NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

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NCGS OFFICERS

COUNSELORS

MEETING ANNOUNCEMENT

DATE: **Wednesday, June 25, 2003**

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 925-424-3669 or at *danday94@pacbell.net* before the meeting.

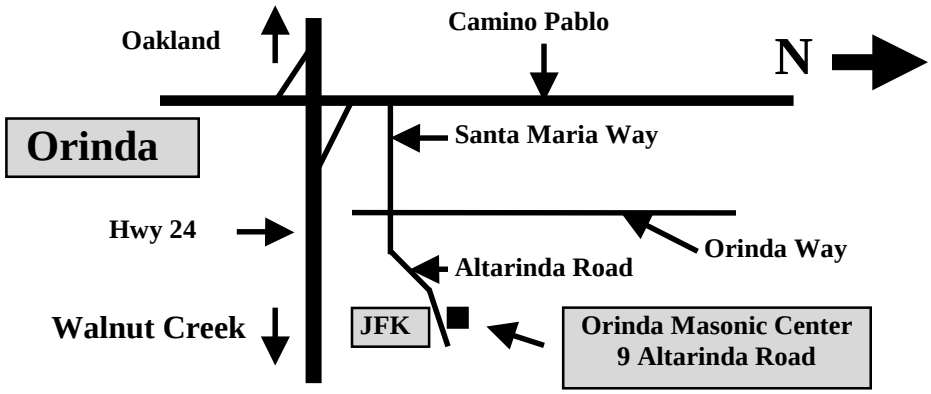
Speaker: **Carol Prentice**, United States Geological Survey, Menlo Park, California

At the Intersection of History and Geology: How Historical Research Into the 1906 Earthquake Provides a Better Understanding of the San Andreas Fault

The great San Francisco earthquake of 1906 was the first scientifically studied earthquake in the US, and among the first scientifically studied earthquakes in the world. Historical materials associated with the study of the 1906 earthquake, such as old photographs, maps, letters, and original reports, have provided essential information to several paleoseismic studies along the northern San Andreas Fault. This presentation will review four study areas where historical materials related to the 1906 earthquake have been crucial elements of recent geologic fault studies.

Carol Prentice received her undergraduate degree in Geology from Humboldt State University in 1979. After teaching high school for three years, she continued her studies in Geology at Caltech, where she earned her MS in 1984, and her Ph.D. in 1989. Since 1989 she has been a research scientist at the USGS, conducting paleoseismic research on faults in northern California, Domincan Republic, Trinidad, Nicaragua, Puerto Rico, New Zealand, Thailand, Mongolia, and Taiwan.

Meeting Location



Northern California Geological Society
c/o Dan Day
9 Bramblewood Court
Danville, CA. 94506-1130

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.

Upcoming Field Trips…

August 2, 2003	***Clear Lake Volcanic Field***	**Rolfe Erickson**, Sonoma State
October 2003	***Point Reyes Area***	**Tom MacKinnon,** Consultant
November 2003	***Mt. Burdell*** *(with a hike to the top!)*	**Rick Ford**, SFSU Graduate Thesis
Fall 2003 (TBA)	***Devil's Slide / Pebble Beach or Pigeon Point***	**Scott Morgan & Jody Castle**, Earth Mechanics
Summer 2004 (TBA)	***Northern California Gold Belt, Quincy*** *(BLM has put all travel on hold)*	**Gregg Wilkerson**, BLM

National Earth Science Day, Black Diamond Mines Regional Preserve Educator's Day

Saturday, October 25, 2003

To help celebrate National Earth Science week, the East Bay Regional Park District and the Northern California Geological Society are hosting on Saturday October 25, 2003 a very special field trip for Bay Area teachers at Black Diamond Mines Regional Preserve, Antioch. The setting for the field trip is the coal mines and historic cemetery located in the foothills of Mount Diablo. The area played an important part in the early history of San Francisco Bay Area as it provided much of the coal needed for the emerging industries. A total of over 4 million tons of coal were mined between 1860 and 1904. The Mount Diablo Coalfield became the major population center in Contra Costa County during the 19th century and five mining towns were established in the coalfield. The coal mines finally closed about the time of the 1906 earthquake and the towns were abandoned leaving behind the many miles of underground coal workings and Rose Hill Cemetery. These unique facilities are maintained by the East Bay Regional Park District and are an ideal location for school field trips.

