NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

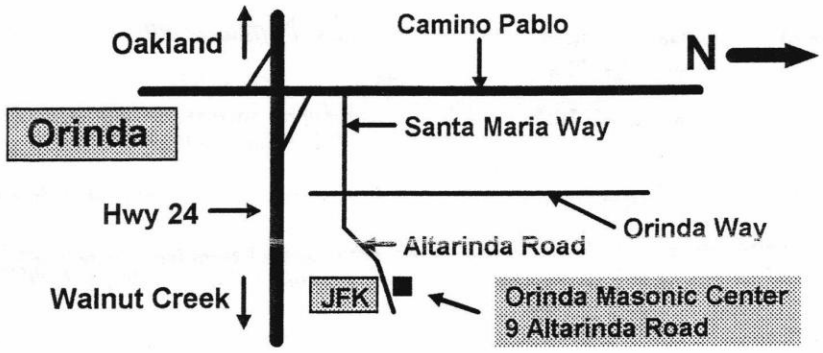
APRIL MEETING ANNOUNCEMENT

DATE: *Wednesday*, April 14, 1999

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

TIME: 6:30 p.m. Social (beer and snacks); 7:00 p.m. talk
Cost is $5.00 per person

RESERVATIONS: Leave your name on the recorder at 925-294-7530 anytime before the meeting.



SPEAKER: Glenn Borchardt, Soil Tectonics, Berkeley, CA.

Soil Tectonics along the Hayward, Concord, and Honey Lake Faults

Soils, generally the youngest materials at the surface of the earth, provide clues to the behavior of faults. At Fremont, we were able to obtain the age of sediments and the slip rate by measuring the age of the soil carbon in a downwarp along the Hayward fault. At Union City, pedogenic calcite was precipitated in soils between 10 and 7 ka (thousands of calendar years ago), when rainfall was about half what it is now. The complex soil and alluvial stratigraphy of beheaded alluvial fans yielded the first slip rate (8+1 mm/yr) for the Hayward fault. At Point Pinole, a white streak appearing on aerial photos taken in 1939 was produced by an "E" horizon formed along the water barrier created during offset of an embayment that crossed the fault at 122 ka. At Concord, the complex stratigraphy at Galindo Creek yielded the first slip rate (3.4+0.3 mm/yr) for the Concord fault. Ductile soil units were drag folded across the fault, yielding measurements of substantial vertical slip (0.45+0.06 mm/yr). At Honey Lake, a stream-side fault crossing showed soil offsets and fault features produced by interactions between tectonism, volcanism, and climate since 7 ka. *This talk will illustrate how the peculiarities of soil development along the Hayward, Concord, and Honey Lake faults have helped our understanding of seismic history.*

Continued on the back page of the newsletter

NCGS Spring/Fall 1999 Calendar

Please note that some of the agenda topics below are <u>tentative</u> and subject to change

April 14	Glenn Borchardt Soil Tectonics, Inc.	***Soil Stratigraphic Methods and Movement on the Hayward, Concord, and Honey Lake Faults, California***
April 27	Paul Weimer University of Colorado	**Talk Cancelled—Talk Cancelled—Talk Cancelled** *Sequence Stratigraphy of [illegible] Turbidite System: Depositional Models* AAPG Distinguished Lecture
May 8	David Rogers Geolith Consultants	***Mission Peak Landslide, Fremont, Field Trip***
May 12	Barbara Romanowicz U.C. Berkeley	***Long Range Relationships Between Earthquakes***
June 5	Pleasanton Ridge Park	***NCGS Family Picnic and Barbecue***
June 26	Ron Crane	***Ohlone Wilderness Field Trip***
June 23	Gary Greene Moss Landing Marine Lab	***Tectonics of Offshore California: Oil Seeps and Biotic Communities***
Sept. / Nov.*	Richard G. Blake	***Evidence of an Ancient Asteroid Impact Scar in the Sacramento Valley Area, California***
Sept. / Nov.*	Dr. David L. Jones	***Tectonostratigraphic Terrane Analysis in California Geology: History and Future Trends***
Oct.	Andrei Sarna-Wojcicki	***Volcanics of the Bay Area Region Field Trip***
Oct. 13	Dr. Ben Santer Lawrence Livermore Lab *1998 McArthur Grant Winner*	***Global Climate Change: Natural or Human-Induced?***

*Dates and specific titles to be announced

Please note: The AAPG Distinguished Lecture *by Paul Weimer has been cancelled!*

1999 Teacher of the Year Awardee Named

The Northern California Geological Society is pleased to announce the selection of a winner for the 1999 Teacher of the Year Award, Margaret Klim of Webster Academy in Oakland. Ms. Klim's science unit for second graders teaches about the role of the hydrologic cycle and the importance of water resources. The $200.00 NCGS award is given by the society as an affiliate of the Pacific Section of the American Association of Petroleum Geologists. The award recognizes creativity in the integration of geological principles into elementary and secondary school science education programs. It is designed to recognize excellence in programs already in place, and to encourage the development and elaboration of new programs. Randy Kirby, Chairman of the society's K-12 Geoscience Education Committee, will present the award to Ms. Klim during the April 14 meeting at the Orinda Masonic Auditorium. Randy thanks the members of the Committee for their work on the 1999 award program. Special thanks are due to Mel Erskine and Joan Barminski of AAPG's Pacific Section, for their role in obtaining seed funds for the 1999 award. As a finalist of the NCGS program, Ms. Klim's application has been forward to Pacific Section to be considered for the $5000.00 National Award.

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

NCGS 1999 FIELD TRIP ANNOUNCEMENT

Mission Peak Landslide (Fremont) Field Trip

Saturday, May 8, 1999

Led by David Rogers, Geolith Consultants, Inc.

This trip will begin with an orientation of the regional geology of Mission Peak including a discussion of the structural/tectonic history of this very recently formed mountain and the current and past landslides that have resulted. Next we will drive to a stop to see the closest location to the slide the City will allow (you may want to bring binoculars for a closer inspection). Following this, we will drive to the top of Mission Peak to see spectacular views of the entire Bay Area. If time permits, our trip may include a stop to collect liquid samples from a local winery at the base of the mountain.

