

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



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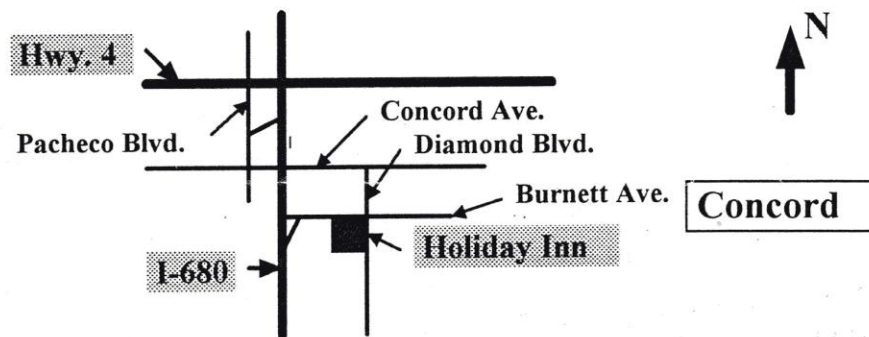
OCTOBER MEETING ANNOUNCEMENT

DATE: Thursday, October 16, 1997

LOCATION: Holiday Inn, 1050 Burnett Ave., Concord, CA.

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

RESERVATIONS: Leave your name on the NCGS recorder at
510-842-0592 anytime before the meeting.



SPEAKER: Sandy Figuers, Norfleet Consultants, Livermore, CA.

Subsurface Geology and Hydrogeology of the East Bay Plains

The NCGS is fortunate to have Sandy Figuers, Principal, Norfleet Consultants, as guest speaker at its October meeting. Sandy is probably at this very moment toiling over several months worth of work that he is preparing for presentation on Thursday the 16th. His lecture will essentially cover the history of East Bay public water supplies from 1860 to 1930, when the emergence of Sierran water supplies provided by manmade reservoirs superceded large scale groundwater pumping of aquifers in the East Bay plains. This historical account of early East Bay hydrogeological activities will be accompanied by a detailed description of pertinent subsurface geology from Richmond to San Leandro compiled by Sandy. As in most areas of California, groundwater sources played a major role in the development and survival of key urban areas. This historical account, coupled with Sandy's considerable knowledge of Bay Area water resources and his entertaining lecture style will make this a presentation you will not want to miss!

(Continued on back page of newsletter)

NCGS Fall 1997 Calendar

Saturday & Sunday, October 11-12, 1997

NCGS Northern Sierra Nevada Uplift Geological Field Excursion
Led by Dr. David Jones, Paleontologist/Geologist, USGS (retired)
David Lawler, Geologist/Paleontologist, FarWest Geoscience Foundation

Thursday, October 16, 1997

Sandy Figuers, Norfleet Consultants
Subsurface Geology and Hydrogeology of the East Bay Plains
Concord Holiday Inn, 6:30 pm social; 7:00 pm talk. Cost is \$5.00 per person

Tuesday, October 28, 1997

David P. Schwartz, Earthquake Geology and Geophysics Section, USGS, Menlo Park
Chasing the Next Big One: Paleoseismology and Future Large Earthquakes in the San Francisco Bay Area
12:00 Noon at the CALTRANS Auditorium, 1111 Grand Ave., Oakland, CA.
Attendance is free. **No food permitted in the auditorium.** Brown-bag lunches may be eaten in the cafeteria in the Caltrans Building next to the Auditorium.

Thursday, November 20, 1997

Tim Rose, Lawrence Livermore National Laboratory
Isotope Hydrogeology of Fracture Flow Systems in an Active Volcanic Region, Southern Cascade Range
Concord Holiday Inn, 6:30 pm social; 7:00 pm talk. Cost is \$5.00 per person

December NCGS Meeting speaker, topic, and location to be announced

San Andreas Fault Displacement Examined in Hollister/Cienega/Pinnacles Field Trip

Recent and past displacements along the the San Andreas and Calaveras faults were studied by nineteen attendees of the NCGS September 27th Hollister-Cienega-Pinnacles field trip. The excursion was ably led by **Dr. Vincent Matthews**, Visiting Professor at Arizona State University, whose correlation of the Miocene Pinnacles Volcanic formation with the Neenach Volcanics about 200 miles to the southeast provided the first strong evidence for major displacement along the San Andreas fault.