The field trip will be led by professional geologists from the Northern California Geological Society and naturalists from the Park District. The size of the group is limited to 30 teachers. The morning will be spent underground exploring the mines workings. Hard hats and flash lights will be provided. After the mine tour, a barbecue lunch will be served in the Picnic ground which will be followed by a leisurely walk through the old town site of Somersville and Rose Hill Cemetery. At the cemetery, the families of the the mining communities are buried and we will learn about their way of life using records and the inscriptions preserved on the headstones.

A fee of about $25 will be charged to cover the costs of an extensive set of handouts and other resources that will be provided to the teachers on the geology, mining and history of the Mount Diablo Coalfield. 1 unit of academic credit is also available for this class on application through the EBRP Academy and California State University, Hayward.

For further information please contact Ray Sullivan at 415-338-7730 or sullivan@sfsu.edu

Please help us get the word out and send word of this announcement this to your favorite teacher!

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

Geology of the Clear Lake Volcanic Field, California

Saturday, August 2, 2003

Trip Leader:

Dr. Rolfe Erickson, Sonoma State University

The active Clear Lake volcanic field lies ~80 miles NE of Oakland. The field is young, with units ranging from ~2.5 Ma to perhaps 10 Ka. The field has not developed a caldera nor large pyroclastic flows but may do so in the future. A spectrum of geochemical / petrological rock types is present, from basalt to rhyolite, with flows of all compositions and felsic tuff present in a large number of separate eruptive units. The field is small as are most of the units in it, and many of its major features can be examined in a day, making it an excellent area for petrologic instruction. A large magma body has been detected geophysically under the west central part of the field, but only subvolcanic phenomena such as the original fumaroles at the Geysers are active today. The largest effect of the magma at present is to drive the steam production in the Geysers steam field that lies just west of the volcanics.

The USGS has recently (1995) published a beautiful large format 3-sheet 1:24000 map and sections of the field. A number of recent studies there have been on such topics as isotope geochemistry, evidence for magma mixing, and the lower crustal metamorphic xenoliths found in some units. Research is active in the area.

The exact itinerary of the trip is still evolving, but we will at least examine the base of the volcanic section where the first eruptive products can be seen accumulating on the Mesozoic basement; representatives of the major rock types, including a flow which originated by magma mixing and a complex obsidian flow; base-surge deposits associated with small maars (explosion craters); the Sulphur Bank mine/EPA superfund site; a cinder cone where lower crustal xenoliths can be found; collapse deposits; and Mt. Konocti itself. We will discuss the source(s) and evolution of the magma(s) in and of themselves and as they relate to California tectonic history.

Rolfe Erickson earned his BA in Geology at Michigan Technological University in 1959, his MS in Geology in 1962 and his PhD in Geochemistry in 1970 from the University of Arizona. He has worked his entire professional career at Sonoma State University where he began in 1966. He teaches mineralogy, optical mineralogy, crystallography, igneous and metamorphic petrology, computer applications, and two field geology courses. His research interests are presently in the petrology of individual exotic blocks in the Franciscan depositional melanges around Cazadero, in peraluminous plutons in the Death Valley area, and in possible tektites found in Dry Creek valley west of Healdsburg.