Time: Saturday, May 8, 1999 Concord at **7:30 a.m.**; City Park, end of west Hunter Rd., Fremont at **9:00 a.m.**

Departure: Concord - Chevron Parking Lot, 2001 Diamond Blvd, Concord, **at 7:30 a.m.** Exit I-680 at Willow Pass Road. Go 1 block east, turn north (left) onto Diamond Blvd. Turn left again at the third stoplight into the Chevron office complex just north of the Willows Shopping Center.

Cost: **$20 for members; $30 for nonmembers**. This price includes transportation, breakfast pastries, lunch, and refreshments.

Directions to the Fremont meeting place: *From the East Bay/Peninsula*: take 880 south to the AutoMall/Durham exit, head east to 680, and take 680 north to the Mission-Hayward (this is the one with a McDonalds). Proceed south on Mission 1.8 mi. to the stop light at West Hunter Rd. and turn right (west). Go 1 block and turn right onto Baretta. Follow Baretta 1/4 mi. till it ends at a "T" intersection. Park is straight across this intersection (beneath the power lines). *From the South Bay*: get on 680 north and take the East Mission exit. Proceed east on Mission about 3-4 miles (I think) to the light at West Hunter, then turn left (west) and follow the directions above. **The Concord group will arrive at 9:00 to 9:30 am.** There will be coffee, donuts, and croissants waiting for you.

********** **REGISTRATION FORM** **********

Name _____ _____

Address (Street/City/Zip)_____ _____

Phone (day) _____ **Phone (evening)** _____ _____

E-mail or Fax No. _____ _____

Regular Lunch _____ **Vegetarian Lunch** _____ (Check one)

I am willing to drive my van or SUV on this trip _____ (check if YES) Mileage will be paid by the NCGS

Please write a check payable to the NCGS and mail it with the completed registration form to:

Bill Howell, 6651 Alisal Street, Pleasanton CA, 94566

If you have any questions or need additional information, call or fax Bill at **(925) 484-3111**

To help NCGS estimate the volume of beer to purchase, please give us some feedback of the other field trips you might attend during 1999 (this will not be considered a commitment). Please indicate your level of interest using the following code:

y = yes, am definitely interested; **m** = maybe; **n (or blank)** = no thank you.

Mission Peak: _____ Del Puerto Canyon: _____ Ohlone Wilderness: _____ NCGS Picnic: _____

American River Rafting _____ Vallecitos Syncline: _____ Bay Area Volcanics: _____ Pinnacles National Monument: _____

Long Valley Caldera: _____ Pigeon Point Turbidites: _____ Vasco Caves: _____

A Benefit Recital

for the

Pacific Section AAPG Foundation

***On the evening of April 27, 16-year-old cellist Evelyn Gardett will perform a benefit recital in memory of her grandfather, honorary lifetime AAPG member Peter H. Gardett. Proceeds from the recital will go to the new Pacific Section AAPG Foundation. Evelyn currently studies with Richard Aaron at the Cleveland Institute of Music.*

***Check in early for the PSAAPG Convention ... come stroll in Carmel ... and enjoy an evening of music with Evelyn and San Francisco pianist Myriam Teie -- and help support the activities of the new PSAAPG Foundation.*

8 P.M., April 27
Sunset Theater, Sunset Center
San Carlos St., Bewteen 8th and 10th Avenues
Carmel, California
10 Minutes from the Embassy Suites, Seaside

* Donations to PSAAPG Foundation Accepted at the Door *

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

NCGS Annual Family Picnic and Barbecue

Saturday, June 5, 1999
9:00 a.m. to 4:00 p.m. at
Pleasanton Ridge Park, Pleasanton, CA

Picnic Cost: **Adults (14 years old and above) - $7.50 / person**
Children (5 to 14 years old) - $5.00 / person
Children under 5 are free

This year's annual picnic will be held at **Pleasanton Ridge Park** south of Pleasanton. Before the barbecue, **Patrick Hubbard** (Treadwell & Rollo) will lead those of us so inclined, on a pleasant hike through the Calaveras Fault Zone to the top of the ridge for some spectacular views of the Livermore Basin, Sunol Valley, Mount Diablo, and the Northern Diablo Range. Following this, we will return for **Tridib's Bodacious Barbecue** and Patrick will discuss earthquake hazards in the Pleasanton area with a particular emphasis on the effects of the Calaveras fault on our lives. After this, if you can still move, we will take a short drive to Tehan Canyon to see a surface expression of the Calaveras fault.

Directions to Pleasanton Ridge: Take the Sunol-Castlewood exit off 680 (south of the 680/580 interchange). Go west 1 block to a fork in road and stay to right onto Castlewood Dr. Cross the RR tracks and bridge to stop sign at Foothill Road. Go left (south) 1.7 miles to Pleasanton Ridge Regional Park (on right). Picnic area is through the gates at the end of parking lot. **Meeting time for hike to ridge: 9:00 am. Barbecue starts around noon.**

Registration Form – NCGS Family Picnic and Barbecue

Name _____

Address (Street/City/Zip) _____ _____

Phone (day) _____ **Phone (evening)** _____ _____

E-mail or Fax _____

No. attending: adults (14 and above) _____ **children (5 to 13)** _____

Remittance enclosed: $ _____

Vegetarian Lunch _____ (Please check)

Please write a check payable to the NCGS and *mail it with the completed registration form to*:

Bill Howell, 6651 Alisal Street, Pleasanton CA, 94566

If you have any questions or need additional information, call or fax Bill at **(925) 484-3111**

To help NCGS estimate the volume of beer to purchase, please give us some feedback of the other field trips you might attend during 1999 (this will not be considered a commitment). Please indicate your level of interest using the following code:

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Mission Peak: _____ Del Puerto Canyon: _____ Ohlone Wilderness: _____ NCGS Picnic: _____

American River Rafting _____ Vallecitos Syncline: _____ Bay Area Volcanics: _____ Pinnacles National Monument: _____

Long Valley Caldera: _____ Pigeon Point Turbidites: _____ Vasco Caves: _____

California Council of Geoscience Organizations (CCGO)

Invites You to

Join Us for Lunch in Berkeley

at the

Geological Society of America

Cordilleran Section Centennial Meeting

Wednesday, June 2, 1999

12:00 noon - 1:30 pm

$17 per person.

