., 25 m.y., and 24.5 m.y., or with two other undated boundaries between 25.5 and 26.3 m.y. The cyclically interbedded marls and mudstones are transgressive and highstand systems tracts laid down under bathyal conditions.

The Albacora gravel/sand-rich channel complexes are interpreted to be time equivalent along basin strike to lobe deposits in the Barracuda, Marlim, and Marlim Sul fields. The various turbidite types are apparently controlled by the underlying Aptian evaporite diapiric intrusion/withdrawal activity and its effects on basin gradient and sediment supply. This yielded progradational, offlapping successions and proximal sand-rich lobes dissected by low-sinuosity, mud-filled channels during a relative sea level fall. The trough-confined sand-rich type 4 lobe deposits filled strike-parallel depressions further into the basin. Subsequent type 5 sand/mud-rich channel fills and splays fill a depression between two type 3 depocenters in the Marlim Sul field that formed at the end of Campos Basin Oligocene-Miocene turbidite activity.

The NCGS sincerely thanks **Dr. Carlos H. L. Bruhn** of Petrobras E&P, Brazil, for his excellent presentation of deep water turbidite hydrocarbon reservoir systems in the Campos Basin. Brazilian petroleum developmental work in this area has revolutionized deep water hydrocarbon exploration and production technology. The NCGS also acknowledges ChevronTexaco for its generous grant supporting the AAPG Distinguished Lecture program. We thank ChevronTexaco for hosting Dr. Bruhn's lecture at its San Ramon facility.

Teacher's Day at Black Diamond Mines Regional Preserve Celebrates Earth Science Week

The East Bay Regional Parks District and the NCGS hosted Teacher's Day at Black Diamond Mines on October 13th. This function celebrates Earth Science Week by allowing Bay Area K-12 earth science instructors an opportunity to learn about the geological, biological, and historical aspects of coal and sand mines operated there during the late Nineteenth through mid-Twentieth Century.

The program started at 9:00 a.m. in the Hazel-Atlas Mine meeting room, where **Dr. Ray Sullivan** of San Francisco State University spoke on the geological history of the area. Ray and his students have spent many years characterizing the geology and interpreting the paleogeography of this site. The geological history began with the Jurassic breakup of Gondwanaland. Ensuing near-shore sedimentation created the most important deposit with regards to historical mining operations, the Eocene Domengine Sandstone. This unit was laid down about 50 m.y. ago (more precise fossil evidence yields an age of 49.5 m.y.). The overall plate tectonic picture at this time indicates an active subduction zone was off the coast; present day San Francisco would be located in the trench at that time. Based on paleobotanical evidence, the climate was tropical at this time and the Central Valley was part of a broad continental shelf. Ray's detailed paleoenvirnmental reconstructions indicate that the Domengine was deposited in an estuary complex that bordered the Sierra Foothills and extended north to the Sutter Buttes from a point east of Sacramento. Hence the entire Sacramento Valley was estuarine and separated from the San Joaquin Valley by the prominent Stockton Arch. Concord now lies where the continental slope at that time began. The 6,000 to 7,000 foot-deep Meganos submarine canyon passed seaward through the Mount Diablo area. The Domengine formation contains two lignite grade coal seams and an abundance of glass grade sand, both of which supported mining operations during the late-1800's and mid-1900's. The Domengine is conformably overlain by the Norton Shale, which in turn is capped by the Markley Formation, containing deep water sands and mudstones. This succession records a sudden deepening of the shelf.

To illustrate his interpretations, Ray showed the group a series of slides depicting modern day estuarine conditions in San Francisco Bay and the Bay of Fundy in New Brunswick, Canada. Examples included the sands of the subtidal zone, sands and muds of the intratidal zone, and muds/vegetation (coal precursors) of the supratidal zone. The Bay of Fundy, where the world's largest tides occur, showed excellent high-energy cross bedded sands and other flood/ebb tide bedforms. Ray contrasted these processes with similar features taken from the tunnel walls at the Black Diamond Mines. A key piece of evidence denoting estuarine conditions in the Domengine sands are thin mud seams draped over sandy ripple that formed when clay settled out of the water at slack tide. This juxtaposition of drastically different energy conditions and sediment grain sizes occurs only under estuarine conditions. Trace fossil evidence includes *Ophiamorpha* shrimp burrows and other bioturbation-induced paleo-environmental indicators.