********** **Field Trip Logistics** **********

Time: Saturday, August 2, 2003; leave Park and Ride @ 8:00 am (7:30 am coffee, pastries); return about 5:30 pm
Departure: We will meet at a bay area park and ride to be determined.
Cost: $35; **$15 for adolescents (11 to 17). Cost includes transportation, refreshments, lunch, and field guide.**

********** **REGISTRATION FORM --- <u>PLEASE RSVP by Monday, July 28, 2003</u>** **********

Name _____ **E-mail or Fax No.** _____

Address (Street/City/Zip)_____

Phone (day) _____ **Phone (evening)** _____ Indicate if you are a nonmember (cost is $40) _____

Regular Lunch _____ Vegetarian Lunch _____ **(Please check one)**

Please mail form and a check made out to NCGS to: **Jean Moran, P.O. Box 1861, Sausalito, CA. 94966**
If you have any questions or need additional information, e-mail Jean at jeanm@stetsonengineers.com, or call 415-331-6806 (evening)

Exploring The Andesite Aqueduct: Tales From Central Mexico

What draws us to geology? Perhaps it is the beckoning of the great outdoors or the intrinsic beauty of nature's landscape. To **Professor Ian Carmichael** of the University of California, Berkeley, it is both an aesthetic appreciation of the dynamic earth and a passion to unlock its secrets that motivates him. Volcanology is in his blood, and for over forty years he has traveled the globe characterizing erupted rocks. Dr. Carmichael's May 28th presentation ***The Andesite Aqueduct: Examples From Western Mexico*** led the audience on a fascinating trek through one of the most active volcanic provinces in the world.

Volcanism is an integral part of the geological cycle. It has terrified civilizations from ancient Minoan Greece and Italy's Pompeii through Mount St. Helens. Many of us have experienced the benign volcanic activity on Hawaii's Big Island, or wandered through California's Lassen Volcanic Park to see the results of recent volcanic activity. But Mexico is a treasure-trove of volcanism, as evidenced by the extraordinary eruption of Paracutin in a barren cornfield sixty years ago. Perhaps few of us recognize the high level of volcanic activity in the central Mexican Volcanic Belt. It is the focal point of subduction involving the eastern Pacific Rivera microplate and the adjacent Cocos plate. This active volcanic belt cuts across Mexico from Guadalajara to the Gulf of Mexico. It is fed by a shallow-dipping (~22˚) subduction zone on the Pacific side along the Middle America Trench that feeds the volcanic belt from a Benioff zone 100 km. below. In addition to the Neogene volcanism along this belt, western Mexico is also home to the largest known ignimbrite (silicic pyroclastics) field in the world, a Tertiary age complex exposed in the Sierra Madre Occidental. Dr. Carmichael and his students have spent over 25 years mapping and studying the petrogenesis of volcanoes in this belt to accurately determine the eruptive productivity along linear segments of the arc front over the last 1 million years. The latter can be used to estimate the recycling rates and material balances between the subducted oceanic crust and magmatic activity in the overlying arc complex.

Two important points were emphasized during the talk: 1) andesites are derived ***only*** by subduction processes, and 2) andesites return water to the crust and the surface. With this statement, Dr. Carmichael began a short tour of volcanoes east of Guadalajara. One example exhibited two periods of caldera collapse, the most recent in 1050 A.D. By careful application of C^{14} dating techniques to charcoal embedded in the lavas, the timing of these two events could be determined. The second phase of caldera development took only about 1000 years to complete. Another caldera in the vicinity had a large central spine of solidified magma similar to that displayed by Mt. Pelee on the Caribbean island of Martinique prior to its disasterous 1902 eruption. The spine was dated as having formed within 30,000 years of the most recent caldera collapse. Obviously explosive caldera events are common in the Mexican Volcanic Belt, although no historic incidents like the Mount St. Helens catastrophe have occurred.

Ian then took a moment to describe the most active volcano on the North American continent, the 13,500-foot Volcan Colima. This strato volcano has erupted four times in the last 25 years, the flows oozing slowly down its slopes as steaming brecciated lavas that glow red at night. Several debris flows snake their way across the landscape below the cone, a stark tribute to explosive eruptions in the past. Three flows were carbon-14 dated, the oldest having been deposited 9,000 years ago, and the other two at 3,000 year intevals thereafter. Dr. Carmichael noted that another such event is in the offing, with ominous consequences predicted for the local populace. Each prior flow amounted to roughly the volume of the pre-existing cone. This would be comparable to a catastrophe like the 1980 Mount St. Helens event.