To register, select the AWG luncheon on the GSA meeting preregistration form. For additional information contact **Rachel Fischer at (310) 833-3915 or rafrag@aol.com.**

Dr. Tanya Atwater will speak about

"Quantitative Plate Tectonics in Western North America:

It (finally) all adds up!"

Using computer animations, maps and landscape images, Dr. Atwater will illustrate the Mesozoic-Cenozoic plate tectonic evolution of Western North America. In particular, she will emphasize:

- the longevity and immensity of our subduction history,
- the havoc of the Laramide flat-slab subduction episode and its aftermath, and
- the creation and evolution of the San Andreas plate boundary system.

Tanya Atwater has been a Professor of Tectonics at the University of California at Santa Barbara (UCSB) since 1980. She attended the Massachusetts Institute of Technology, University of California at Berkeley and Scripps Institute of Oceanography. Dr. Atwater's research has ranged from the details of sea floor spreading to the global aspects of plate tectonics. She has been on numerous oceanographic expeditions in the Pacific and Atlantic Oceans, including twelve dives to the deep sea floor in the tiny submersible, Alvin. She is best known for her works on the plate tectonic history of the San Andreas fault system, in particular, and of western North America, in general.

Dr. Atwater is deeply involved in UCSB's undergraduate program, and works to revitalize teaching techniques and modernize science curricula. She works at many levels--with the media, with museums, in K-12 teacher workshops--to spread Earth information and Earth passion across the wider citizenry. Dr. Atwater is a fellow of the AGU and GSA, a co-winner of the AAAS Newcomb Cleveland Prize, and a member of the National Academy of Sciences.

CORRECTION / UPDATES TO THE NCGS SPECIAL Y2K-EOW FIELD TRIP EDITION

The NCGS Board wishes to make a correction to statements made in the February newsletter regarding the Year 2000 crisis and the upcoming End of the World. In that newsletter, we announced that because the predictions for Y2K-related disaster have been so dire, it must mean the problem is not limited to computer clock malfunctions and must include atomic clocks as well. The Board interpreted the consequence of this to mean that the Earth's radioactive clocks will also be reset to zero and the planet will return to it's initial condition present over 4 billion years ago in the year 00 (i.e. molten). Although we were personally looking forward to seeing all the overburden (i.e. grass, trees, and dirt) dissolve so the structural geology beneath it could finally be seen, it appears that our analysis was flawed. Since making that special announcement, I received some junk mail from a gold-trading company. It included an article entitled:

The Year 2000 Problem - The Year the Earth Stands Still

While it's not known just how much gold-trading salesmen know about the earth, it is well known that all geologist are full of schist. Logic dictates, therefore, that these salesmen must know more about the earth than we do. As a result, I ordered two cases of Sierra Nevada and called an emergency meeting of the NCGS Board (free beer is the only way to get them to show up). After we thought (i.e. drank) long and hard about how the Y2K crisis could make the earth stand still, we finally figured out our mistake. It turns out that the Y2K problem will not simply end with clocks being reset to 00. Apparently, after this occurs, things will then become so confused that clocks will actually stop!

Now, the earth's rotation has been used as a clock since time immemorial. Therefore, this must be the explanation for the article's title. Upon realizing this, the Board's geophysicist predicted that when Y2K comes, the sudden change in inertial motion will cause everything to start flying around, just like in a rapidly moving car when the brakes are suddenly applied (at least that's what we think he said - his speech was getting rather slurred by this time).

After another round, the Board's paleo-tectonic reconstructionist realized that this must have been what happened when Gondwanaland and Laurasia (and probably Pangaea as well) split apart many millions of years ago. At this point, the Board's paleontologist had an "Ah Ha!" experience (at least that was his excuse for falling over backward onto the floor) and began mumbling incoherently about dinosaurs having computers. The Board's ecologist then lifted the lampshade off his head and made the observation that, were it not for a flaw in the Dinosaur's (Computer) Operating System (DOS), these reptiles would not have gone extinct and mammals would not have evolved. Then, just before passing out, he surmised that the Cretaceous asteroid impact suggests that the Y2K problem is not limited to the earth alone. It just goes to show that- **`those who fail to learn from history are condemned to repeat it'.** The NCGS Board sincerely apologizes for any inconvenience caused by our error in the February newsletter. Sincerely,

Bill `if you can't interject some humor into what your doing, it may not be worth doing' Howell

****

So what's a geologist to do when the world is coming to an end (I mean besides having another Sierra Nevada)? That's right! Go on an NCGS field trip to see some of the most remarkable geology in the world (what a segue eh?). **Nonmembers are invited on all NCGS field trips *if there is room.* Trip costs are $30 for nonmembers on all 1999 NCGS trips. However, nonmembers should consider joining the NCGS for $15 a year and take advantage of the $20 member field trip fees.**

There's still time to sign up for the May 8th field trip to Mission Peak with Dr. David Rogers. There are some last minute changes tho: 1) there is an alternate meeting place in Fremont for those coming from the Peninsula, East Bay, or South Bay; and, 2) following the recent rains, the mountain has begun slipping again. An estimated 12 million cubic yards may be coming down soon. As a result, the City of Fremont's lawyers will not allow anyone to walk on the slide. We will get close to it but members are advised to bring binoculars to observe details that, unfortunately, we will not be able to touch. The van ride to the top, and all other elements described below, are still on.

May 8th Mission Peak Landslide David Rogers (Geolith Consultants)

This trip will begin with an orientation of the regional geology of Mission Peak including a discussion of the structural/tectonic history of this very recently formed mountain and the current and past landslides that have resulted. Next we will drive to a stop to see the closest location to the slide the City will allow (you may want to bring binoculars for a closer inspection). Following this, we will drive to the top of Mission Peak to see spectacular views of the entire Bay Area. If time permits, our trip may include a stop to collect liquid samples from a local winery at the base of the mountain.