The morning stops on the trip included a several block tour of a Hollister neighborhood straddling the Calaveras fault, and the Almaden Winery building on Cienega Road about ten miles SSE of Hollister. The Hollister tour featured offset street curbs and sidewalks, distorted fences and homes, and tensional cracking or compressional buckling of pavements exposed to right-lateral shearing forces along the fault. Dated structures affected by fault movement indicate variable creep rates in space and time that range from periods of no measurable displacement to 15 mm/year (1961-67). The Almaden Winery building on the San Andreas fault shows at least 6 inches of right-lateral foundation displacement since its construction in 1948. Dr. Matthews concluded with a synopsis of aseismic creep and total displacement measurements compiled by various techniques along this section of the San Andreas fault. Creep rates range from zero 12 miles northwest of San Juan Bautista to 30 mm/year sixteen miles southeast of the Almaden Winery. Very long baseline interferometry (VLBI) across the western U.S. through the central San Andreas to the Pacific Plate yield displacements of 37 to 40 mm/year. About 20 mm/year displacement between the Pacific and North American Plates is taken up by the Hayward and Calaveras faults, according to one model. In the Hollister area, aseismic creep along the Calaveras fault is ~13 mm/year.

The group spent lunch and the afternoon at Pinnacles National Monument in the Gabilan Range, hiking to outcrop exposures of several volcanic units in the 23.5 million year old Pinnacles Volcanic formation. The most accessible units are in the mid to upper part of the section, and were also key units in Dr. Matthews correlation with the Miocene Neenach Volcanics 200 miles away. *The lowest unit in this sequence is a pumice lapilli tuff stratigraphically located midway in the section. It contains long-tube pumice fragments and a striking lack of the less dense vesicular pumice type, evidence that supports submarine deposition of the tuff. A petrographically equivalent pumice lapilli tuff*

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is present in the Neenach Volcanics east of the fault. A more strenuous hike up Condor Gulch trail toward the jagged spires that give the park its name led the group up-section through exposures of heterolithic agglomerate, andesite, porphyritic dacite, porphyritic rhyolite, and rhyolite breccia. The agglomerate is interpreted as a lahar or volcanic avalanche that flowed over and scoured out portions of the underlying pumice lapilli tuff. The overlying andesite unit contains a unique scoriaceous amygdaloidal andesite subunit that provides one of the best tie-ins with the Neenach Volcanics. Three of the four andesitic subunits found in this part of the section are found in the same stratigraphic position in the Neenach, and the fourth may simply have been overlooked. The porphyritic dacite and rhyolite units are exposed above the andesites, and have their own unique microstructural features.

This sequence of eleven volcanic units is for the most part microstructurally and stratigraphically equivalent to the section exposed in the Neenach Volcanics. The correlated section is confined to the northern part of the Pinnacles that borders the Chalone Creek fault, an offshoot of the San Andreas. The section changes significantly to the south. Dr. Matthews interprets the Chalone Creek fault as an early Miocene trace of the San Andreas that was subsequently replaced by the current right-lateral strike-slip system only a few miles northeast. Considering the differences observed within the Pinnacles Volcanics over short distances, the similarities between the Pinnacles and Neenach Volcanics offer compelling evidence that the two suites are cogenetic. The final kilometer of volcanic section is a magnificent outcropping of rhyolite breccia that forms the rugged spires and cliffs on the ridge tops. The outcrops assumed a warm reddish glow in the setting sunlight as the group boarded the vehicles to return to the bay Area.

The NCGS gives its warmest thanks to **Dr. Vincent Matthews** for taking time from his duties at Arizona State to prepare the trip guidebook and lead this excursion to one of the most geologically significant volcanic fields in northern California. The registration, food, and transportation arrangements were handled by **John Karachewski**, **Tim Ault**, and **Tridib Guha**. Many thanks to **Mel Erskine** for procuring the services of Dr. Matthews for the NCGS.

Faculty Position in Neotectonics/Structural Geology at San Francisco State University

The Department of Geosciences at SFSU invites applications for a tenure-track faculty position at the assistant professor level in Neotectonics/Structural Geology, beginning in August 1998. The position requires a Ph.D. in Geology and a strong commitment to excellence in both teaching and research. Some background in teaching is necessary, and experience in industry or government agency from areas of engineering geology such as trench analysis, fault interpretation, and environmental geophysics is required. The successful candidate will have prime responsibility for teaching undergraduate and graduate courses in structural geology, neotectonics and plate tectonics, and will share responsibility for courses in engineering geology, geophysics, and field methods as well as non-majors classes at the introductory level. Responsibilities include maintaining a research program involving both graduates and undergraduates. We seek someone to work with local environmental firms and agencies, and to assist in expanding our new graduate program in Applied Geosciences.

