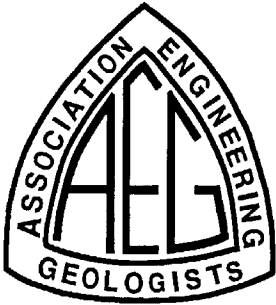


Association of Engineering Geologists

Southern California Section

NEWSLETTER - November 1989



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Ground-Water Consultants
17800 Castleton Street, Suite 175
City of Industry, CA 91748
Amer. Geop. Union TELENET
KOSMOS Computer Mail
Username: KROWE

2550 Beverly Blvd.
Los Angeles, CA 90057

Dinner Meeting *Tuesday November 14th*

- The Quiet Cannon Restaurant
901 North Via San Clemente
Montebello
- Cost - \$20.00
- For reservations call by November 10th
Jerry Treiman
(213) 620-3560 (CDMG LA Office)

Make reservations by Noon on the Friday before the Meeting

- 5:30 Social Hour
- 6:45 Dinner
- 7:30 Announcements
- 8:00 Program
- 9:00 Section Affairs

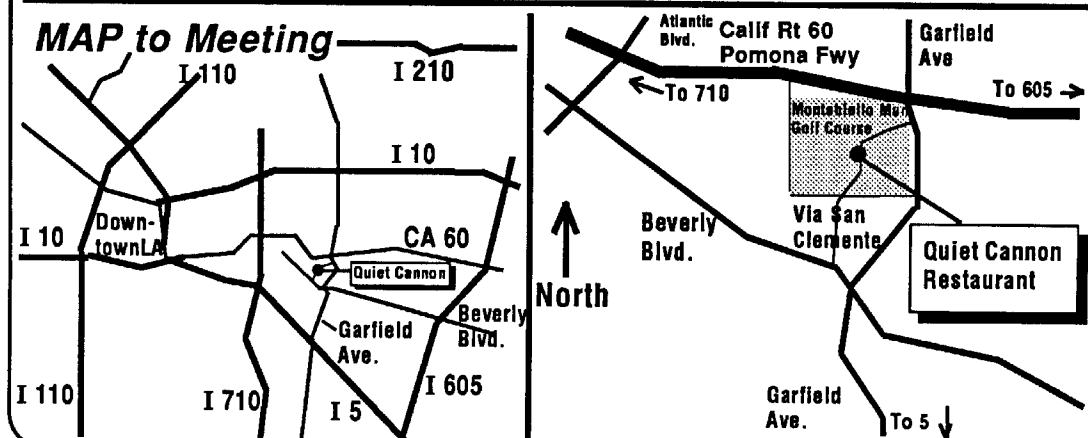
Program

TOPIC Sand Sources and Compartmentalization of Beaches in Southern Orange and San Diego Counties

SPEAKER Dr. Robert H. Osborne - USC Professor of Geology

Short Topic: Field Report: *The 7.1 Magnitude-Santa Cruz Earthquake.*

Plus - Installation of New Southern California Section Officers



Program

Topic & Speaker

Sand Sources and Compartmentalization of Beaches in Southern Orange and San Diego Counties
Dr. Robert H. Osborne

During the last eight years, the **Sedimentary Petrology Laboratory** at the **University of Southern California**, in conjunction with the **U.S. Army Corps of Engineers**, has been working on the "**Coast of California Storm and Tidal Wave Study**". The work has been directed toward the identification and quantification of sand sources and net transport pathways using Fourier grain-shape, mineralogic, stratigraphic and historical analysis. **Research has focused on defining the sedimentary structure of the Oceanside Littoral Cell.** It appears to be considerably more complex than either the **Mission Beach or Silver Strand Littoral Cell** (i.e., areas north and south, respectively, of Point Loma in San Diego). Sedimentologic results suggest that 1) subaerial cliff erosion and 2) the resuspension and onshore transport of inner continental shelf sand are volumetrically important to dominant processes supplying beach sand. To date, these processes have been severely underestimated.

Dr. Osborne, received his Geology degrees as follows: **B.S. - Kent State U.; M.S. - Washington State U.; and Ph.D. - Ohio State U.** **Dr. Osborne** has been with **USC** since 1966. He served as **Dept. Chair and Director of the Center for Earth Sciences** from 1986 to 1989. He has also done consulting for numerous engineering geology firms and has been and expert witness for several legal firms.