Directions to the alternate meeting place: From the East Bay/Peninsula, take 880 south to the AutoMall/Durham exit, head east to 680, and take 680 north to the Mission-Hayward (this is the one with a McDonalds). Proceed south on Mission 1.8 mi. to the stop light at West Hunter Rd. and turn right (west). Go 1 block and turn right onto Baretta. Follow Baretta 1/4 mi. till it ends at a "T" intersection. Park is straight across this intersection (beneath the power lines). From the South Bay, get on 680 north and take the East Mission exit. Proceed east on Mission about 3-4 miles (I think) to the light at West Hunter, then turn left (west) and follow the directions above. The Concord group will join you around 9:00 to 9:30 am. There will be coffee, donuts, and croissants waiting for you.

June 5th Family Picnic at Pleasanton Ridge Patrick Hubbard (Treadwell & Rollo)

This year's annual picnic will be held at Pleasanton Ridge Park south of Pleasanton. Before the barbecue, Patrick Hubbard will lead those of us so inclined, on a pleasant hike through the Calaveras Fault Zone to the top of the ridge for some spectacular views of the Livermore Basin, Sunol Valley, Mount Diablo, and the Northern Diablo Range. Following this, we will return for Tridib's Bodacious Barbecue and Patrick will discuss earthquake hazards in the Pleasanton area with a particular emphasis on the effects of the Calaveras fault on our lives. After this, if you can still move, we will take a short drive to Tehan Canyon to see a surface expression of the Calaveras fault.

June 26th The Ohlone Wilderness Trip Ron Crane (consultant)

This trip will traverse the Ohlone Wilderness Trail beginning at Sunol Regional Park (near Sunol), and ending at Del Valle Park in Livermore. It will involve crossing a major portion of the northern Diablo Range (most of it through private land). Along the way, Ron will discuss (and we will see): a plunge view of the Calaveras Fault and associated "flower" structures; Cretaceous deep-sea fans unconformably overlain by Miocene sands; the northern plunge of the Diablo range (with unconformably overlying Miocene, Pliocene, and Pleistocene sands that strike at almost 90 degrees from the underlying Franciscan); dismembered thrust sheets (including the Maguire Peaks thrust sheet which is a tightly folded syncline of Pliocene through Upper Miocene sands lying unconformably on a pillow basalt sequence); fault bounded Franciscan terrains with both N-S and NW-SE strikes; a tear fault; a major anticlinorium AND a major synclinorium; and a bunch of other stuff. Our journey will culminate at Del Valle Reservoir with a spelling test on all the terms used during the trip.

July The Del Puerto Canyon Trip Ron Crane (consultant)

This trip is designed to acquaint the geologist with the eastern flank of the Northern Diablo Range. This geology includes sediments from the Quaternary and Pleistocene, rocks from the Miocene and Eocene, deep-sea fan deposits from the Cretaceous, a siliceous volcanic sequence of probable Jurassic age, the Jurassic Lotta Creek tuff, greenstones and sheared Franciscan sediments, serpentine, gabbro, and peridotite. The structural/tectonic setting of this area involves an east-vergent wedge which has produced, among other features: a syncline of Jurassic-Cretaceous deposits; a backthrust fault that dips 30+ degrees to the east; isolated "blobs" of serpentine; tear/thrust faults; and Pleistocene and Quaternary-aged sediments with dips up to 40 degrees.

August River Rafting Down the South Fork of the AmericanRuss Graymer (USGS)

This day trip is **UNDER CONSTRUCTION**. The only possible field trip that can be planned for August in California has to involve water. As my pop used to always say- "Before the Y2K crisis hits and the world comes to an end, you have to go river rafting down the south fork of the American to see the granite plutons, metaseds, and the Logtown Ridge metavolcanics." (That's a direct quote!) Russ Graymer is a former grad student of Davey Jones and has studied this area extensively. The trip will begin at Coloma (northwest of Placerville). An experienced rafting company will lead us through exposures of the Coloma Pluton, the Mount Ararat Terraine, and the American River Terrain. Additional stops will be made to inspect some of these features. Teenagers on up are invited if accompanied by a parent. Additional details will be provided in a subsequent newsletter.

September Vallecitos Syncline Mel Erskine (consultant)

This (possibly) overnight trip is still **UNDER CONSIDERATION**, but it's looking good. It turns out that Mel is one of those rare geologists who is also a teetotaler. Although I'm wondering why he got into geology in the first place, his work is top notch (maybe there's a connection?). I just need to arrange some final logistics and we'll get to see some very unique structural geology that Mel says is of great tectonic importance for understanding California geologic history. The Vallecitos "Syncline" is located in the central Diablo Range south of Hollister. It is the outcrop of a complex active thrust system that has been reactivated several time since the late Cretaceous. The trip will include access to areas on private property that are not open to the general public.

October Volcanics of the Bay Area Region Andrea Sarna (USGS)

This trip will discuss the age and correlation of tephra layers in the greater San Francisco Bay Area. We will visit an area near Mount Diablo where there are several tuffs that formed 12 to 3.4 million years ago. Dr. Sarna will describe how these tuffs can be chemically characterized and correlated, their eruptive sources, and his recent work re-dating tuffs using the Argon-Argon method. Current results indicate many tuffs are older than previously reported on the basis of conventional K-Ar dating. Dr. Sarna will also discuss other regional tephra deposits, including a proposed reconstruction across the San Andreas fault system involving units south of Mount Diablo, within the northern Berkeley Hills, in the area north of San Pablo Bay, in the Wilson Grove Formation northwest of Petaluma, and in the Delgada submarine fan west of the San Andreas fault and Cape Mendocino.

The Following Trips Are Under Consideration for the Year 2000 (providing the Earth abides).