The Mexican Volcanic Belt has fascinated igneous petrologists with the compositional and microstructural variability of its lavas. An interesting feature of some compositionally equivalent lavas is the difference in their phenocryst populations (phenocrysts are minerals that crystallized out of the magma early, and are significantly larger than the finer-grained matrix that surrounds them). As an example, Dr. Carmichael showed a photomicrograph of an andesite (62% SiO_2) containing plagioclase, pyroxene, and hornblende phenocrysts. Next he offered a compositionally identical lamprophyre with large hornblende phenocrysts in a fine-grained plagioclase-rich matrix. Why the textural difference between compositionally equivalent lavas? The answer lies in their water contents. Dr. Carmichael and his graduate students have performed hundreds of high pressure-high temperature experiments to simulate various conditions in a deep-seated magma chamber. These experiments ingeniously allow petrologists to saturate the test charge with water, subject it to various pressure and temperature conditions, then quench it to retain the equilibrium mineral assemblage. Numerous experiments are needed to plot the stability regions of various mineral suites on a pressure versus temperature graph. These can be contoured to show the water content as a function of the P-T conditions. The absence of plagioclase and pyroxene phenocrysts in the lamprophyre was evidence of a higher dissolved water

content in the erupting magma, which suppressed the crystallization of anhydrous (water-free) minerals like feldspar. Pressure, temperature, and water content also place constraints on magma sources, depths of lava generation, eruption temperatures, and the evolution of various magma types.

The Jalisco block is located southwest of Guadalajara, and forms the western tip of central Mexico, where the coast suddenly trends southeastward as it parallels the Middle American Trench. The Jalisco block is bounded by graben valleys, and here is where the volcanic diversity blossoms. The grabens cradle an assortment of shield volcanoes, small cinder cones erupting basaltic lavas that are much more fluid than the andesites. One such cone displayed pillow structures on its flanks, indicating the flows had been water-quenched. Further field work revealed that the flows had dammed a stream and formed a small lake into which subsequent lavas had poured. Dr. Carmichael noted that shield volcanoes tend to erupt a large volume of magma over a short time span. The andesite strato volcanoes erupt more frequently but in smaller volumes. There are 3,000 to 4,000 cinder cones in these graben valleys, and by dating these individual eruptive events, a geomorphological evolution of the volcanic landscape can be established. Through a series of photos spanning a time interval of 9,300 years, the audience witnessed the transformation of recently erupted cinder cones with shallowly runneled sides to older cones with deeper ravines, and eventually to the eldest cones, sculpted by torrential rains and deeply dissected by arroyos.

The basaltic andesite cinder cones also show variations in phenocryst mineralogy among magmas with identical compositions. At a 55% SiO_2 content, some lavas contain an assemblage of olivine and phlogopite (brown magnesium-rich mica) phenocrysts, whereas another suite contains hornblende and pyroxene phenocrysts. The olivine-phlogopite assemblage is derived from a magma with 6% dissolved water. A decrease in magma temperature stabilizes hydrous mineral phases, and a loss of water allows plagioclase to enter the phenocrysts assemblage. Hence, an estimate of magmatic water content can be made from the relative volume and mineralogy of the phenocrysts in the erupted lavas. The source of the intermediate magmas in the central Mexican Volcanic Belt is a hornblende lamprophyre, which requires at least 6% dissolved water to stabilize its hornblende phase. The presence of tiny hornblende lherzolite nodules in some of the eruptives indicates a mantle source for the magmatic water. The water saturation point at the magma source in the mantle, which corresponds to a pressure of about 10 kilobars (10,000 atmospheres), is about 16 weight % water. By determining the approximate magma delivery rate along portions of the exposed volcanic arc, these ranges in dissolved water content can be used to estimate the amount of water returned to the crust. About one-tenth of the emplaced magma actually reaches the surface, which constrains the amount of water vapor returned to the atmosphere. However, plagioclase-rich phenocryst assemblages like those of Volcan Colima indicate that the magma has lost its 2.5 to 4.5% water content when it erupted. Assembling the various pieces of the subduction-eruption tectonic cycle suggests a crude balance exists between the quantity of water returned to the crust along the ~35,000 kilometers of subduction-related arc volcanism, and that which is subducted.