Ray is a native of Wales, a major coal-mining district in Great Britain. He closed with slides depicting coal mining techniques and working conditions in his homeland, various coal processing technologies, and major disasters linked with the Welsh coal industry. He compared Welsh mining systems with those used at Black Diamond Mines, and noted the Welsh cultural influences.

The Black Diamond mining district evolved because it was the sole source of coal on the West Coast of America at that time. It was a poor quality lignite grade that occurred in two seams only a few feet thick. But the mines produced over 4 million tons of coal over a 40 year period before access to higher grade sources in South America and the state of Washington forced them to close down. During peak producing years, Black Diamond Mines coal was transported by train to docks at Pittsburg and then shipped to consumers in Stockton, Sacramento, and San Francisco.

East Bay Regional Park District naturalist **Christie Johnson** followed Ray's presentation with an account of the local history. The area was originally inhabited by Miwok Indian tribes. However, after 1772 Spanish, Mexican, and American settlers began arriving in the area. Cattle ranching was the major industry until coal was discovered. Coal mining began in earnest in the 1850's and was a major fuel source for San Francisco, Stockton, and Sacramento. Coal fueled the growing railroad system and heated homes and businesses. The Preserve is underlain by about 200 miles of tunnels, all of which have been closed for public safety. However the "Coal Rush" drew hundreds of people of Irish, Italian, French, German, Canadian, and Australian descent to the area. But most of the miners were Welsh. The cities of Nortonville, Somerville, Stewartsville, West Hartley, and Judsonville quikly sprang up. Because they were isolated by the rugged terrane, the towns developed a tight-knit social life. Dances and other events were held at the local hotels, the towns had many saloons, and baseball became a favorite recreational pastime. Unfortunately, the risks of mining left their mark on the people's lives. Mine gas explosions and cave-ins claimed many lives, fires razed several buildings, and

childhood diseases killed offspring in many families. Young boys labored in the mines and were subject to the same risks as the adults. The hearty towns folk accepted these burdens as part of their livelihood and continued to work the mines. Ultimately the best coal seams were mined out and the operations were moved to Washington State. With the main source of income gone, the towns were eventually deserted. Many of the abandoned buildings were scavenged for lumber and parts as ranchers, some of them former miners, settled in the hills. In the 1920's Marvin Greathouse reopened the Somerville mine site to excavate sand for the Hazel-Atlas Glass Company in Oakland. The mines were worked until competition from Belgian sand used as ship ballast provided a cheaper raw material source. Another mine in Nortonville produced foundry sand for the Columbia Steel Works. It, too, closed when the foundry was shut down, and sand mining ceased by 1949. Both mines produced over 1.8 million tons of sand.

After Christie's talk, EBRPD mining engineer **Pat Dedmon** led groups on a tour of the mine, pointing out mining and geological features to the teachers as they weaved their way through the well-maintained drifts. This tunnel system was opened to the public only a few years ago after extensive refurbishment was completed by staff member **John Waters** and his crew. This facility is the only maintained public mine in the Bay Area. It offers a first-hand glimpse of a major mining operation and a well-kept museum that catalogues the history and wildlife of this important coal-producing district.

After a delicious barbecue prepared by the now legendary NCGS Past President Tridib Guha and his assistants Phil Reed and Dan Day, Christie took the group to nearby Rose Hill Cemetery. This site was where the locals were buried. It also provides clues to the history of the settlements, of personal relationships, and clues to the cultural evolution of the area. The gravestones themselves tell a unique story. The oldest markers were carved from marble, which weathered poorly in the acidic soil. The discovery of techniques to carve the hard granite and gabbro rock slabs quarried in the Sierra foothills saw these rock types replace the less resistant marble headstones. Many markers have suffered from acts of vandalism over the years. Now they are protected by the east bay Regional Park District. Christie led an exercise to glean historical information from the tombstones using newspaper clippings and obituaries from the time. Regional Parks staff member **Tracy Parent** is currently researching historical details about the settlements from newspaper archives. Her outstanding effort, which includes interviews with survivors from the mining settlements, has been a major contribution to the local history.