Pinnacles National Monument Vincent Matthews
Mammoth/Long Valley Caldera David Hill & Roy Bailey
Deep Sea Turbidites at Pigeon Point on the San Mateo Coast
The Vasco Caves in the Altamont Hills North of Livermore

Note- suggestions for future trips are always welcome. Please contact **Bill Howell** at **(925) 484-3111**.

WE GOT YOUR INPUT !

Many thanks to the 45 people who took the time to answer our questionnaire! We think that's an excellent response and the results will help us to better plan our program. Here's a summary of what you said:

1. **Which activities do you like best?**

	Number checked	% of Questions	Average rank (of 7)
Field trips	40	89%	2.0
Evening speakers	38	84	1.9
Newsletter	36	80	2.9
AAPG Distinguished lecturers	33	73	3.7
Noon speakers in Oakland	29	64	4.6
Family night speakers on popular topics	25	56	4.3
Family picnics	20	44	5.3

"Average rank" is the average of the rankings where they were given. We assume that topics not checked or ranked were not favorably viewed by the respondent but these are not included in the averages.

2. **What type of technical talk do you like?**

California geology and seismology	44	98%	1.9
Bay Area geology and seismology	42	93	1.7
Geology around the world	41	91	3.1
Hydrogeology and remediation	29	64	5.0
Petroleum geology	29	64	5.0
Geotechnical	28	62	5.0
Dinosaurs and the like	26	58	5.1
Other	20	44	5.6

Pretty clear break between regional geology and geological specialties

3. **I'm in favor of supporting:**

Teachers Day program	32	71%	2.1
Scholarships	30	67	1.9
Earth Science Teacher of the Year award	29	64	1.9

We didn't ask for these to be ranked and most people didn't. Two-thirds support these activities with no clear favorite.

4. **Why do you come to evening meetings?**

The technical talk	40	89%	1.0 unanimous
See friends	26	58	2.3
Browse and buy guidebooks	23	51	3.1
Increase network	21	47	2.7
Beer, sodas, munchies	10	22	3.9

No surprise here. To tell the truth, part of the question was a bit of advertising.

5. **Why don't you come to the evening meetings?**

Too busy	26	58%	2.0
Too far to drive	14	31	1.3
Talk doesn't sound interesting	12	27	2.2
Other (see comments below)	8	18	1.0
No dinner	4	8	3.3

We didn't ask for these to be ranked and most people didn't. The averages don't mean much due to very small numbers.

6. **Location of meetings**

Move around? Yes--7 No--18 Depends--15 (Oops! We didn't ask "on what")

Best location? East of Oakland Hills--20 Oakland/South Bay/ Peninsula, Novato--15

7. **Want a membership directory?**

Yes--38 No--4

Even if it costs a little? Yes--30 No--4

8. **Prefer e-mail newsletter?**

Yes--19 No--21

We will look into e-mailing the newsletter to those who want it. It costs roughly $ 1 per printed and mailed newsletter, so there should be considerable saving using e-mail.

What other activities would you like to see included?

1. Invitations to K-12 science teachers to join our field trips, free or nominal cost. Needs specific written invitations to a rotating list of school districts.
2. More interaction, e.g., a column in the newsletter, a chat section on a web page, an email newsletter

Why don't you come to evening meetings – answered "other"

1. Live in Oregon, live in the City, live in Sacramento, live in Novato
2. Many times the notices arrive after other plans have been made. A calendar in the newsletter is helpful.
3. 2 small kids at home prevent attending evening meetings
4. Out of town 50% of time

In addition, we received a lot of very useful suggestions and comments on the program, field trips, and meeting improvements, and a lot of very appreciated and favorable comments on the newsletter and things in general about how the NCGS is operating these days. Another plus, several people volunteered to work on committees. Thank you!

SECOND ANNUAL

SIERRA NEVADA RIVER RAFTING AND GEOLOGY FIELD TRIP

sponsored by
San Francisco, Sacramento, Great Basin, Southern California, and Southwestern Sections of the

ASSOCIATION OF ENGINEERING GEOLOGISTS

Saturday and Sunday
June 26 and 27, 1999

SOUTH FORK OF THE AMERICAN RIVER
in the California Mother Lode,
1 hour east of Sacramento

AEG members & families: $120/person (30% less than last year!)
Non-members: $140/person

Includes: Saturday raft trip from Chili Bar to Coloma, operated by ARTA (American River Touring Association, Inc.)
Sunday field trip: *Geology of the Central Motherlode and Sierra Foothills Wine Country*
Friday and Saturday night camping at Camp Lotus (Bring your own gear)
Meals provided by AEG and prepared by attendees (Saturday and Sunday breakfast and lunch, Saturday dinner)

Reservations and Payment Due April 6. Space is limited.

Mail to Betsy Mathieson, c/o Terratech, 1365 Vander Way, San Jose, CA 95112 (408/297-6969; e-mail BMathieson@post.Harvard.edu). Make checks payable to AEG San Francisco Section. Include names of attendees (& children's ages), your e-mail address, and your phone number.

Rafting Details: Paddle rafts with professional guide in each raft. Class III rapids. Excellent for first-timers and families. Minimum age 12 years. ARTA provides transportation from Camp Lotus to the river and back. Passenger release forms and information sheets will be mailed to participants upon receipt of reservations and payment.

CCGO GETS GEOLOGY BACK INTO BUILDING CODE

At the March 19th and 20th public hearings for the 2000 International Building Code, the California Council of Geoscience Organizations (CCGO) succeeded in ensuring the consideration of geologic factors in pertinent portions of the new code. Initially proposed by CCGO in October of 1998, the Structural Committee voted to accept the addition of slope stability as a factor to be considered in foundation and soils investigations. CCGO also provided testimony against a proposal by the National Council of Architectural Registration Boards which would have excluded geologists from performing basic components of geologic practice including the classification and investigation of soil, the number and types of borings in an investigation program, selection of appropriate drilling equipment, and overseeing boring and sampling programs. The consideration of slope stability in foundation and soils investigations, along with all other portions of the 2000 International Building Code, now goes before a vote of the memberships of the International Conference of Building Officials, the Building Officials and Code Administrators, and the Southern Building Code Congress International, Inc., at their Joint Annual Conference, to be held on September 12-17, 1999,in St. Louis, Missouri. The need for involvement in this process was necessitated by the nearly complete exclusion of geologic consideration from the 2000 International Building Code. This new code will replace the Uniform Building Code in the United States and serve as the benchmark for construction internationally. CCGO was represented at the hearings by Betsy Mathieson, Vice President.

