

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



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FEBRUARY MEETING ANNOUNCEMENT

Joint Meeting with Bay Area Geophysical Society (BAGS)

DATE: Wednesday, February 21, 2001

LOCATION: Lafayette Veterans Memorial Building,
3491 Mt. Diablo Blvd., Lafayette, CA.

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

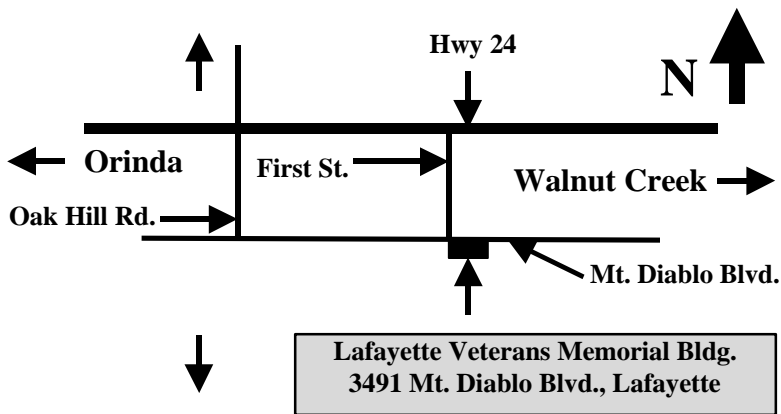
RESERVATIONS: Leave your name and phone number at 925-294-7530 or by e-mail at dday@nrmc.com before the meeting.

SPEAKER: Dr. John E. Warme, Professor of Geology,
Colorado School of Mines, Golden, Colorado

Anatomy of an Anomaly: The Catastrophic Devonian Alamo Impact Breccia, Nevada

Facies models, stratification sequences, sequence stratigraphy, and seismic stratigraphy provide tools for rock analysts to interpret sedimentary basin structures. Without such experience and insight, important anomalous occurrences are misinterpreted or completely overlooked. This theme is illustrated using three catastrophic carbonate mass flows; two are explainable based on associated structural features, but the third, the Alamo Breccia, requires another level of investigation. The Late Devonian Alamo Breccia is a sedimentary megabreccia found in 15 different mountain ranges in Nevada. It occurs anomalously within shallow water carbonate platform facies of the Upper Devonian Guilmette Formation. Before thrust dismemberment it covered a north-south distance of 200 km. and an area of several thousand square km. across the carbonate platform. The Breccia is 130 meters thick at its center and feathers out on its periphery. Iridium concentrations, shocked quartz, ejecta spherules, displaced fossils, a chaotic ejecta bed, and up to 500-meter long displaced blocks overlain by five tsunami-deposited graded beds confirm that the Breccia formed from meteorite or comet impact. The Alamo Event was large enough to rearrange the Devonian platform paleogeography, but not sufficient to cause direct extinctions. Known asteroid and comet fluxes with Earth-crossing orbits suggest there are other similar deposits in the stratigraphic record that serve as reservoirs, seals, and seismic markers as well as extinction horizons. The Alamo Breccia is a model for such deposits.

Continued on back page of newsletter



From Hwy 24 going west: Take the Central Lafayette/Moraga exit and turn south on First St. under the freeway to Mt. Diablo Blvd. The Veterans Bldg. is on the southeast corner of this intersection. **Coming east on Hwy 24,** take the Oak Hill Rd./Central Lafayette exit and turn right on Oak Hill Rd. Turn left on Mt. Diablo Blvd and go two traffic lights to First St. The Veterans Bldg. is on the right across from Taco Bell at 3491 Mt. Diablo Blvd.

John E. Warme, has been Professor of Geology and Geological Engineering at the Colorado School of Mines since 1979. He received his Ph.D. in Geology from UCLA in 1966 and was a professor at Rice University from 1967 to 1979, where he held the W. Maurice Ewing Chair in Oceanography (1976-1979). Dr. Warme was a Fulbright Scholar at the University of Aberdeen, Scotland in 1966-67, and is a former President of SEPM (1983-84) and an honorary member of that organization. His professional interests include stratigraphy, basin analysis, and paleoecology. He has done field work and subsurface studies in California, Nevada, the Rocky Mountains, Latin America, Europe, and North Africa, and has led or co-led AAPG Field Seminars in California, the Grand Canyon, and Morocco. He is member of the AAPG, AAAS (Fellow), AGU, GSA (Fellow), SEPM, the International Association of Sedimentologists, the Rocky Mountain Association of Geologists, the Moroccan Association of Petroleum Geologists, the Colorado Scientific Society, and Sigma Xi. In 2000 Dr. Warme received the Augustana College (Illinois) Alumni Association Outstanding Achievement Award.