The Department of Geosciences includes Geology, Meteorology, and Oceanography, and consists of 13 faculty members from these fields. The department offers B.S. and B.A. degrees in Geology and the M.S. degree in Applied Geosciences.

To apply, send curriculum vitae including a statement of teaching and research interests, and the names and addresses of three references to:

John Monteverdi
Department of Geosciences
San Francisco State University
1600 Holloway Avenue
San Francisco, CA. 94132

Applications must be postmarked by January 15, 1998

For more information, contact the web site <http://tornado.sfsu.edu/geosciences/geosciences.html>

San Francisco State University is an Equal Opportunity / Affirmative Action employer

Brentwood Area Gas and Oil Fields Discussed at September NCGS Meeting

Those in attendance at the September 18th NCGS Meeting were treated to a very informative presentation on gas and oil prospects in the Brentwood, California, area by **Richard G. Blake** of the Lawrence Livermore National Laboratory. Mr. Blake's talk "*Sacramento Valley's Meganos Submarine Canyon: Geology and Hydrocarbon Accumulations in the Brentwood Area*" gave listeners an excellent introduction to the complex geology that underlies the very unassuming surface topography of the Sacramento delta area. The Meganos Canyon is one of four major canyons incised into sediments of the Sacramento Valley; the other three are Princeton Gorge, Martinez Gorge, and Marklee Gorge. The Meganos Canyon began as a subaerial gorge just south of Sacramento, and extends about 50 miles southwest to the Brentwood area, where its canyon fill outcrops as the Deer Valley formation on the northeast flank of Mt. Diablo. The gorge fill consists of sandstone, conglomerates, and mudstones, with turbidite sequences exposed at the distal end in the Mt. Diablo area. The erosional surface of the canyon is very complex, and reflects some significant local variations in canyon bottom topography caused by scouring and meandering of the canyon bottom. The distal end Deer Valley formation outcrop exposes a 1000 to 2000 foot thick section of canyon fill, but the canyon is 9000 feet thick at its deepest point. The Meganos Canyon truncates gently dipping, normal faulted Upper Cretaceous and Paleocene sedimentary formations in the Brentwood area. Sandstone units in these formations are the main gas and oil producers, mainly in the Upper Cretaceous Martinez formation. The Brentwood area is unique among the Sacramento Valley submarine canyons because the erosional surface was controlled by several north-south trending faults that were active before and after the canyon formed. This concurrent faulting activity partially controlled canyon erosion and the location of tributaries feeding the canyon, which produced an unusually complex erosional surface. The muddy canyon fill acts as a trap for hydrocarbons generated in the underlying truncated sediments.

Mr. Blake detailed the Brentwood Oil Field, with its pre-canyon fault entrapment, and the Riverbank, Dutch Slough, Knightsen, and East Brentwood Gas Fields, all of which are channel edge or channel bottom subcrop traps, i.e., trapped at the canyon side or bottom erosional unconformity. In this configuration, oil and gas migrate up-dip in the Upper Cretaceous and Paleocene sandstone units and accumulate at high points beneath the canyon fill unconformity. Several drilling operations just missed major gas accumulations by only a few hundred feet horizontal distance. Those that hit the reservoirs produced high quality 1050 to 1100 Btu gas. One reservoir yielded a 300 foot thick gas zone.

A key exploration tool now being used by developers in this area is 3-D seismic analysis. This technique better defines faulting and canyon bottom structures, which enhances discovery efforts. Although this is not a major oil-producing region, Shell Oil discovered a small reservoir in the Martinez formation in 1962 that yielded 35 to 40 degree oil. Later abandoned by Shell, the find has intrigued smaller exploration groups that are taking a closer look at prospects in this area. The gas potential, however, is the main driving force for further exploration and development in the Brentwood vicinity.

The NCGS thanks **Richard Blake** for taking time to address its members on gas and oil finds near Brentwood. His talk emphasized some important economic aspects of a subsurface feature that played an important role in the sedimentary evolution of California's Great Central Valley.

Dinosaur Story Released from "Purgatory"

The NCGS recently received a news release from the Colorado Geological, Division of Minerals and Geology, detailing a new publication entitled "*Dinosaur Lake: The Story of the Purgatoire Valley Dinosaur Tracksite Area*", authored by Martin Lockley, Director of the Colorado University at Denver Dinosaur Trackers Group, and colleagues Barbara Fillmore and Lori Marquardt. The 64-page publication is lavishly color-illustrated by Paul Koroshetz and is written in non-technical language. Members might recall Dr. Lockley's AAPG Distinguished Lecture presentation to the NCGS a few years ago, when he gave a fascinating account of his work on dinosaur tracks, their identification, and interpretation. Much of this work appears in his book *Tracking Dinosaurs*.