THIS MONTH

November 1989



*Kelly E. Rowe
Hydrogeologist*

This month the program speaker is **Dr. Robert Osborne** from **USC**. He will speak about the circulation of beach sands in the southern California area. There is concern that because we essentially control all of the stream flow in this area with dams and debris structures, the source of beach sands have been cut off and continual erosion of the existing beaches is occurring. Earlier projections on this erosional process suggested that we will have to frequently replenish the sands at our beaches and sources of beach sand will have to be located and eventually mined for this purpose.

Last Month **Dr. Tanya Atwater**, from **UCSB**, presented a very interesting and enjoyable series of slides and sounds from **Tierra del Fuego** (south tip of South America) and the **Palmer Peninsula** (Antarctica). **Christine Smith** had to study for tests and was thus unable to present her point of view. **Tanya**, however, was obviously enthralled about the people she met and the sights she saw on the field trip. It took place over a three month period last winter, their summer, when there was typically 3 hours of night. The people were some of the most prominent geologists working locally and also some of the most respected geologists with international reputations. The sights included the unusual geology of metamorphic complexes and the unusual animals of seals, walruses, penguins and various birds in their habitat. A musical interlude included recorded sounds of some of these animals.

We had an unusually large number of **no-shows** for the October meeting. **Thirty-seven (37) out of 100** people who made reservations for the meeting did not show up. This impacts our budget because we have to pay for the minimum number of meals we reserve. A 15 % **no-shows** is typical and planned for. **Please remember that if you do change your mind about coming to the meeting, call the treasurer to let him know that you cancel. This will be appreciated.**

At the September meeting **Buzz Spellman** announced the number of people who were signed up to take the recent state exams for geologists and engineering geologists. These were as follows:

Test Location	People for R.G.	E.G.
Los Angeles	388	133
Sacramento	138	44
<u>San Francisco</u>	<u>220</u>	<u>88</u>
Total	746	265

This is certainly an astounding number of people who are attempting to be registered in the state. The September newsletter listed the dates for these tests to be one week earlier than when they took place. It was in the printers when the error was noted. Although it was a mistake, hopefully it encouraged some southern California folks to study a little earlier so they were better prepared for these tests.

It is still uncertain whether more than one test per year will be scheduled in the future. According to Geology Board Member, **Buzz Spellman**, this is dependent upon the budget the governor sets aside for giving tests.

Continued on page 3

Continued from page 2

The new Southern California Section officers will take their oaths of office at the November meeting. The new officers are as follows:

Bob Hollingsworth	Chairman
Eldon Gath	Vice Chairman
Kelly E. Rowe	Secretary & Newsletter Editor
Charles Daugherty	Treasurer

Continuing in the capacity of **Publications Chairman** will be **Steve Townsend**. Steve can be found at the check-in table at the monthly meetings selling the stock of publications, i.e., special publications and guidebooks from our section's annual field trip events. Steve says that if you are interested in receiving a copy of the recent field trip guidebook about **Engineering Geology Along Coastal Orange County** now is the time to call him at (213) 430-6500 to reserve your copy. Copies of this guidebook are presently unavailable but is planned for reprinting soon and requires an estimate of anticipated purchases.

Also continuing in the capacity of **Membership Drive Chairman** will be **James O'Tousa**. James is available to discuss membership applications and change of status applications with anyone at the monthly meetings, or you can give him a call.

The annual association meeting was held in **Vail, Colorado, October 1 to 6, 1989**. The meeting was attended by over 450 professionals as well as a number of students and guests. The meeting facilities were excellent as well as the local scenery and weather. Although the peak time for the leaves to change color had passed a couple of weeks earlier some of the aspens were still brilliant yellow.

Meeting programs included two symposia on large landslides and effective landslide hazard reduction. Fifteen technical sessions covering ground water hydrology, debris flows, landslides, rockfalls, methods in engineering geology, neotectonics, hazardous waste, and engineering geophysics were also presented. In addition, two short courses on ground water flow and transport and engineering geophysics, as well as seven field trips, were also given.

Representatives from the **Allegheny-Ohio Section of AEG** were present to promote and answer questions about the next annual meeting. It is planned to be held in **Pittsburgh, Pennsylvania on October 1 to 5, 1990**. The theme is "Engineering Geology for the 90's". The program will focus on mine subsidence, slope stability, dams, karst, erosion, and ground water, with emphasis on new technology and rehabilitation of existing facilities. Sessions are being planned in the following areas:

- Dam Foundations and Rehabilitation
- Applying Computers to Landslide Problems
- Rock Slopes
- River and Lakeshore Stability and Erosion

- Hydrogeology/Hazardous Waste
- Problems of Appalachian Geology

If you are interested in submitting abstracts for this meeting contact the **Technical Program Chairman, Richard E. Gray, GAI Consultants, Inc., 570 Beatty Road, Monroeville, PA 15146 (412) 856-6550**. The "Call For Papers" notice states that abstracts (250 words or less) should be submitted by **December 31, 1989**.