Northern California Geological Society
 c/o Judy Hayes
 453 Scotts Mill Rd.
 Danville, CA. 94526-4234

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 dday@nrmc.com to sign up for this service.

NCGS 2001-2002 Calendar

Wednesday, January 31, 2001

Keith Knudsen, California Division of Mines and Geology (CDMG)

New Quaternary Geologic and Liquefaction Susceptibility Mapping of the Nine-County San Francisco Bay Region and CDMG's Seismic Hazard Mapping Program

Orinda Masonic Center

Wednesday, February 21, 2001 / AAPG Distinguished Lectures (see front page and flyer in this newsletter issue)

John Warne, Colorado School of Mines, Golden, CO.

Active Margin Sequences and Submarine Canyon Facies Models

Chevron Overseas Petroleum, Inc., 6001 Bollinger Canyon Road, San Ramon, CA. at 12:15 in Room B-1039B

AND

Anatomy of an Anomaly: The Catastrophic Devonian Alamo Impact Breccia, Nevada

Lafayette Veterans Memorial Building, 3491 Mt. Diablo Blvd., Lafayette, CA. / 6:30 pm social; 7:00 pm talk; cost \$5

Joint Meeting with BAGS

Saturday, March 3, 2001

Caldecott Tunnel Field Trip (Please check flyer in newsletter)

9:30 am at Caldecott Tunnel Bldg. off Tunnel Rd., Berkeley. Leader: *Grant Wilcox*, Branch Chief, CalTrans Geologists, Oakland, CA.

A trip including a movie on the tunnel construction, a trek through tunnel air ducts, and a synopsis of the tunnel engineering geology

Thursday, March 22, 2001 / AAPG Distinguished Lecture

Andrew Pulham, University of Colorado, Boulder, CO.

Reservoir Performance and Reservoir Quality in a Sequence Stratigraphic Framework: Case Studies from Siliciclastic Reservoirs in the Americas and Europe

COPI; Room 1036; 11:00 am to 2:00 pm (exact time TBA)

Wednesday, April 25, 2001

Laurel Collins, San Francisco Estuarine Institute

Tentative topic: **Wildcat Canyon: Watershed and Sedimentation Interactions**

Orinda Masonic Center

Wednesday, May 30, 2001

Dave Mustart, San Francisco State University

Tentative title: **Hydrothermal Pipes in Six Granitic Plutons in California: Evidence for Evolution and Migration of a Magmatic Volatile Phase**

Orinda Masonic Center

Wednesday, June 27, 2001

Bruce Jaffe, USGS Menlo Park

Tentative Title: **Mercury Contaminated Hydraulic Mining Debris in North San Francisco Bay: A Legacy of the Gold Rush**

Orinda Masonic Center

Wednesday, September 26, 2001

Richard Sedlock, San Jose State University

Tentative title: **Blueschists and Ophiolites in Baja: Coast Range Geology, But With Outcrops**

Orinda Masonic Center

Wednesday, October 24, 2001

David Lawler, Far West Geoscience Foundation, Berkeley (Tentative)

Title: **Hydraulic Gold Mining's Historical Legacy - Mercury Contamination Issues: Sierra Nevada and Klamath Mountain Regions, California**

Orinda Masonic Center

Wednesday November 28, 2001

David Des Marais, NASA Ames Research, Menlo Park

Title: **The Biogeochemical Carbon Cycle and the Coevolution of Early Earth and Biosphere**

Orinda Masonic Center

Wednesday January 30, 2002

Roger Ashley, USGS Menlo Park

Title: **Lode Gold Deposits of the Sierra Nevada and Their Environmental Impacts**

Orinda Masonic Center

AAPG Distinguished Lecture

Sponsored by Chevron Overseas Petroleum, Inc. and NCGS
Wednesday, February 21, 2001