The annual Teacher's Day event is a joint effort by East Bay Regional Parks District staff members at Black Diamond Mines Preserve and NCGS volunteers. Much of the preparation and presentation was accomplished by Regional Parks staff under the guidance of Naturalists **Bob Kanagaki** and **Christie Johnson**. **Pat Dedmon** conducted the mining tours and provided his technical expertise on mine construction, operation, and the geological features exposed in the mine tunnels. **Dr. Ray Sullivan's** continued support of this event is instrumental in making it a success (not to mention his wife Barbara's delicious Welsh cakes!). NCGS Past President **Tridib Guha** and his wife **Mita** always draw compliments for their excellent barbecue eats. And other assorted duties were tackled by 2001-2002 President **Randy Kirby**, Past President **Don Lewis**, Treasurer **Phil Reed**, and Newsletter editor **Dan Day**. We all look forward to next year's event!

Mercury Contamination from Hydraulic Gold Mining in the Northern Sierra Nevada and Klamath Mountains Discussed at October NCGS Meeting

U.S. Bureau of Land Management geologist and Mining Engineer **David Lawler** entertained members at the October 24th NCGS meeting with a sobering discussion of the environmental effects of mercury residues from California's Gold Rush era. ***"Mercury Contamination of Water, Sediment, and Biota in Watersheds Affected by Historic Gold Mining in California"*** explored the history and current levels of residual mercury at and downstream from sites that liberated placer gold from auriferous gravels using hydraulic mining techniques.

David has over 20 years of professional experience in mining alluvial placer gold deposits and mercury use as a recovery agent. His strong paleontological background bolsters his ability to evaluate the biological effects that residual mercury from the hydraulic mining operations has had on aquatic organisms downstream. The work that David has been doing in the Klamaths and Northern Sierra Nevada Range is an interagency effort by the Bureau of Land Management, the USGS, the EPA, the U.S. Forest Service, and several state and local agencies. The study involved hundreds of man-hours sampling water, sediment, and wildlife from several abandoned mine sites and affected watersheds.

The Northern Sierra Nevada and Klamath Mountains were world-class gold mining districts in the mid- to late 1800's. The California Gold Rush can easily rank with other major historical mining ventures in terms of total metal extracted and its local economic effects. It was certainly on par with today's activity in South America's Amazon and Orinoco River complexes. The exploited areas in the Northern Sierra Nevada Range were part of the Eocene ancestral Yuba and Bear River systems. These massive fluvial complexes are estimated to have been as large as the Orinoco and Amazon watersheds in terms of the volumes of water they handled. It must be remembered that the climate at this time was tropical to subtropical and thus considerably wetter than today. The rivers formed fluvial deposits 600 to 800 feet thick and had a huge delta complex in the Marysville area. The Eocene drainage system was easily exploited by Nineteenth Century

hydraulic mining technology because its inverted topography occupies the higher elevations on the western slopes of the Northern Sierras. The present drainage cuts the Eocene river channels at right angles and concentrates the gold as placer deposits in the riverbeds below. The miners cleverly made use of this situation to extract gold from the gravels. They constructed well-engineered flume systems to transport water to the mining sites and provide them with the hydraulic head needed to wash the gravels out of the outcrops. They dug tunnels into the mountainsides to house the long sluice boxes used to concentrate the gold. The entire process needed to be controlled so that enough hydraulic force was imparted to the outcrops to liberate the gravels, yet not so forcefully that the mines were buried in their own tailings. The elemental mercury was used as an amalgamating agent that engulfed small gold particles by surface tension effects and allowed the ore to be physically recovered from the gangue material. The gold recovery was only ~30% efficient, but the sheer volumes being processed kept the operations booming. The quantities of mercury used in this recovery process are mind-boggling. It is estimated that about 20 tons of mercury per 100 feet of sluice box was consumed each year. Experts calculate that roughly 4,000 tons of mercury was lost from the mines during their operation. The mines kept mercury production flourishing in the New Idria and New Almanden mining districts of the central Diablo Range, and at smaller facilities in the Coast Range.