Dr. Carmichael's work in this region has not been limited to volcanism and petrology. He and his students have done a considerable amount of mapping and tectonic studies in the graben zones bounding the Jalisco block. In 1995 they installed numerous GPS (global positioning satellite) systems on the Jalisco block to track its movement, and were rewarded with a major 8.0 magnitude earthquake off the Mexican coast that provided vital tectonic information. The network is now being monitored by a group of seismologists who are reaping the benefits of the U.C. Berkeley group's hard work. Regional structural mapping in and around the Jalisco block has revealed substantial tectonic activity, including the 1.5 km. strike-slip offset of a 160,000 year old volcanic cone, and an active fault trace slicing precariously close to a large concrete dam. These disturbing observations underscore the need for extensive seismic hazard evaluations in this active tectonic region before major engineered structures are built.

The NCGS gratefully acknowledges Dr. Ian Carmichael's contribution the its monthly speaker program. His fascinating talk touched on topics of volcanology, experimental petrology, mineralogy, gemorphology, seismology, and tectonics in one of the most active volcanic belts in the world. We deeply appreciate his willingness to summarize over 25 years of research in central Mexico that has resulted in major contributions to igneous petrology. A selected list of Dr. Carmichael's recent publications, including the Mexican Volcanic Belt studies, appears on the U.C. Berkeley Earth and Planetary Sciences Department website at **http://eps.berkeley.edu/www/**. Select "Faculty" from the menu toolbar, and then his name. He also co-authored the classic 1974 textbook *Igneous Petrology* with Francis Turner and John Verhoogen.

NCGS Field Trip - Franciscan Metasedimentary Section at Pacheco Pass

Reported by Richard Cardwell

A stratigraphically coherent section of Franciscan metasedimentary rock is well exposed in the Diablo Range at Pacheco Pass east of Gilroy. This section was exhumed from depths of 20 to 30 km in a Mesozoic subduction zone. On Saturday, April 12, NCGS members and friends joined Professor Gary Ernst and his students from Stanford University on a field trip to this area. We were also joined by Dr. Juhn G. (Louie) Liou's class of petrology students.

Our day began on a rainy spring morning at the Fremont Park and Ride lot. After being fortified by coffee and donuts supplied by Phil Reed, we drove to Casa de Fruita east of Gilroy where we met with Dr. Ernst and his students.

Gary began by giving us an overview of the Franciscan Complex in the Diablo Range. The Diablo Range is part of the California's Coast Range. The Franciscan represents the trench complex of a Mesozoic, east-dipping subduction zone. Coeval with the formation of the subduction complex was the development of a volcanic arc, whose roots are the Sierra Nevada batholith. The Central Valley represents the forearc basin of the subduction system.

The Franciscan Complex is a package of rocks formed in an upper Mesozoic subduction zone. It consists of sediments deposited in an accretionary prism (imbricated ocean trench deposits) as well as the sections of the underlying oceanic crust and mantle. Ages range from uppermost Jurassic through Cretaceous. The sediments of the accretionary prism are medium- to fine-grained detrital rocks (graywackes, micrograywackes, and dark shales) that were sourced from the Sierran volcanic-plutonic arc, and they were deposited into the trench as turbidites. In the subduction process they have been metamorphosed into metagraywackes. The ocean floor rocks are represented by radiolarian chert, pillow basalts and pillow breccia, and peridotite (oceanic mantle). These have been metamorphosed into metachert, greenstone, and serpentine, respectively.

Gary mapped the geology of the central Diablo Range in the Pacheco Pass quadrangle. The terrane consists predominantly of Franciscan metagraywackes and finer grained metaclastic rocks. The Franciscan is divided into 4-5 packages separated by a series of subhorizontal bedding-pane thrusts. The thrust detachment at the base of each tectonic unit is mapped below a zone of mafic blueschist with overlying metachert. Gary has interpreted each package as a thin thrust slice dipping to the east. The packages are interpreted as getting older to the east. The oldest package is bound on the east side by the "Coast Range Thrust" represented here by the Ortigalita fault. East of the fault lies the Great Valley Series.