Dr. John E. Warme, Colorado School of Mines, Golden, Colorado

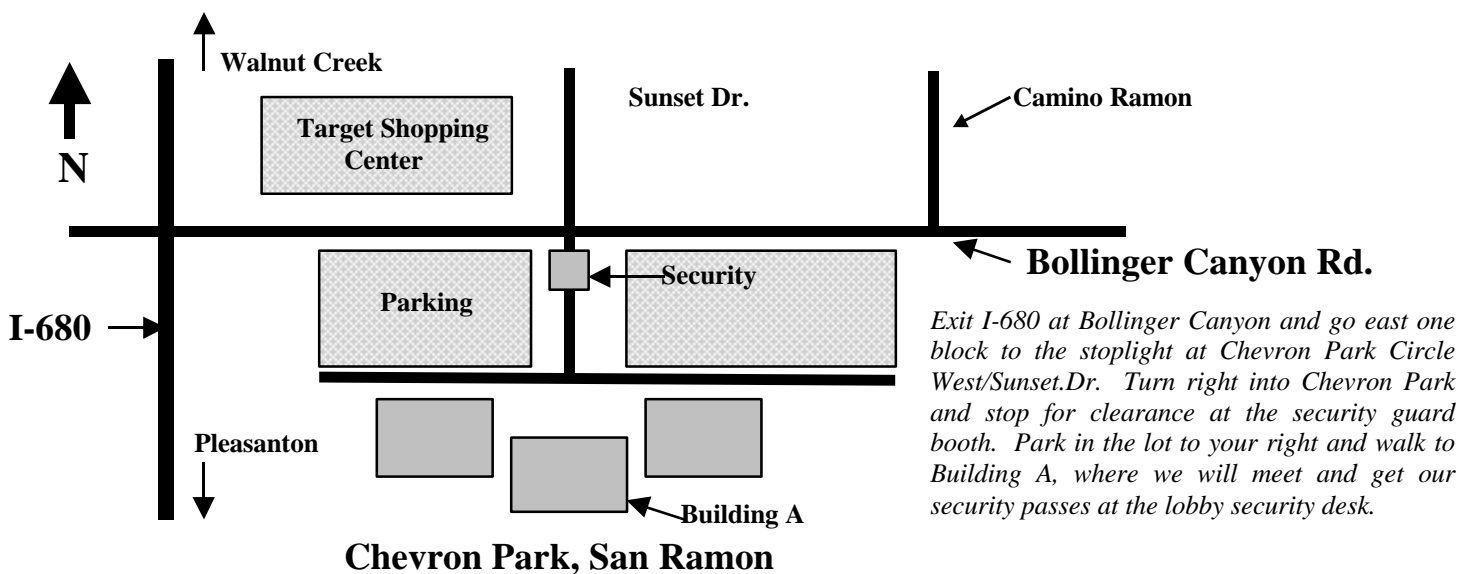
12:15 in Room B-1039B at COPI Chevron Park, 6001 Bollinger Canyon Rd., San Ramon

Active Margin Sequences and Submarine Canyon Facies Models

Superb Lower and Middle Eocene forearc facies in northern San Diego County, California, exhibit three stratigraphic sequences that show shoreline and shallow marine facies (Delmar/Torrey Sequence) unconformably overlain by submarine canyon deposits (Ardath and Scripps Sequences). Delmar/Torrey facies include fan-delta, lagoon, barrier beach, and marine shelf environments backed by alluvial fan complexes. This sequence contains suites of sedimentary structures, fossils, and trace fossils characteristic of the now-familiar proximal facies models. In contrast, the large scale of submarine canyons and their sedimentary fills has inhibited development of applied models for them. The study area provides rare, continuous exposures that can be applied to subsurface exploration and development. They show that the Delmar/Torrey Sequence is separated from the overlying Ardath submarine canyon facies by a major sequence boundary and facies shift. This unconformity represents the floor and margins of the fossil "Eocene Torrey Submarine Canyon." The submarine canyon facies model includes a basal massive sandstone overlain by cross-cutting marine channels with unpredictable heterolithic fill that includes active-channel conglomerates, diverse sandstones and siltstones, and abandoned-channel mudstones, collectively termed "variegated fill." A second sequence-bounding unconformity caps these channels, overlain by the conglomeratic Scripps Sequence. Surprisingly, age dating of the lower canyon boundary and the canyon fill strongly suggests that their development was driven primarily by eustacy, even though the regional setting was a tectonically-active forearc.

Dr. Warme's biography is on the back page of this newsletter.