The Purgatoire Valley tracksite is the largest in North America, made 150 million years ago by brontosaurus and allosaurus on an ancient shoreline, and was first seriously studied only 15 years ago. The somewhat remote and relatively inaccessible valley, also known as "Picketwire Canyon," is open to the public April-October via a 5-mile trail by foot, mountain bike, or on horseback. Motorized tours can be booked through the U.S. Forest Service Office in La Junta, Colorado by calling (719) 384-2181.

Copies of "*Dinosaur Lake*" (Special Publication 40) are available over-the-counter for \$12.00 at the Colorado Geological Survey in Denver, or by telephone/mail order (add \$5.00 shipping fee) from Orletta Fairchild, Publications Dept., Colorado Geological Survey, 1313 Sherman St., Room 715, Denver, CO 80203. Phone orders call (303) 866-3340; Fax orders to (303) 866-2461. Visa and MasterCard accepted.

A Welcome to New Members

In addition to the ten new members listed below, the NCGS would like to give a special welcome to **Mr. Stanford L. Rose** of Menlo Park. Mr. Rose is a former Chevron employee who was Manager of Overseas Chemical and Mineral Research when he retired in 1975. His daughter, Margaret Rose informs us that Mr. Rose pioneered Chevron's efforts in minerals exploration, and discovered important deposits in Colombia, South America. He participated in negotiations for Chevron over mineral rights in Saudi Arabia and Japan, and surveyed the Gobi desert for Chevron in the late 1930's, which was the first mapping done in that region. His Geology degree is from Stanford University. The NCGS is honored to have Mr. Rose as a new member. The following individuals join Mr. Rose as our newest society members:

Patricia A. Anderson
Luis Damerell
Harold Dorell
R. Forrest Hopson
Randy E. Kirby

Peter Leffler
Bill Loskutoff
Darwin Myers
Katerina Shelekhova
Ian Wells

Red Rock Canyon Mammalian Fauna Unique in California

Imagine yourself walking across the Mojave desert landscape and suddenly stumbling across a 10 million year old pachyderm tusk, or perhaps the teeth of an extinct species of horse or antelope. This scenario is a relatively common occurrence when Dr. David Whistler, Curator of Vertebrate Paleontology at the Los Angeles County Natural History Museum comes to Red Rock Canyon State Park in Kern County, California. Whistler has been collecting at this site on highway 14 about 25 miles north of Mojave, California, since 1959 and has led diverse groups of eager fossil hunters to this spot since 1983. Dipping Miocene sediments are exposed in this area by tectonic activity along the Garlock and El Paso fault systems. Paleoclimatic evidence indicates the site in those times had much milder and wetter conditions, with a 30 inch annual rainfall, fish-filled streams, and a terrestrial fauna that included 8 types of camel, 3 kinds of rhinoceros, 8 horse species, 7 antelopes, and a variety of rodents, lizards, snakes, rats, and hedgehogs.

In modern times, the site has been used as a movie set for westerns, Biblical extravaganzas, and science fiction movies. From a paleontological viewpoint, however, it contains the oldest record of fossil mammalian life in the state. Prime sites are littered with bones, teeth, and other artifacts. The Opal Canyon exposure of the Dove Springs Formation is a type location for Claredonian mammal fossils. At Dove Springs Wash, 10,000 year old stream sediments containing freshwater clams, aquatic snails, and frogs are exposed on the valley floor. The youngest sediments surround human skeletal remains 4200 years old. Fossil-laden rocks collected at these outcrops are taken to a screen sieving complex set up near park headquarters that is used to separate fossils from the rock matrix and concentrate them for characterization by the museum paleontologists. Although tedious, this hard field work has paid off. In March, 1997, Whistler and his motley crew found part of a gomphothere tusk, a 10 million year old elephant with shovel-like tusks.

For nearly 40 years this remote area has provided an exciting glimpse into the mammalian past, courtesy of David Whistler's persistent combing of the desert floor. Who knows what other extraordinary finds are awaiting discovery by the watchful eyes of Whistler and his devoted colleagues.

Our thanks to NCGS member **Thelma Dana** for bringing the source article "*The Columbo of the Miocene*" by Chronicle staff writer Carl Nolte in the Sunday, June 15, 1997 issue of the San Francisco Chronicle to our attention.