Since debris from the hydraulic mines was choking the watersheds downstream and affecting agriculture, the 1884 Sawyer Decision was passed by the California courts to prohibit any mining activity that polluted the state's rivers. This act essentially closed down hydraulic mining in California. But the harm had already been done. Streams were choked with sediment, landscapes were denuded, major flooding now occurred along the Sacramento River from Sacramento to Yuba City, rich agricultural land was buried, the Sacramento-San Joaquin estuary was choked with sediment, and thousands of tons of mercury had been washed into San Francisco Bay. Greenhorn Creek in the Bear River watershed is today smothered in 200 feet of hydraulic mining debris. Some estimates place the amount of sediment washed out of the hydraulic mines at 300 million cubic yards.

David has been studying the Ancestral Yuba River system for 15 years, and has also spent some time in foreign placer mining districts. He and his colleagues have been instrumental in characterizing the extent of mercury contamination in Northern California derived from hydraulic mining activity. The interagency project David supports is focused on determining levels and sources of mercury/methylmercury in the affected watersheds, assessing mercury concentration in Northern California game fish, and targeting hot spots for subsequent remediation work. A serious problem with elemental mercury is its ability to methylate, or form the toxic methylmercury (MeHg) complex (CH_3Hg^+), which readily enters the biological food chain. Methylmercury is formed by sulfate-reducing bacteria, which flourish in the abandoned sluice tunnels. This being the case, in 1999-2000 the interagency team sampled water, sediment, and biota downstream from several abandoned mine sites and from lakes in the affected watersheds. The U.S. EPA threshold value for total recoverable mercury (TR-Hg) and MeHg are 50 nanograms per liter (ng/L) and 0.1 ng/L, respectively. Seventeen of 53 unfiltered water samples analyzed for TR-Hg exceeded this concentration. Water flowing out of two sluice tunnels in the Bear River watershed registered TR-Hg exceeding 100,000 ng/L. All organisms in the food chain sampled at the mouths of these tunnels had high mercury contents.

The mobility of MeHg allows it to move downstream and precipitate in river and lake sediments, where it enters the food chain. The sluice tunnels harbor an abundance of residual elemental mercury. Using a gold pan, David related how he sifted 1000 grams (~2.2 lbs.) of sediment in one abandoned tunnel and recovered 30 grams of elemental mercury. The tunnels also pose a serious safety threat to recreational gold miners who enter them, and have a suspected influence on mercury levels downstream. Predaceous fish in these watersheds registered high mercury concentrations. Eight of 57 bass sampled had wet weight fillet mercury contents over 1 ppm, and 41 of 141 fish analyzed had mercury levels that exceeded 0.5 ppm. These findings have persuaded three counties to issue a Public Notification warning citizens to limit their game fish consumption.

Future research by the interagency abandoned mine land (AML) team will focus on defining mercury hot spots and remediating the sources. For abandoned sluice tunnels and mine sites, this entails the removal of loose debris and shotcreting wall rock that could trap the mercury in cracks and crevices. Mercury transport mechanisms are also poorly understood, and may provide methods for reversing chemical and biological processes that form methylmercury and other mercury complexes. Clarifying bioaccumulation pathways and identifying biomonitors to signal excessive mercury accumulation could safeguard the public against toxic exposure. And additional sampling programs are warranted to define levels of mercury contamination in lake sediments, watersheds, and biota in areas affected by hydraulic gold mining operations.

Many thanks to **David Lawler** of the Bureau of Land Management for updating NCGS members on the status of mercury contamination from abandoned hydraulic mining sites in the Northern Sierra Nevada and Trinity mountain ranges. The scope of this toxic contamination is unnerving, but the awareness of this potential public hazard is an important step toward source identification and remediative action. David is also founder of the Far West Geoscience Foundation, "…a California-based non-profit organization devoted to scientific research and public education in the geosciences within the western Cordillera region of the Americas." To learn more about the FWGF and its activities, visit their internet website at **http://www.webbnet.com/farwestgeo/.**

Pacific Section AAPG & SPE Western Region Joint Meeting

Energy Frontiers: A 2002 Perspective

May 18-23, 2002

Anchorage, Alaska

CALL FOR ABSTRACTS / PAPERS

Papers are invited in both oral and poster format for the theme sessions listed below. The deadline for abstract submittal is November 15, 2001. AAPG papers will require an abstract only, while SPE papers will require an abstract, followed by a full-length paper, upon acceptance. AAPG and SPE papers can be submitted for any session theme, with preference for format (oral only, poster only, oral or poster). Authors selected will be notified by December 15, 2001. AAPG oral and poster presentations will be judged.