Please register for this talk on the NCGS voice recorder at 925-294-7530 or by e-mail at ddow@chevron.com. *You must pre-register to attend so that Chevron security can prepare passes for you to access the Building B lecture room!*



NCGS-Sponsored *Caldecott Tunnel Tour*

Saturday, March 3, 2001

9:30 a.m. at the Caltrans Facility, Tunnel Road, Berkeley (West Caldecott Tunnel entrance)

The Northern California Geological Society has made arrangements with Caltrans to host a tour for its members of the Caldecott Tunnel workings. The tunnel is one of the Bay Area engineering achievements of the Twentieth Century. Each day thousands of motorists use it to cross the Berkeley Hills between Berkeley and Orinda. It is one of the major traffic arteries feeding the San Francisco Bay proper. Caltrans regularly holds public presentations at their facility near the west entrance to the tunnel. On Saturday, March 3rd, NCGS members will get an opportunity to learn how the tunnel was made, what engineering obstacles had to be overcome, and what it takes to keep this structure operating safely and efficiently. The video presentation of the Tunnel's construction and history will be followed by a tour of the tunnel air ducts and descriptions of its engineering geological features. *The grouted and concreted tunnel walls preclude any examination of in situ geology, but the NCGS is preparing some handouts to give participants that describe the local geology and strata encountered in the tunnel bores.*

Time: 9:30 a.m. sharp at the Caltrans Maintenance Facility, Tunnel Road, Berkeley

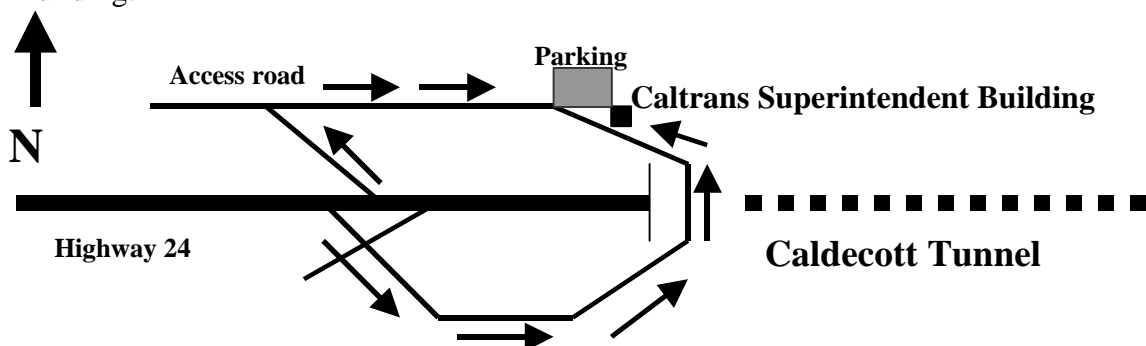
Leader: Grant Wilcox, Chief Geologist, Caltrans Office, Oakland, CA.

Cost: \$5.00 per person; children 13 or younger are free. Pay at the door. Fee covers handouts, coffee, beverages, and breakfast pastries at the presentation.

Children: There are no restrictions on children attending this tour.

Registration: Please make your reservations by leaving your name, phone number, and the number in your party on either the NCGS recorder at 925-294-7530 or the same information by e-mail at jeanm@stetsonengineers.com.

Directions: **East on Highway 24:** Take the Old Tunnel Road exit off Highway 24 just before the west Caldecott Tunnel entrance. Go through the intersection at the end of the offramp and veer left up the grade toward the Tunnel entrance. Follow the road through the gate (ignore the "authorized vehicles only" sign) and over the freeway past the main tunnel structure. Park on the north side of the freeway in the lot at the Superintendent Building. **West on Highway 24:** Take the far right lane through the Caldecott Tunnel and immediately take the first exit to Tunnel Road. Turn right at the stop sign and follow the access road east (paralleling Highway 24). Where this road ends continue through the gate, ignoring the "authorized vehicles only" sign. Continue up the hill toward the main tunnel entrance structure, and park in the lot next to the Superintendent Building.



Quaternary Geologic and Liquefaction Susceptibility Mapping of Bay Area Counties Presented at January Meeting

Keith Knudsen of the California Division of Mines & Geology's San Francisco office, and formerly with William Lettis & Associates of Walnut Creek, gave an excellent update of California's Seismic Hazards Mapping Act and work that he has been doing at CDMG to delineate seismic hazard zones based on liquefaction susceptibility studies. His presentation *New Quaternary Geologic and Liquefaction Susceptibility Mapping of the Nine-County San Francisco Bay Region and CDMG's Seismic Hazard Mapping Program* discussed in detail the collaborative work by William Lettis & Associates (WLA), the USGS, and CDMG to provide improved Quaternary geological maps for seismic hazard zoning in the Greater Bay Area.