One of the best techniques to determine the depth of burial is by examining the petrology and geochemistry of the minerals in the metagraywackes. The albite present in the original sedimentary and igneous rock has been converted into jadeitic pyroxene plus quartz. This reaction can only occur in a high pressure, low temperature environment. Laboratory experiments indicate temperatures of about 200°C and pressures of about 6-7 kilobars. This corresponds to depths of about 20 to 30 km in a subduction zone.

The process for getting the subducted oceanic crust back to the surface (exhumation) is not well understood. Whatever the process, it must be rapid on order to preserve the high-pressure, low temperature minerals. Gary favors a process propelled by buoyancy. Jadeitic pyroxene is less dense and more viscous than olivine that occurs in the mantle. This difference in buoyancy allows the subducted crust to rise. More remarkable is the fact that these tectonic blocks, some at least 10 km, have been returned to the surface from such depths relatively intact (stratigraphically coherent).

Stop 1 was located about 8 miles west of Casa de Fruita on Highway 152. Here we examined a large outcropping knob. The knob consists of greenstone blocks surrounded by metasediments. Greenstone is weathered basalt and everyone could see outlines of good pillow structures. The basalts are only slightly metamorphosed (epidote and chlorite facies). These blocks represent weakly recrystallized oceanic crust, possibly a seamount that was subducted into the trench. Often these greenstones are quarried for highway gravel, but not at this location.

The blocks are surrounded by metagraywacke and metashale. In hand specimen, the metagraywacke is not obviously a blueschist facies rock. However, the diagnostic minerals are easily visible in thin section. Other blueschist facies minerals such as lawsonite, glaucophane and aragonite occur in this rock. The quartz veins were dramatically exposed in the outcrop and represent the conversion of albite into jadeite and quartz.

For Stop 2 we drove east and turned off onto Old Highway 152. We stopped at an outcrop of weathered metagraywacke. Here the metagraywacke is relatively coarse-grained and the goal was for everyone to see the jadeitic pyroxene in hand specimen. Under a hand lens the jadeite here is tan- to flesh-colored with a pearly luster. Grains appeared as fibrous radiating sprays and prismatic clusters.

Jade is a rock composed of mineral jadeite and is an important ornamental gem. Ornamental jadeite is only found in metamorphic rocks of tectonic convergence zones, usually as alluvial pebbles or boulders. In California boulders have been found in near New Idria and Big Sur. All Mexican jadeite is in carved objects, but its source is not known. However, it is known that Guatemala was an important source of jade, providing the material for the carvings of the Central American Indians, and now it is mined in there. “Chinese” jadeite is found in stream beds in Myanmar (Burma). It has been found in place at one locality in Japan.

Stop 3 was further east at the end of Old Highway 152 where we stopped at the Dinosaur Point parking lot overlooking the San Luis Reservoir. The wind was howling across the reservoir as we ate lunch. Gary pointed out a metagabbro that intruded into the metagraywacke. This sparked a discussion of how a mafic magma could be injected into a turbiditic accretionary prism prior to subduction-zone metamorphism and subsequent exhumation.

Returning back to Highway 152 we headed further east to Stop 4. We examined a section of metagraywacke, metachert and greenstone-blueschist. The metachert is an unusual blue color due to the presence of riebeckite, a blue amphibole. The greenstone has a glaucophane mineralization on the fracture surfaces. Glaucophane is a blue amphibole, and is found only in metamorphic rocks. Like jadeite, the occurrence of glaucophane reflects high-pressure, low temperature metamorphic conditions.

Then we walked to an overlook of the highway on the south limb of an east plunging antiform. The Franciscan section here consists of siliceous shale overlying chert, in turn overlying greenstone.