The Northern California Geological Society presents:
Chasing the Next Big One: Paleoseismology and Future Large Earthquakes in the San Francisco Bay Area

by Dr. David P. Schwartz, U.S. Geological Survey, Menlo Park

Tuesday, October 28, 1997

12:00 Noon in the CALTRANS Auditorium, 1111 Grand Ave., Oakland, CA.

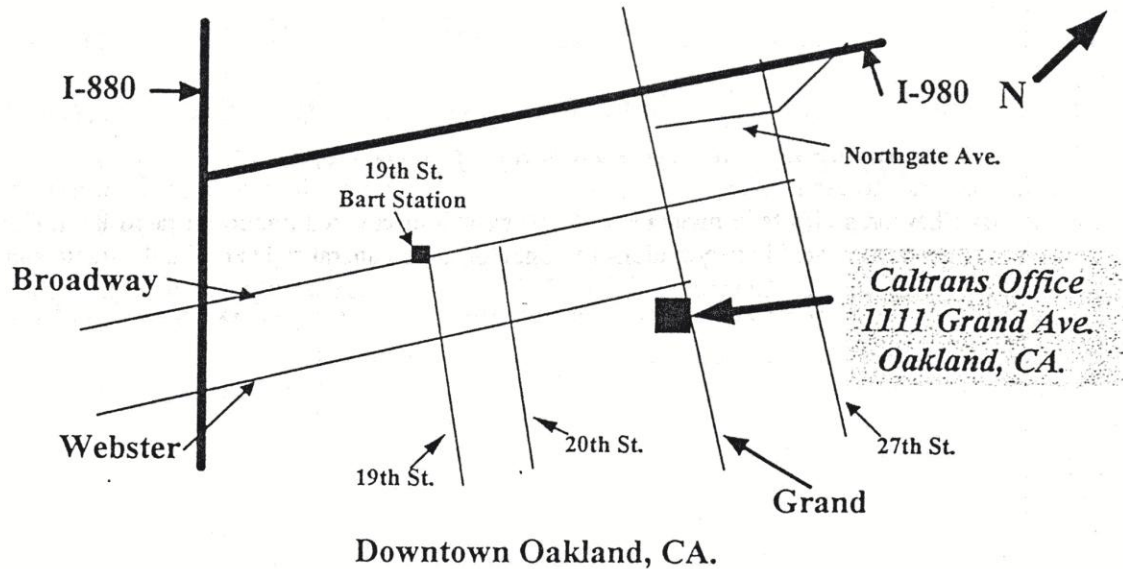
Please make reservations by leaving your name and phone number with Karen Forrest at 510-286-0303. There is no charge for attending this meeting. **Please, no food allowed in the Caltrans Auditorium.** However, there is a cafeteria in the Caltrans Building next to the Auditorium where you may purchase food or eat your brown-bag lunch.

Questions? Contact Greg Bartow at 510-286-0741.

The San Francisco Bay area sits within the active Pacific-North American transform plate boundary. About 80 percent (39 mm/yr) of the total plate boundary slip is partitioned onto the San Andreas, San Gregorio, Hayward-Rodgers Creek, and Calaveras-Concord-Green Valley faults across a 45 to 60 km-wide zone that passes through the urban core. As a result, the Bay Area has the highest density of active faults and the highest rate of seismic moment release per square km of any urban area in the US. Historically the Bay Area has not experienced one complete earthquake cycle and current time dependent estimates of future earthquakes are based on incomplete behavior data for the major seismogenic faults. The 1988 Working Group on California Earthquake Probabilities estimated a 50% probability of one or more M7 events during the next 30 years using only the San Andreas and Hayward faults. This was increased to 67% in 1990 by inclusion of the Rodgers Creek fault. Since 1990 new slip rates (northern Calaveras, Concord, peninsula San Andreas) and data on timing of the most recent and penultimate events (San Gregorio, northern Calaveras, 1906 San Andreas) have been obtained. The 1999 probability report will incorporate strike-slip faults not considered earlier (San Gregorio, Calaveras, Concord-Green Valley, Greenville) as well as reverse faults, blind thrusts, and background earthquakes. The new paleoseismicity data are revising basic fault behavior concepts with recognition of a slip rate gradient on the San Andreas and fundamental changes in fault segmentation models (San Andreas and Hayward faults). Segment-specific Bay Area recurrence intervals are short (200-300 yr) and are affected to an unknown degree by fault interaction, particularly large 1906-type events that produce stress shadows. A strongly focused effort is being initiated to develop a paleoearthquake chronology on the major Bay Area faults for the past 1000-1500 years, an interval spanning three or four earthquake cycles. This will not only produce information for hazard estimates but is a way to evaluate newly emerging fault interaction models and earthquake clustering. These paleoseismology studies will provide a fault behavior framework extending into the next millennium.