The first part of Keith's talk focused on the new nine-county Quaternary mapping project that he was involved with at WLA. This was the first detailed Quaternary mapping to be done in this area since the 1970's. The results are published in USGS Open File Report 00-444, which is available on the Survey's website at: <http://geopubs.wr.usgs.gov/open-file/of00-444/>. This work was compiled by colleagues Janet Sowers, Robert Witter, Carl Wentworth, Edward Helley, Robert Nicholson, Heather Wright, and Katherine Brown. The study concentrated on recent streams, which have deposited the youngest sediments, and on Holocene alluvial fan deposits. The map scale is now more detailed at 1:24,000 and 40 units are used instead of the 12 in previous work. The researchers used 7.5 minute quadrangles, concentrated on defining liquefaction susceptibility, and compiled the results into a digital database. The area covered extends from point Arena-Healdsburg to south of San Jose and east from the coastline to Lodi-Stockton.

The mappers delineated the sediments by age and by depositional environment. Age ranges varied with the type of deposit, but could include material less than 1000 years old or from 30,000 to 2 million years old. The depositional environments include alluvial terraces and fans, estuarine deposits, beach/shoreline sediments, fluvial environments, basins, and anthropomorphic deposits like landfill. Depositional ages were determined by geomorphic position, cross-cutting relationships, soil profile development, depth and extent of erosional dissection, and correlation with dated horizons. From a seismic hazard viewpoint, the older deposits are more dense, transmit earthquake waves better, and are less susceptible to liquefaction than younger sediments. Depositional environments were refined by topographic interpretation, stereo-pair aerial

photography, landform analysis, and detailed field reconnaissance work. The latter provided grain sizing, bedding and sorting features, hydraulic conductivity, and lateral continuity.

The liquefaction susceptibility of units was assessed using a table array that ranked each unit using categories such as evidence of historical liquefaction, acceleration needed to trigger liquefaction in the sample, depth to groundwater, degree of lithification, and grain size. The liquefaction susceptibility of the units are rated on a relative scale from very high to low. The resulting liquefaction susceptibility map is thus derived from the Quaternary geologic map. Historical ground failures associated with earthquake activity compiled in the work of Youd and Hoose (1978) were used to compile a GIS database and compare these features with Quaternary map units. The researchers have separated the landslides from the liquefaction failures and added data from the Loma Prieta earthquake. The latter show a strong correlation between pipeline breaks, gas line ruptures, and road damage to earthquake-induced liquefaction. The liquefaction maps, GIS files, and reports can be found at <http://geopubs.wr.usgs.gov/>. Keith noted the need to go to other types of sediments to see what the failure susceptibilities are to pinpoint earthquake damage prone units. Scientists are also looking at the 3rd dimension, the thickness of Quaternary units, and how that affects their earthquake failure susceptibility.

The CDMG's Seismic Hazard Mapping Program originated from the 1990 Seismic Hazard Mapping Act following the Loma Prieta earthquake. This project has a goal of zoning high risk areas by 2010. The purpose of the study is to provide maps of seismic hazard zones prone to earthquake-induced liquefaction and landsliding. These maps can be used by local municipalities for property development and to conduct site-specific risk investigations to help formulate mitigation procedures. The mapping project is statewide and has progressed more rapidly in southern California. A total of 289 quadrangles have been granted high risk status. Heavily populated areas are given precedence. Through January 2001, the Seismic Hazard Mapping Program has released maps of the City and County of San Francisco and the cities of Oakland and Piedmont. Current work is being focused on the Santa Clara Valley.

The NCGS is sincerely grateful to Keith Knudsen for delivering an excellent update of this collaborative mapping and GIS database program. This work complements ongoing earthquake probability mapping in the Greater Bay Area. If used properly, it will help communities prepare for major earthquake events and develop land prudently in high risk areas.

A Day In The Field With Tom Dibblee

To Plate's Edge: San Fernando Valley to Palmdale

Saturday, April 7, 2001 8:00 a.m. - 4:00 p.m.

The **Dibblee Geological Foundation** invites you to participate in a rare opportunity to visit several classic geologic locations and spend a day in the field with *living-legend* **Tom Dibblee**, along with **Peter Weigand, Karen Savage, Helmut Ehrenspeck, and Eric Hendrix**. The new Palmdale/Pacifico Mountain map by **Tom and Helmut** will be available and will be featured. There is dramatic geology, all mapped by Tom, for every interest on this field trip to the edge of the plate. We will make stops at **Vasquez Rocks, the San Andreas fault, the Soledad fault, and lunch in Placerita Canyon Park**.