For Stop 5 we continued east along Highway 152 until we crossed the Ortigalita fault. The fault is the so-called Coast Range thrust, and marks the boundary between the Franciscan Complex and the upper Cretaceous Great Valley Series. Here the Great Valley Series is steeply east-dipping, weakly metamorphosed conglomeratic sandstones and siltstones. This material was derived from the Sierran arc located to the east. Mineral assemblages indicate the Great Valley was buried to only about 10 km versus the Franciscan burial depth of about 20 to 30 km. These different burial depths are found all along the Coast Range thrust. We then continued eastward for a brief stop at the Romero Visitor Center.

Stop 6 was located at the first Franciscan outcrop west of the Ortigalita fault. Gary pointed out the trace of the fault across the countryside. It was marked by a change in vegetation, style of erosion, and drainage pattern on either side of the fault zone. The Franciscan here consists of metagraywacke along with siltstones and tuffaceous units.

Throughout the day our group managed to avoid the rain showers that covered most of the Bay Area. However, our luck finally ran out as it began to rain at the end of Stop 6. We said farewell to our Stanford friends, and they returned to Stanford for the night before venturing out again the next day.

The NCGS sincerely thanks Dr. Ernst for allowing us to join his class on this excellent field trip. His field guide describes the trip in detail and includes a colored geologic map of the area. We thank Jean Moran for another wonderful job in organizing the trip, handling trip registration, arranging transportation and food. Finally, we thank all of the drivers for use of their cars and vans.

The Groundwater Resources Association of California presents its Seventh Symposium in its Series on Groundwater Contaminants

Perchlorate In Groundwater: Occurrence, Analysis and Treatment

July 31, 2003
Radisson Hotel, Sacramento, CA

Web Announcement -- **http://www.grac.org/perchlorate.html**

Perchlorate has been found to impact drinking water aquifers in California and elsewhere leading to the closure of numerous municipal water supply wells. Perchlorate can be accidentally released to water bodies from a number of sources. It is a primary ingredient in solid propellant for rockets and missiles and therefore a common contaminant at aerospace facilities. In addition, perchlorate-based chemicals have been used in a range of industrial processes including production of highway safety flares, aluminum refining, electroplating, and production of paints.

Information about the use, environmental behavior and treatment of perchlorate has only recently become available. This symposium will showcase experts on the occurrence and potential sources of perchlorate, its fate and transport characteristics, regulatory status, toxicology and chemical detection challenges. The program will also provide information about known impacts of perchlorate on water resources in California as well as current remediation/water treatment options. The symposium will feature speakers from regulatory agencies, universities, national laboratories and industry and is expected to attract up to 350 participants.

The Symposium will consist of the following three sessions:

SESSION 1: Sources, Occurrence, Geochemistry, Fate and Transport, Analysis and Toxicity of Perchlorate
SESSION 2: Perchlorate in California
SESSION 3: Treatment and Remediation

In addition to the above sessions, experts have been invited to participate in a panel discussion on policy and legal issues relating to perchlorate contamination at the end of this one-day event day. This will be followed by a reception featuring poster and exhibitor presentations.

Information updates and program agenda will be posted to the following web page when they become available - http://www.grac.org/perhclorate.html

GRA is also coordinating a pre-symposium site visit to Aerojet's perchlorate treatment facility on July 30 (on an air-conditioned bus with plenty of cold beverages!):

GRA Field Trip
AEROJET PERCHLORATE TREATMENT FACILITY TOUR
July 30, 2003 departing the Radisson Hotel at 2:30 PM

Aerojet's engineering staff, who have been pioneers in the perchlorate treatment arena, will be on hand to discuss how they met the challenges of large-scale perchlorate removal from groundwater, and the challenges of delineating and containing perchlorate in a fluvial aquifer. The tour will depart the Radisson Hotel at 2:30 PM on July 30th, and spend about 2 hours at the Aerojet Facility.