The semi-annual board of directors meeting was attended by **Jeff Holt, Robert Hollingsworth, Hugh Robertson, Glenn Brown, and Howard (Buzz) Spellman**. Numerous topics and proposals were addressed. These included the association budget elimination of at-large members, collection of section dues by the association the salary survey, and a ground water policy statement. The California lobbyist also received a great amount of attention. The lobbyist situation will be discussed more fully at the November section meeting. In general, however, our request for funding from the association was rejected 14 to 6, and certain restraints were placed on our future contracts with the lobbyist.

With regard to the lobbyist, the response to the section's request for funding has been good. As of October 24th, the following firms have contributed \$200 or more. Hopefully, other firms will contribute to ease the overall burden of our annual fees to the lobbyist.

Allan E. Seward Engineering Geology, Inc.

Buena Engineers, Inc

Earth Technology Corporation

Emcon Associates

Geocon, Inc.

Geolabs, Inc. - Westlake Village

Geoplan, Inc.

Goffman & McCormick, Inc.

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Irvine Soils Engineering, Inc.

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Leighton & Associates, Inc. - Irvine

MAA Engineering Consultants

Robertson Geotechnical

Zeiser Geotechnical

The expenses for the lobbyist are paid for partially by the contributions of these firms. These contributions combined with half of your annual fee (\$20.00) for the local section operation pay for the lobbyist's services. A total of \$10,000

Continued from page 3

per year are required to retain his services. It will be a continuing effort to collect sufficient funds for these services. You are encouraged to plan your firm's budget for a regular annual contribution so it is not a financial strain on the section.

You may notice that the last page of the newsletter advertises for you to renew your annual fees. The newsletter, from November to February, will be sent out to all International AEG members listed in the Southern California Section to encourage that they participate locally. Please note that your local section fees operate the section's activities and the annual fees to International AEG do not help operate the section. Therefore, based upon the response we get from the returned mail you will simply be on or off the newsletter mailing list. In the interest of saving printing & postage costs you will not get an invoice notifying you of your renewal opportunity. If you have any questions about getting onto the mailing list feel free to call the Secretary/Newsletter Editor.

The November meeting will feature/sidelight narratives of slides taken of the epicenter area after the 7.1 Magnitude Santa Cruz Earthquake (World Series Earthquake?) of 1989. Reports from the field indicate that there is no evidence of ground surface ruptures of the fault, but there are numerous occurrences of slope movement, e.g. landslides and debris flows. The epicenter was located inside the rugged Santa Cruz Mountains. Several section members were reconnoitering the vicinity of the epicenter hours after the event. A short series of slides providing evidence of the event will be presented.

For what its worth, the event brought to mind an article from "California Geology" January 1981. The article presents the findings of professors Jennings and Kanamori, who examined the local seismoscopes which were damaged during the 1906 earthquake. They concluded that

the largest possible magnitude of this earthquake event was 6.9. The 8.25 magnitude of the 1906 event was based upon measurements from the relatively new instruments located in Europe. This article is reprinted here on page 5 for your consideration in light of the magnitude earthquake which was experienced.

The same "California Geology" January 1981 issue had a table of the Destructive California Earthquakes from 1812-1980. Although it is a little out of date there was some extra space in this newsletter for it to be reprinted below and compared with the 7.1 Magnitude Santa Cruz Earthquake event. This event overwhelms the other events in the column stating the "Dollar Loss at the time of the quake", but fortunately the "Lives Lost" figure shows it to be only the third worst. The worst being the 1906 San Francisco 8.25 M event - 700 lives, followed by the 1933 Long Beach 6.3 M event 115 lives.

Member News

Dave Grover (Grover Hollingsworth & Assoc., Inc.) spoke at the California Real Estate Inspection Assoc. annual meeting, in Palm Springs, on Oct. 14. His topic was "Foundations and Drainage". The focus was a description of the types of foundations for residential structures related to soil conditions and remedial drainage control of nuisance water.

TABLE 1. DESTRUCTIVE CALIFORNIA EARTHQUAKES, 1812-1980.