David P. Schwartz is an Earthquake Geologist / Paleoseismologist with the Earthquake Geology and Geophysics Section, Western Earthquake Hazards Team, of the U.S. Geological Survey in Menlo Park, CA. He received his B.A. and M.A. degrees in Geology from Queens College of the City University of New York (1966, 1973), and was awarded his Ph.D. in Geology in 1976 from the State University of New York at Binghamton. His doctoral thesis was on the geological development of Central America, where he spent 10 months in eastern Guatemala mapping metamorphic rocks and active faults. From 1973 to 1985, Dave worked for Woodward-Clyde Consultants, where he mapped active faults along the Alaskan pipeline route, was part of the reconstruction efforts in Managua, Nicaragua, after the 1972 earthquake, and participated in earthquake hazard studies for critical facilities, dams, and nuclear power plants throughout the western U.S. and in Peru, Egypt, and Japan. It was during this time that Dave worked on and contributed to the development of earthquake geology and paleoseismicity as scientific fields. His major contribution to the latter is the characteristic earthquake recurrence model, which has become a cornerstone of many seismic hazard analyses. In 1985, Dave joined the USGS, Menlo Park, where he has led earthquake geology and paleoseismological studies of surface ruptures associated with large magnitude historical earthquakes. These studies have included the great 1857 and 1906 earthquakes on the San Andreas Fault, the M7.5 1976 Motagua Fault earthquake in Guatemala, the M7.0 1980 Irpinia Fault earthquake in Italy, the M6.9 1983 Borah Peak Fault earthquake in Idaho, the M7.3 1992 Landers Fault earthquake in Southern California, and most recently the M8.1 1957 Gobi-Altay Fault earthquake in Mongolia. Dave is currently Northern California coordinator for the National Earthquake Hazards Reduction Program and Chief of the newly formed San Francisco Bay Area Earthquake Hazards "megaproject". He has been a member of the Working Group on California Earthquake Probabilities that issued the 30-year earthquake forecasts for California in 1988, 1990, and 1995, and is heading the new Bay Area probability study which will be available in 1999. Dave and his wife and two children reside a mere two miles from the Calaveras Fault in Danville, CA.

(a location map and parking information are on the back of this meeting announcement)



Directions to Downtown Oakland CALTRANS Office:

From I-580: Take I-980 / Downtown Oakland exchange off of I-580. Exit I-980 at 27th St./Grand Ave. exit and go across 27th onto Northgate. Turn left onto Grand Ave. where Northgate deadends. Stay on Grand Ave. for 3 blocks. The CALTRANS Office is on the corner of Webster and Grand Ave.

From I-980/Hwy 24 via Caldecott Tunnel: Stay on I-980 heading toward I-880. Take 27th St./Grand Ave. exit and go across 27th onto Northgate. Turn left where Northgate deadends into Grand Ave., and stay on Grand for 3 blocks. The CALTRANS Office is on the corner of Webster and Grand Ave.

From I-880 going north: Take the Broadway exit off I-880 and turn right on Broadway. Continue east on Broadway to the intersection with Grand Ave. Turn right onto Grand and go 1 block to grand and Webster. The CALTRANS Office is on the corner of Webster and Grand Ave.

Parking lots near the Oakland CALTRANS Office:

- West Grand Ave. between Valley and Broadway: Douglas Parking; \$3.25 flat rate all day.
- 23rd St. and Valley: Douglas Parking; \$2.75 flat rate all day.
- 23rd St. and Webster (next to YMCA): Douglas Parking; \$4.00 flat rate all day.
- 23rd St. and Webster (across from the YMCA): The Parking Place; \$4.00 flat rate all day.
- 23rd St. and Webster (corner): Douglas Parking; \$1.00 / 30 min., \$5.50 max., close at 6:00 p.m.
- 23rd St. and Webster: The YMCA Garage; \$0.95 / 30 min., \$5.50 max., close at 10:00 p.m.
- 23rd St. and Waverly: Covered parking, \$0.75 / 30 min., \$5.50 max., close at 6:30 p.m.
- Valdez between 23rd and 24th St.: Douglas Parking; \$4.00 flat rate all day.

Around the Bay

Friday, October 17. *1-DAY WINERY TOUR OF NAPA VALLEY, Section I.*
Saturday, October 18. *1-DAY WINERY TOUR OF NAPA VALLEY, Section II.*

These tours are great - educational but mostly fun! This is a bargain, especially if you're interested in wine and how geology and physical environmental impacts the wine - grape to glass...