SUBMITTING AN ABSTRACT

We strongly encourage you to submit your abstracts through the internet at the 2002 Convention website: **http://www.aapg-spe-2002.org**. Abstracts are limited to 250 words. If you do not have access to the internet, you may send your abstract to **PS-AAPG, P.O. Box 101288, Anchorage, AK 99510.**

POSTER SESSION INFORMATION

Poster abstracts should be submitted for one of the technical sessions listed below. Final poster sessions will be determined after abstracts are accepted. Posters will be displayed during morning or afternoon sessions. Authors must be present at specific times. Poster space includes 3 panels, each 4'x 8' Some booths may accommodate tables.

SPE TECHNICAL SESSION THEMES

SPE Program Coordinator - Gordon Pospisil (907) 564-5769 pospisg@bp.com
Poster Session Coordinator - Robert Krantz (907) 265-6573 bkrantz@ppco.com

Innovations & Novel Applications

Fracture Stimulation

Reservoir Characterization & Reservoir Mechanisms

Surface Facility Applications

Health, Safety, and Environment

Improved Oil Recovery & Reservoir Management

Production Optimization & Artificial Lift

Coiled Tubing Drilling

Rotary Drilling Technology

Formation Evaluation

Completion Innovations

New Development Case Histories

GEMS Sessions (Short Topics)

AAPG TECHNICAL SESSIONS

AAPG Program Coordinator - Bob Swenson
(907) 265-6808; rswenson@ppco.com
Poster Session Coordinator - Robert Krantz
(907) 265-6573; bkrantz@ppco.com

Geology of the Brooks Range and Southern Colville Basin, Alaska - Gill Mull (gil@dnr.state.ak.us) (907) 269-8791

North Slope Gas Resources Symposium - Ken Thompson, Mark Myers (Mark_Myers@dnr.state.ak.us) (907) 269-8800, Kirk Sherwood (907) 271-6085

Russian Arctic and Sakhalin - Dick Garrard (rgarrard@ppco.com) (907) 265-1536

Shifting Paradigms and Application of New Technologies in Mature Development Areas - Chris West (Westcc@bp.com) (907) 564-4626

Resource Development in the Mackenzie Delta, Canada - Larry Lane (LLone@NRCon.gc.ca) 403-292-7131

NPRA: The Emerging Frontier - Greg Wilson (gcwilso@ppco.com) (907) 263-4748

ANWR Coastal Plain: Geology and Petroleum Potential - Dave Houseknecht (dhouse@usgs.gov) (703) 648-6466

Cook Inlet Forearc Basin: An Old Petroleum Province Getflng New Attention - David Bdmberry (dibrimberry,@marathonoll.com) (907) 561-5311

Arctic Petroleum Systems - Doliam Masterson (wmaster@ppco.com) (907) 265-1138
Exploration for Unconventional and Shallow Gas Resources of Alaska - Jim Clough Oim@dnr.state.ok.us) (907) 451-5030 Charles Barker (barker@usgs.gov) (303) 236-5797

Environmental Geology in Northern Regions - Marilyn Plitnik (Marilyn.A.Plitnik@poaC2.usace.army-mil) (907) 753-2881/ Bob Braunstein

Beyond the Petroleum Window - Mineral Resources of the North Pacific Region - Tom Bundtzen (bundtzen@mosquitonef.com) (907) 458-8951

Geophysical Techniques in ArcTic Regions - Mike Foust (mfoust@ppco.com) (907) 263-4471

Triassic Paleogeography of Alaska and the Arctic: lmplicaflons for Source and Reservoir Rock Deposition - Mike Whalen, mtwholen@gi.alaska.edu (907) 474-5302

The Borrow Arch: Geologic Evolution and Hydrocarbon Habitat - Sandy Phillips (phillis2@bp.com) (907) 564-4587

Tectonics of the Circum-Arctic - Tom Homza (homzotx@bp.corn) (907) 564-4720