CCGO also proposed a change in the definition of "active fault" which, as presented in the current version of the code, requires rupture in the past 11,000 years in addition to a slip rate of at least 1mm per year. CCGO's proposed elimination of the minimum slip rate requirement was opposed by the Code Resource Support Committee, on the grounds that the change was inconsistent with National Earthquake Hazard Reduction Program (NEHERP) guidelines. CCGO will consult with NEHERP regarding this issue.

The ICBO Structural Committee also rejected CCGO's proposal to reinstate a requirement for geologic observation during grading. Opposition testimony came from the National Association of Home Builders, who argued that the wording (from the 1994 Uniform Building Code) was too broad. One committee member provided a reference to IBC Section 1707.7, which has a requirement for a special inspection before placement of fill. Unfortunately, no requirement exists for inspection of cut slopes during grading.

CCGO's final proposal was to replace the term "Registered Design Professional" with "Registered Professional" because many geologists do not consider themselves "design" professionals. However, Paul Sweeney, Executive Officer of the California State Board of Registration for Geologists and Geophysicists, has provided information that California's Department of Consumer Affairs includes Registered Geologists in its list of design professionals, along with Professional Engineers, Architects, and Landscape Architects. As it became evident that the proposal would not be accepted, CCGO withdrew it in order to preserve the goodwill gained by our previous testimony. It should be noted, however, that CCGO's Work Plan for 1999 includes further research of the occurrence and appropriateness of the term "Registered Design Professional" in California statutes, regulations, and public policies.

During CCGO's testimony, an unanticipated alliance arose with a group of interior designers from several states and Canada who also spoke against the architects' proposal. A member of this group expressed surprise later that so few interior designers attended the hearings. Another responded, "there's a lot of apathy out there. If they knew the threat to their livelihood, they'd be here." That conversation could easily have been between two geologists. We hope CCGO's success at the hearings will inspire other geoscientists to turn out at such critical events in the future. Thank you to those of you who contributed background information and suggestions for the weekend's testimony.

For further information or to volunteer to help in the continued effort to keep geology in building codes, please contact **Betsy Mathieson** via e-mail at **Bmathieson@post.Harvard.edu**, or via phone at **(408) 297-6969.**

March Field Trip Participants Have a Blast on Altamont Pass

Undaunted by weather forecasts predicting rain, the NCGS opened its Spring 1999 field trip season with a jaunt to Brushy Peak on the Altamont Pass near Livermore. The trip was attended by thirty members and spouses eager for a look at an area only recently opened to the public. The Livermore Area Recreational and Parks District (LARPD) purchased former ranch land that includes the local landmark, and has since granted ranger-supervised access to the property. The limited access is a step taken by the Parks District to protect rare flora and fauna on the property from inadvertent destruction by visitors.

The attendees caravaned from Concord to Sycamore Grove Park south of Livermore, where they were met by LARPD ranger **Pat Sotello**. Also present was field trip leader **Ron Crane**, Chevron retiree and consultant, who has spent several years mapping the Mt. Diablo region south across the Livermore Valley into the Diablo Range. Ron's plan was to give a brief introduction to the geologic complexities of the Brushy Peak area with comments on the regional geology and tectonics. The group that assembled at Sycamore Grove Park was transported by van to the east flanks of Brushy Peak, just north of Livermore on the western limb of the Mt. Diablo antiform. This fold forms the windmill-dotted ridge separating the Livermore Valley from the Great Valley to the east.

Access to Brushy Peak is from the east along Altamont Pass and Dyer Roads. The latter winds through ranching land dotted with massive outcrops of Cretaceous (lower Campanian age; 80 to 85 m.y. old) sandstone and conglomerate representing coarse grained channel flows in a mid-sea fan. The shoreline at this time was in the present day Sierra foothills and the sands were accumulating in 6000 to 10,000 feet of water. The gravelly conglomerates contain fist-size rounded cobbles of quartzite, chert, granite, andesite, sandstone, volcanics, metamorphic and igneous rock suites from a diverse source area as far east as Nevada. The outcrops are up to fifty feet high and dip 20 to 30° westward. Their surfaces are dotted with numerous "wind caves." These depressions are actually solution features formed by percolating groundwaters that gradually dissolve away the calcium carbonate cement binding the grains together. More accessible areas are dissolved away first, and the individual sand particles fall out leaving behind cavities ranging from a few inches to over fifteen feet in height exposed along the perimeter of the outcrop. These depressions and shallow caves played an important role in both the history and the biology of Brushy Peak.

Once the group reached the final destination on LARPD property just east of Brushy Peak, they began the ascent to its tree-dotted summit. The lower slope is occupied by the California buckeye and the crest is populated by live oak trees. From this vantage point on top of Brushy Peak, Ron pointed out geological features to the south and southwest across the Livermore Valley. In the distance loomed the silhouette of the Sinbad Hills atop atop Pleasanton Ridge thrust over Miocene age sediments along the Calaveras fault. In the distant foreground Ron noted a low ridge of Livermore gravels (Plio-Pleistocene) just south of Pleasanton which is bounded to the south by the Verona thrust fault. The Diablo Range, with its Franciscan rocks occupied the southern horizon, and the Pleistocene age Tassajara Hills in the foreground bordered the north edge of the Livermore Valley. These ridges are small anticlines and synclines that were produced by southwestward movement along a thrust plane beneath Mt. Diablo.