Thanks to Barney Popkin for putting these tours together and sending out the word.

By wine maker **Jeff Werter** with encouragement from Barney Popkin. Highlights geology, soil, microclimates that make this place what it is! Plus wine tastings along the way. Leaves from and returns to downtown San Francisco
Cost is \$30 in advance. Van transportation provided.

Contact Jeff Werter, Tt EM, Inc., 135 Main St., Ste. 1800, San Francisco, CA. 94105 with check or call Jeff at (415) 543-4880 for information

Barney Popkin's San Francisco Bay-Area Environmental Events

This notice may be too late for enrollment in many of these classes, but is included to give members an idea of the courses being offered by the U.C. Extensions. Information about future course offerings can be obtained by calling the numbers listed with the classes.

SEPTEMBER 1997 CLASSES AND EVENTS

Monday, September 22-December 8. *FUNDAMENTALS OF GROUNDWATER HYDROLOGY*

X 411 EDP 301275. By U.C. Berkeley with Gary Aguiar, M.S., P.E.

6:30-9:30 p.m., 12 evenings. Cost is \$365. At 20 Wheeler Hall, U.C. Campus, Berkeley.

RSVP U.C. Berkeley, (800) 752-0881 or (510) 642-4111 or fax (510) 642-0374.

Wednesday, September 24. *CALIFORNIA ENVIRONMENTAL QUALITY ACT: A STEP-BY-STEP APPROACH*

Section 972U211. By U.C. Davis with Ronald A. Bass and A. Nero Rivasplata.

8 a.m.-4 p.m. Cost is \$235. At University Club, Old Davis Rd., U.C. Davis.

Call U.C. Davis Extension at (800) 752-0881 or (916) 757-8777, fax (916) 757-8558.

Wednesday-Friday, September 24-26. *NORTHERN CALIFORNIA WATER TOUR*

By Water Education Foundation. Tour travels the length of the Sacramento Valley and includes visits to Oroville and Shasta dams, Feather River fish hatchery. Call (916) 444-6240.

Wednesday, September 24-December 3. *DESIGN OF BUILDINGS FOR LATERAL FORCES*

X 462 EDP 301291 By U.C. Berkeley with R. Jay Love, M.S.

6:30-9:30 p.m., 10 evenings. Cost is \$365. At Oakland City Center, 1338 Broadway, Plaza Level, Ste. 110 RSVP

U.C. Berkeley, (800) 752-0881 or (510) 642-4111 or fax (510) 642-0374.

Wednesday, September 24-December 17. *INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS*

X 412.7 Sect. 1 EDP 301630 By U.C. Berkeley with Todd T. Fitzgibbon, B.A.

6:30-9:30 p.m., 10 evenings. Cost is \$395. At 310 Florence Moore Bldg., Menlo College, Valparaiso Ave. off El Camino Real, Atherton.

RSVP U.C. Berkeley, (800) 752-0881 or (510) 642-4111 or fax (510) 642-0374.

Wednesday, September 24-December 17. *SOIL AND FOUNDATION ENGINEERING*

X 405 EDP 301283 By U.C. Berkeley with Albert Buchignani, M.S.

7:00-9:30 p.m., 12 evenings. Cost is \$365. At 174 Barrows Hall, U.C. Campus, Berkeley.

RSVP U.C. Berkeley, (800) 752-0881 or (510) 642-4111 or fax (510) 642-0374.

Thursday & Friday, September 25 & 26 and October 9 & 10. ENVIRONMENTAL PLANNING AND SITE ANALYSIS.

X 432.3. Section 972U500. By U.C. Davis with Joseph J. Donaldson.
8 a.m.-5:30 p.m. Cost is \$490. At University Club, Old Davis Rd., U.C. Davis.
Call U.C. Davis, (800) 752-0881 or (916) 757-8777, fax (916) 757-8558.

Thursday-Saturday, September 25-27. ECOLOGICAL RISK ASSESSMENT

X 486 By U.C. Berkeley with Clarence A. Callahan, Ph.D. and Harry Ohlendorf, Ph.D.
8:30 a.m.-5 p.m. 3 days. Cost is \$335. At U.C. Berkeley Extension Downtown, 150-4th St., San Francisco
RSVP U.C. Berkeley, (800) 752-0881 or (510) 642-4111 or fax (510) 642-0374.