The Aerojet facility tour will be followed by a dinner meeting hosted by GRA's Sacramento Branch. The dinner meeting will feature a case-study presentation by the Santa Clara Valley Water District:

GRA Sacramento Branch Dinner Meeting
THE SAN MARTIN PERCHLORATE PROBLEM:
LEVERAGING LOCAL GOVERNMENT RESOURCES FOR RAPID RESPONSE
July 30, 2003 at the Sheepherder Inn

Thomas K.G. Mohr, Solvents and Toxics Cleanup Liaison, will present the District's work on the highly publicized San Martin perchlorate plume. The groundwater contamination was first discovered in 2000 and subsequent investigations have indicated that a 7-mile-long perchlorate plume has impacted at least 400 water supply wells, mostly private domestic wells. As a result, there has been a high level of public concern and the problem has received significant media attention. The presentation will discuss both technical and community relations aspects associated with this high-profile case. The San Martin perchlorate problem illustrates the integral role groundwater plays in the daily lives of citizens and how a single impact can affect every corner of a community. The perchlorate content of unburned highway safety flares will also be discussed and results of laboratory work conducted by the District will be presented.

The Sacramento Branch Dinner meeting will be held at the Sheepherder Inn. The tour bus will stop at the Sheepherder to drop off participants for the Dinner Meeting, and return to the hotel thereafter. Attendees wishing to attend only the Dinner Meeting may catch the tour bus at the Radisson at 5:45 for a return trip ride to the Sheepherder.

The Sheepherder Inn is located at 11275 Folsom Blvd (1/2 Block East of Sheraton Hotel), Rancho Cordova, CA 95742.

AIPG and CCGO Presentation of Geoscience Awards at the 2003 California State Science Fair

Reported by Dave Sadoff

The American Institute of Professional Geologists (AIPG) in conjunction with the California Council of Geoscience Organizations (CCGO) once again judged and presented geoscience awards at the 2003 California State Science Fair. This was the third consecutive year that AIPG and CCGO have presented these awards in the Junior and Senior Divisions. The judging commenced at the California Science Center, located in Exposition Park (adjacent to the University of Southern California campus) at 8:30 A.M. on May 20th. Judging was conducted by Jim Jacobs and Dave Sadoff, President and Vice President, respectively of the California Section of AIPG.

The Junior Division winner was Eric Leidersdorf of Los Angeles County for his project "Use Your Head(land)! An Experiment in Shore Protection". Mr. Leidersdorf explored the differences to shoreline and currents caused by breakwater geometry. He built his own garage wave machine and studied the different current and sediment transport pathways caused by various breakwater configurations. He added a steady volume of red dye during wave machine operation and recorded the results using a videocamera. He then interpreted the data to predict longshore currents and beach erosion based on the geometry of the breakwaters.

The Senior Division winner was Allison Suarez of Calaveras County for her project "Solving the Mystery of the Penn Mine Wetland". Ms. Suarez wished to find out what caused the low pH in the Penn Mine wetland during the 2002 rainy season; and why the wetland removed dissolved iron during the rainy season while most other dissolved metals increased. She conducted the experiment by collecting water samples at a mine seepage, wetland inlet, and wetland outlet. She analyzed the samples for pH, turbidity, dissolved and total iron. She interpreted from the analytical results that dissolved iron increases at the Penn Mine during the rainy season because the limestone drains, which were designed to increase the pH of acid mine drainage at the site, are less effective during periods of increased effluent. The flow of water slowed in the down-slope wetland (she measured detention time during January and February at 1.5 days); the pH in the wetland dropped when dissolved iron changed to insoluble iron. Ms. Suarez also won the California State Fair Project of the Year Award!

Honorable Mentions were awarded to Allison Julander of Kern County for her project "How Does the Kern River Affect Southwest Bakersfield's Groundwater", to DeeAnn Kroeker, also of Kern County, for "Gypsum's Effect on Soil Drainage", and to Angeline Wolski of Humboldt County for "Burning Questions: The Effect of Fires on Soil Infiltration Rates".

As in the past three years, most of the exhibits were extraordinary. The incredible time and effort expended by the contestants was easily discerned by their finished products. It was wonderful to see the skills exhibited by these budding geoscientists.