Brushy Peak was formed by three major tectonic events: the Albian (~100 m.y.) Diablo range thrusting event; moderate Oligocene-Miocene (20 to 30 m.y.) uplift; and the Pleistocene to recent uplift that placed it in its current location. During Albian times a deep trough existed north of Brushy Peak and east of Mt. Diablo that had two normal faults bounding its south side. The Kellogg Creek fault bounded the south end of the trough and an intermediate block separated it from the Brushy Creek fault further south. Down-dropped blocks along splays of the Brushy Creek fault focused sand channels into the area, while shale facies to the south marked the edge of the mid-sea fan deposits. The Cretaceous fan deposit was uplifted and eroded down to Campanian strata during the Oligocene-Miocene tectonic event. Later the Upper Miocene Briones sand (10 to 12 m.y.) covered and protected the Cretaceous sediments. During the Pleistocene the Mt. Diablo antiform rose and the area was uplifted on a west-facing backthrust as older rocks were thrust eastward along the sediment-basement contact. In the Brushy Peak area the backthrust is located along the Greenville fault zone but is difficult to define. It dies out with the antiform to the south. Minor backthrusting in the Brushy Peak area repeats part of the section and reactivates older normal faults as tear faults. Ron noted that there are at least 5 major tectonic events that have affected the area in late Jurassic/Tithonian times, during the Albian, the early Tertiary, the mid-Miocene, and Pleistocene-recent times. Much of this tectonism is in response to stresses generated by complex interactions between the Pacific and North American plates.

The group descended the summit and ate lunch near the Vernal Rock outcrop of gravelly sandstone. There LARPD ranger **Pat Sotello** described some of the unusual flora and fauna that live in this isolated area. In addition to being an important golden eagle breeding area, the region is also home to rare lichen species and fairy shrimps. The shrimps are small fresh water crustaceans living in shallow pools that fill depressions in the sandstone outcrops. The shrimp has a life cycle that takes advantage of California's rainy season to hatch, grow to adulthood, then breed before hot, dry summer weather hits. Once the pools dry up, the shrimp die and and their eggs assume a cyst-like stage that

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protects them until rains late in the year fill the pools, the larvae hatch, and the cycle repeats itself. Sharp-eyed members spotted these tiny shrimp in several pools darting among clumps of algae.

The Brushy Peak area also has some local color and history. Pat recounted the tale of two early landowners, John Elliott of Ireland and Canadian John Scullion, who were granted land deeds in this area during President grant's administration. Elliott died in 1911 and was buried in a crypt on nearby Post Office Rock. With tales of legendary bandit Juan Murrietta's treasure rumored to be hidden in Brushy Peak's caves, several soldiers from Camp Parks in Dublin raided Elliott's tomb during World War I. Repeated vandalism forced landowners to encase the tomb in concrete. As the group toured Post Office Rock, Pat mentioned this was also the site of a dance hall used by Livermore Valley residents until the post-World War II years. Visitors would often leave messages in shallow cubby-holes in the sandstone that resemble mail slots in a post office—hence the name Post Office Rock.

On returning to the vehicles, the group caravaned to the Lake Del Valle dam site south of Livermore on the northernmost reaches of the Diablo Range. The site offers an excellent vantage point to view gently NE-dipping Livermore Gravels (Plio-Pleistocene/Quaternary) on the east dam abutment contrasted with Briones sandstones on the west bank dipping 25° NNW. Both the Briones and the Livermore Gravels unconformably overlie overturned Cretaceous on either side of the dam that dips over 45° NNE. A fault cuts through the lake and one branch offsets the Pliocene. Farther south serpentine is exposed at the entrance to Arroyo Del Valle Park. Detailed maps of the reservoir dam site by the California Division of Water Resources present a complex geological picture that includes granite outcrops. The area appears to be a faulted landslide block, but its complex geology does not match well with the much simpler surrounding geology. At the south end of the lake the Hetch Hetchy aqueduct water tunnel passes beneath the reservoir. Maps of the tunnel show "granite" exposures and Franciscan basement thrust over Livermore Gravels. Unfortunately, the tunnel walls are sealed with concrete, so no one can authenticate these interpretations. Both the dam site and the tunnel geological descriptions offer challenging problems that Ron hopes to work on soon. At this point the trip ended, the final stop added as an enticement for the Ohlone Wilderness field trip that Ron plans to lead on June 26th.

Many thanks to NCGS Vice President/Field Trip Coordinator **Bill Howell** for his role in planning the trip, transportation, lunch, and for handling the registration duties. **Cesar Luga** and his staff at the Martinez Nob Hill Foods again prepared a delicious lunch under Past President **Tridib Guha's** guidance. And our sincerest thanks to **Ron Crane** and LARPD ranger **Pat Sotello** for providing us with a very entertaining trip to this historic/ biologic/geologic Livermore Valley landmark.

March NCGS Meeting Discusses the Hydrostratigraphic Analysis of Sediments Beneath Mather Air Force Base, Sacramento

Members who attended the March 10th NCGS Meeting in Orinda heard IT Corporation's Deputy Geosciences Director **John Sciacca** describe a comprehensive stratigraphic site analysis program of fluvial sediments underlying Mather Air force base east of Sacramento. ***"Hydrostratigraphic Analysis of a Complex Fluvial Depositional System, Eastern Sacramento County, California"*** chronicled a detailed study of fluvial sediments beneath the base in an effort to understand contaminant transport pathways for site assessment and remediation purposes.

John began by listing reasons for understanding the depositional environment in addition to the borehole stratigraphy at contaminated sites: 1) the depositional environment controls the 3-dimensional distribution of permeable sand bodies; 2) the permeability of sediments in a sedimentary system is influenced by the depositional environment; and 3) the combined effects of the previous two factors will determine the distribution and transport of contaminants through the subsurface. Mather Air force Base lies on Pleistocene river terrace deposits of the ancestral American River. These fluvial sediments are underlain by the Plio-Pleistocene Laguna Formation (granitic in provenance), which overlie the Mio-Pliocene andesitic volcaniclastics and volcanic sediments of the Mehrten Formation. The fluvial terrace gravels are thought to be correlated with Sierran glacial events. The principle deposits are the Arroyo Seco Gravels, equated to the Fair Oaks Formation. The terraces are in the vadose zone and were exposed to chlorinated hydrocarbon contamination, particularly TCE. The groundwater system in the area surrounding Mather Air Force Base is part of the Elk Grove cone being pumped for municiple and industrial use.