Date	Location	Magnitude	Lives Lost	Dollar Loss at the time of the quake
1812	San Juan Capistrano	6.8	40	—
1857	Fort Tejon	7.9	1	—
1865	Santa Cruz Mountains	6.5	—	500,000
1868	Hayward	6.8	6	350,000
1872	Owens Valley	7.8	27	250,000
1892	Vacaville	6.8	1	225,000
1898	Mare Island	6.5	—	1,400,000
1899	San Jacinto	6.7	6	—
1906	San Francisco	8.3	700	500,000,000
1915	Imperial Valley	6.3	6	900,000
1918	San Jacinto and Hemet	6.8	1	200,000
1925	Santa Barbara	6.3	13	8,000,000
1926	Santa Barbara	5.5	1	—
1932	Humboldt County (offshore)	6.4	1	—
1933	Long Beach	6.3	115	40,000,000
1940	Imperial Valley	6.7	9	6,000,000
1941	Santa Barbara	5.9	—	100,000
1941	Torrance-Gardena	5.4	—	1,100,000
1949	Terminal Island	3.7	—	9,000,000
1951	Terminal Island	3.1	—	3,000,000
1952	Kern County	7.7	14	60,000,000
1954	Eureka-Arcata	6.5	1	2,000,000
1955	Terminal Island	3.3	—	3,000,000
1955	Oakland-Walnut Creek	5.4	1	1,000,000
1957	San Francisco	5.3	1	1,000,000
1961	Terminal Island	?	—	4,500,000
1969	Santa Rosa	5.6	1	8,350,000
1971	San Fernando	6.4	65	504,950,000
1975	Oroville	5.7	—	2,500,000
1978	Santa Barbara	5.1	—	12,000,000
1979	Imperial Valley	6.6	—	30,000,000
1980	Livermore Valley	5.5	—	3,934,000
1980	Mammoth Lakes	6.0	—	1,500,000
1980	Northern California (offshore)	7.0	—	2,000,000
TOTALS			1,030	\$1,207,759,000

1989 Santa Cruz Mountains 7.1 ±78 7,000,000,000

NEW INSIGHT ON 1906 SAN FRANCISCO EARTHQUAKE

The 1906 event was the first major earthquake in the United States to be recorded on scientific instruments, and it produced the first recognized evidence for the association of faulting with earthquakes, as well as providing the first impetus for earthquake-resistant designs in this country. The possibility of a quake of similar magnitude occurring on the San Andreas fault or elsewhere on some other fault is often the controlling factor in the design of major engineering projects in California.

The Richter, or local magnitude, scale used in reporting magnitudes of California temblors was devised in 1935 for southern California by Charles F. Richter, now Caltech professor of seismology, emeritus. The local magnitude measures the size of an earthquake on a range of vibration highly damaging to structures, and is of particular importance to earthquake engineers. Richter and Caltech seismologist Beno Gutenberg later extended the scale to worldwide earthquakes. The scale has since gained wide acceptance and is currently the most commonly used measure of earthquake size.

Richter's original concept was elaborated upon, so that several types of magnitude scales, such as the surface-wave magnitude scale, are now in existence. The surface wave magnitude measures the overall size of the quake, including the length of faulting. It does not necessarily indicate the strength of ground shaking near the fault. These scales provide earthquake specialists with a more complex variety of information about the different types of ground motions produced by a specific quake than is available from the original Richter local magnitude scale.

Paul C. Jennings, professor of civil engineering and applied mechanics, and Hiroo Kanamori, professor of geophysics, have developed a new mathematical formula for interpreting old seismoscope records of the 1906 quake. The formula enables experts to derive the local magnitude of temblors from the records of seismoscopes—instruments designed to yield a different type of information about ground wave motions than that given by today's seismograph readings. Using the new formula Jennings and Kanamori have derived a local magnitude (M_L) of 6.9 for the 1906 quake. This contrasts with 8.25, the surface wave magnitude (M_S) that the temblor is traditionally assigned. The newly obtained value, 6.9, is approximately comparable to that of

many recent large earthquakes in California (for example, the 1971 San Fernando earthquake, 6.3 to 6.4; the 1968 Borrego Mountain earthquake, 6.4 to 6.9; the 1953 Kern County earthquake, 7.2). These figures indicate that the 1906 San Francisco quake is comparable to these temblors in strength of ground shaking near the fault, although the area affected in 1906 was much larger because of the extensive length of the San Andreas fault. Jennings and Kanamori were particularly interested in determining the local magnitude of the San Francisco quake because this temblor serves as a prototype for the disaster-causing potential of such an event.