This trip is in association with the **2001 GSA Cordilleran/AAPG Pacific Section Meeting**

Proceeds from this trip will benefit the Dibblee Geological Foundation; a nonprofit educational organization dedicated to the preservation and publication of Tom Dibblee's extensive geologic mapping of California. Spend a special day in the field with Tom and enjoy a great picnic while supporting this very important cause.

Fee: \$100.00 (includes coffee and donuts, bus transportation, guidebook, and lunch). **Registration deadline is April 1st. Advanced registration is necessary to reserve a bus seat and lunch.**

For further information e-mail John Powell at powell.family@gte.net, call 805-987-5846, or write to him at PO Box 2309, Camarillo, California 93011

Registration Form

Name _____ Telephone _____

Street Address _____

City _____ Zip _____

Fax _____ e-mail: _____

Make checks payable to the Dibblee Geological Foundation and mail this form with your check to:

John Powell, PO Box 2309, Camarillo, California, 93011

A meeting place map and schedule will be e-mailed or faxed with your registration confirmation.

Winter Quarter, 2001 Land Use Planning Courses at University Extension, U.C. DAVIS

This winter, professionals in land use planning, urban design and environmental planning have a variety of winter courses to choose from at University Extension, UC Davis. The following course are offered this quarter:

Water Resource Planning in California. Friday, March 9, 2001, 9 a.m.-4:30 p.m., 1632 Da Vinci Court, Davis, \$240 (\$50 discount for AEP/CCAPA members), includes course materials and lunch. Enroll in **section 003NAT222**.

Water Conservation in California: The State of the Art. Dates, times and location to be announced, section 003NAT601.

Clean Water Act Section 404: Nationwide and Other Specialized Permits.

Friday, Jan. 12, 9 a.m.-4:30 p.m., University Club, Old Davis Road, UC Davis, \$240 (\$50 discount for AEP/CCAPA members), includes course materials and lunch. Enroll in **section 003NAT223**.

Habitat Conservation Planning. Date, time and location to be announced, \$240 (\$50 discount for AEP/CCAPA members), includes course materials and lunch. Enroll in **section 004NAT201**.

Habitat Restoration: Intensive Workshop. Thursday-Friday, April 19-20, 2001, 94:30 p.m., Sutter Square Galleria, Sacramento, \$240 (\$50 discount for AEP/CCAPA members), includes course materials and lunch. Enroll in **section 004NAT203**.

Groundwater Law, Hydrology, and Management. Date, time and location to be announced. \$240 (\$50 discount for AEP/CCAPA members), includes course materials and lunch. Enroll in **section 004NAT204**.

Watershed Conference 2001. Date and time: March 27 or 29 (to be announced), 8:30 a.m.-5:00 p.m., location to be announced, section 003NAT600.

Water Quality Regulation and Permitting. Fall 2001, dates, time and location to be announced.

To request information or to enroll, call (800) 752-0881 or enroll online at www.universityextension.ucdavis.edu

EXPANSIVE SOILS: A short course sponsored by the San Francisco Section of AEG

Taught by: Richard L. Volpe, P.E., G.E.

Saturday March 17, 2001

This four hour short course is an introduction to expansive clays for engineering geologists and geotechnical engineers. We will examine the types of damage caused by expansive clays to homes and business that has been recorded over the past several years. We will also evaluate a field checklist for expansive soils, discuss laboratory test methods, field treatment of soils during construction, and foundation design considerations needed to combat expansive soils.

8:30 – 9:00 Registration	10:15 - 10:30 Break
9:00 - 9:15 Introduction and general considerations	10:30 - 11:00 Test methods
9:15 - 9:30 Definition of an expansive soil	11:00 - 11:30 Treatment of soils
9:30 - 10:15 Recognition of expansive soils – checklist	11:30 - 12:00 Foundation design

Location: Evergreen Room, Santa Clara Valley Water District, Blossom Hill Facility, 1020 Blossom Hill Road, San Jose CA. The Annex is at 1020 Blossom Hill Road, San Jose, on the south side of Blossom Hill Road, one block east of the intersection of Blossom Hill Road and the Almaden Expressway.

Contact: Ernest Solomon, 27500 Elena Road, Los Altos Hills, CA. 94022

Phone: 650-948-3528

e-mail: esolo@earthlink.net

fax: 415-522-5220 (c/o Olivia Chen Consultants)

Fee: (pay at the door): AEG Member \$25 Non-AEG member \$30 Student \$5

Name: _____ Status (member, non-member, student): _____

Phone No.: _____ e-mail: _____