Previous site investigation did not relate the stratigraphy to a specific working depositional model, and the subsurface interpretations were confusing and resulted in inconsistent correlations between well sites, or led to forced interconnections between units. Coincidentally, the well monitoring network was not screened in some channel deposits that could potentially enhance contaminant transport. The IT Corporation team's approach to this investigation was: 1) review the geological literature pertaining to the site; 2) examine local regional outcrops of the units; and 3) fit the lithologies into a depositional model consistent with the site stratigraphy. Geophysical and

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stratigraphic borings were run using gamma ray, spontaneous potential, and guard resistivity measurement techniques. The various electrofacies were interpreted from the geophysical log patterns and compared with the borings to define the subsurface stratigraphy at each monitored well site. The electrofacies concept characterizes each sedimentary unit based on its electric response in the continuous log profile. Each technique provides valuable information to help define the finescale stratigraphy of the bore hole. Gamma ray logging defines specific time stratigraphic markers like ash fall tuff horizons, and the guard resistivity log is very good at resolving thin-bedded units. The combined results of these well surveys allowed the investigators to define the various stratigraphic units, identify unconformities, correlate the unconformities between well sites, and construct isopach maps of the correlated units. These subsurface maps permitted the team to estimate the probability of interconnection between units and to plan an appropriate monitoring system. The geophysical log patterns also provided lithologic facies interpretations that could be matched with specific depositional models. The electrolog models have been based on numerous log profiles that have been conducted in various known sedimentary environments, and are an important subsurface interpretive tool.

John digressed to discuss the results of the electrofacies analysis. Some of the units identified in the subsurface could be traced for distances of over 3 miles. The stratigraphy was examined in the context of bed load, mixed load, and suspended load fluvial systems. One important contaminant transport pathway in the Laguna Formation, dubbed unit B, was interpreted as a bed load dominated or meandering river deposit. It was carefully examined for hydrocarbon contamination and then contoured for TCE and PCE concentration. Contaminant plumes associated with this unit were controlled by scour structures, and some extended for nearly 3 miles. A time stratigraphic mixed load channel sequence was identified in the southern part of the facility and was traced for over 3 miles down dip. This sequence is also a major contaminant pathway that contains chlorinated hydrocarbon plumes up to two miles long. Unraveling this complex fluvial system and defining the key contaminant transport pathways provided a sound foundation for modeling effective extraction well designs for subsequent remediation efforts. Research by Roy Shlemon in the early 1970's correlated units in the terrace gravels, Laguna Formation, and the Mehrten volcaniclastics with key glacial events in the Sierras. Some of the channel sequences were associated with glacial outwash when ice fields receded during the warmer periods in the climatic cycles.

John summarized this site investigation by reiterating the key steps in this detailed hydrostratigraphic program. Electrical and geophysical logs of existing monitoring wells were used to analyze the main well field, and were correlated with stratigraphy gleaned from the well borings. A depositional model based on the geophysical log and well boring analyses was formulated. The depositional model allowed the investigating team to design and refine well monitoring programs, to develop aquifer testing plans, construct contaminant transport models, and to plan a remediation strategy for this site. John finished by citing IT Corporation's philosophy for site analysis: Architecture-Control-Process-Variation; characterize the sedimentary architecture, determine the mechanism that produced the observed sedimentary features, identify the geological process involved, and ascertain the systematic variations in the process that influence contaminant transport.

The NCGS thanks **John Sciacca** of IT Corporation for providing an in-depth technical description of this important site investigation. John is one of several Bay Area professionals spear-heading the marriage of detailed hydrostratigraphic/sequence stratigraphic analysis with traditional monitoring well geophysical log studies and boring identification in complex fluvial/alluvial deposits at major contamination sites. This approach is revolutionizing site assessment and remediation design.

Dr. GLENN BORCHARDT was trained as a soil scientist at the University of Wisconsin, Madison (B.S., M.S.) and at Oregon State University (Ph.D.). He has 5 years experience studying volcanic ash soils and correlating them by using Instrumental Neutron Activation Analysis. He is the developer of the SIMAN coefficient for use in similarity analysis. He has 5 years experience studying the clay mineralogy and chemical stabilization of California. Since 1977 he has been a developer of soil mineralogical and stratigraphic methods for studying fault activity throughout the state. He is the co-discoverer of the Holocene slip rates of the Hayward and Concord faults. He provided the soil and geologic input for the earthquake planning scenarios written for the State of California. Borchardt is Principal Soil Scientist at Soil Tectonics, a pedo-chronopaleoseismological consulting firm in Berkeley, California. He is the author or co-author of over 180 technical publications and reports.

GEOLOGISTS AND HYDROGEOLOGISTS

Entry-level positions available for project geologists and hydrogeologists who are interested in working on industrial and federal projects in our Hazardous Waste/Industrial and Federal Operations (IFO) Group. Assignments include sites investigations, remedial investigations, feasibility studies, remedial design, and system construction, and operations and maintenance for hazardous waste projects. Specific responsibilities include borehole logging; well installation; soil sampling; sample management; groundwater monitoring/sampling; data interpretation, and preparation of site work plans and project report. Bachelors degree with emphasis in geology and hydrogeology and 0 to 3 years experience required. Technical writing skills, presentation skills, lithologic logging experience, and RCRA/CERCLA knowledge a plus. Successful candidates must be willing to perform field work and travel.

- Mail, E-mail, or fax cover letter and resume by COB Monday, April 2, 1999 to:

  Nancy Barnes, R.G., Montgomery Watson, 1340 Treat Boulevard, Suite 300, Walnut Creek, CA 94596
  Phone (925) 975-3400 / Fax (925) 975-3412 / E-Mail nancy.barnes@mw.com

- Resumes will be reviewed by Montgomery Watson's management staff.
- Qualified candidates will be contacted by phone to schedule interviews.

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