Friday, September 26. INTRODUCTION TO WATERSHED MANAGEMENT

EDP251140 By U.C. Berkeley with Thomas Mumley, Ph.D.
9 a.m.-5 p.m. Cost is \$245. At U.C. Berkeley Extension Downtown Center, 150-4th St., San Francisco
RSVP U.C. Berkeley, (800) 752-0881 or (510) 642-4111 or fax (510) 642-0374.

Tuesday, September 30-December 2. FUNDAMENTAL CHEMISTRY FOR HAZMATS SPECIALISTS

X 401, EDP972U81. By U.C. Santa Cruz with Steven Fedder, Ph.D.
1-4:30 p.m., 9 meetings. Cost is \$390. At UCSC Extension, 3120 De la Cruz Blvd., Santa Clara.
Call UCSC, (800) 660-8639 or (408) 427-6600, fax (408) 427-6690.

OCTOBER 1997 CLASSES AND EVENTS

Sunday-Friday, October 5-10. INTERNATIONAL SYMPOSIUM ON ENVIRONMENTAL GEOCHEMISTRY.
By American Society of Agronomy. At Vail, CO. Call R.C. Severson at (303) 236-5514 or (303) 236-3200.

Wednesday, October 1-December 10. REGULATORY FRAMEWORK FOR TOXIC AND HAZMATS

X 428.5, EDP972U03. By U.C. Santa Cruz with Gregory P. O'Hara, JD. 6-9 p.m., 10 meetings. Cost is \$390. At UCSC Extension, 3120 De la Cruz Blvd., Santa Clara, CA.
Call UCSC, (800) 660-8639 or (408) 427-6600, fax (408) 427-6690.

Friday, October 3. WATER SUPPLY AND FISH IN THE SACRAMENTO-SAN JOAQUIN DELTA

By U.C. Berkeley with William J. "B.J." Miller, Ph.D. & David Fullerton.
Covers the physical Delta, the biological Delta, conflict resolution and long-term solutions to Delta problems--the CalFed Bay-Delta Program.
8 a.m.-4:30 p.m., 1 day. Cost is \$245. At U.C. Berkeley.
RSVP U.C. Berkeley, (800) 752-0881 or (510) 642-4111 or fax (510) 642-0374.

Friday-Saturday, October 3-4. ENVIRONMENTAL MANAGEMENT AND THE INTERNET

X 441.2 EDP972V48. By U.C. Santa Cruz with Dorothy Thronton, B.S., MPH & Michael T Katz, B.A.
9 a.m.-5 p.m., 2 meetings. \$260. At UCSC Extension, Macintosh Lab, 3120 De la Cruz Blvd., Santa Clara, CA.
Call UCSC, (800) 660-8639 or (408) 427-6600, fax (408) 427-6690.

Friday-Saturday, October 3-11. SITE REMEDIATION: CURRENT METHODS AND TECHNOLOGIES

X417 Natural Science, EDP 972V60. By UCSC with Jim Rubin, B.S., P.E.
9 a.m.-5 p.m., 4 meetings. Cost is \$390. At UCSC Extension, 3120 De la Cruz Blvd., Santa Clara, CA.
Call UCSC, (800) 660-8639 or (408) 427-6600, fax (408) 427-6690.

Monday-Friday, October 6-10. PERRY JOHNSON'S ISO 14000 TRAINING

In Los Angeles, CA. \$1,995. RSVP to (800) 479-2020, (310) 607-0222, fax (310) 607-0220, or www.pji.com.

Monday-Friday, October 6-10. DETERMINING FEDERAL WATERSHED JURISDICTION

EDP251827 By U.C. Berkeley with Terry Huffman, Ph.D.
5 days. 8:30 a.m.-5 p.m. Cost is \$895. At U.C. Berkeley Ext. Downtown Center, 150-4th St., San Francisco
RSVP U.C. Berkeley, (800) 752-0881 or (510) 642-4111 or fax (510) 642-0374.

(Continued from front page of newsletter)

Sandy Figuers has been involved in Bay Area geology and consulting work for several years, particularly since leaving Chevron Oil in 1989 to pursue a career in geological consulting. Sandy began his career with Chevron after receiving his Ph.D. in geology and engineering geology from the University of Texas, El Paso (UTEP). His petroleum industry exploits took him overseas to Papua, New Guinea, where he mapped in rugged jungle terrain while keeping a watchful eye out for poisonous snakes and other hazards. After a brief sojourn with Rogers-Pacific, he established Norfleet Consultants in Livermore, CA. In addition to his consulting business, Sandy has also held an elected position with the local water district in Livermore. In spite of his busy work and family life, Sandy has managed to find time to give talks at monthly NCGS meetings and to co-lead or participate in field trips to his favorite East Bay geological sites.

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