In their calculation of the San Francisco quake's local magnitude, Jennings and Kanamori evaluated data from two instruments that recorded the event—a "simple pendulum" device located during the temblor at Yountville, California, 65 kilometers from the epicenter near the Golden Gate Bridge, and a Ewing Duplex Pendulum seismoscope that recorded the quake at Carson City, Nevada, 291 kilometers from the epicenter (see photo). The seismoscope at Carson City was retired from service in 1916; it recent-



Paul Jennings adjusts an antique seismoscope. In 1906 this seismoscope was located at Carson City, Nevada, and recorded the San Francisco earthquake. The 1906 records from this instrument and another recording device located at Yountville, California, were used to develop a formula for calculating the local magnitude of the 1906 event. *Photo courtesy of California Institute of Technology.*

ly was located in storage at the Reno campus of the University of Nevada.

Both instruments are similar to today's more sophisticated seismoscopes—devices that record earth motions via a conical pendulum suspended by a fine wire from a horizontal beam. The record is scribed by the pendulum on an inverted smoke watch glass, and the strength of the temblor is calculated through mathematical analyses of the extent of the scratch marks. Engineers use seismoscope records to calculate the effects of earth motions on buildings and other structures.

Their method of calculation should prove particularly important in determining the local magnitude of large earthquakes, because the more sensitive seismographs near an earthquake epicenter are generally thrown off-scale by very large temblors.

The two professors also have devised a technique to determine the local magnitude of a quake from the recordings of strong-motion accelerograms—other instruments used to record data about seismic waves produced by earthquakes. The popularly accepted 8.25 surface-wave magnitude of the San Francisco quake was derived mainly from stations in Europe. Information from instruments in the immediate area was so severely distorted by the shaking as to be of limited usefulness.

Before evaluating the record of the Carson City instrument, the scientists needed to know its inherent responses to seismic waves—its period, damping, and gain. When the instrument was recovered, it was damaged and some of its original parts were missing. At Caltech, it was repaired by Ivar Sedleniek of the Institute's Seismological Laboratory and Raul Relles of the Earthquake Engineering Laboratory.

To check the accuracy of their reconstruction, and to help evaluate the seismoscope's functioning, Kanamori and Jennings compared test results from their instrument with those from identical tests done on a similar instrument in London. The London instrument, which is in the London Science Museum, was tested by their colleague N.N. Ambraseys. After these tests, they calculated the magnitude of the quake from the records of both the Carson City and the Yountville seismoscopes, and arrived at an approximate local magnitude of 6.9.

In arriving at this figure they also examined records from Ewing Duplex Pen-

dulum seismographs from Mt. Hamilton, Alameda, San Jose, Oakland, and Berkeley, California—all located from 20 to 36 kilometers from the earthquake fault. Records from those sites were seriously distorted by the strong motion, which drove the instruments off-scale. However, the scientists estimated that, even if the instruments had gone off-scale by a factor of 20, which was unlikely, the local magnitude of the San Francisco quake would not have been more than 6.9.

In addition to calculating the local magnitude of the San Francisco quake, Kanamori and Jennings applied their method for determining local magnitude to the Guatemala earthquake of February 4, 1976. A seismoscope in Guatemala City produced the only seismic recording obtained near the fault. Based on this limited record, the quake's local magnitude was calculated at 6.9. The surface-wave magnitude of this earthquake had been estimated at 7.5... *Caltech News Release.* ☼

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United Water Conservation District
Attention: Frederick J. Gientke
General Manager
725 E. Main Street
Santa Paula, CA 93060

Seminars/Meetings/Field Trips

NOVEMBER 1989

6 "Walrus and Brontotheres - New Discoveries from the South Bay Pliocene and North County Eocene" - Thomas A. Demere, San Diego Assoc. of Geologists November Meeting, at San Diego Natural History Museum, Balboa Park, San Diego, CA Cost: \$20 - Dinner 7:00; Program 8:00 CONTACT: Geocon, Inc. (619)558-6900.

5-10 "Managing Water Related Conflicts: The Engineers Role" at , Santa Barbara, Engineering Foundation

7-9 "HAZMAT WEST 1989" at , Long Beach Convention Center, Tower Conference Management.

(11) Note: "Day In The Field With Tom Dibblee" has been rescheduled for "some time in the Spring '90" for the Santa Monica Mountains.

12-15 "NCGA Mapping & Geographic Information Systems '89" at , Los Angeles, Westin Bonaventure Hotel, National Computer Graphics Association (NCGA), 2722 Merrilee Dr., Suite 200, Fairfax, VA 22031 CONTACT (703)698-9600.

14-16 "Fundamentals of Groundwater Hydrology" at , Houston TX, DuPont.

15 Call For Papers "International Symposium on Mapping and Geographic Information Systems." at , June 21-22, 1990 San Francisco, Colorado CONTACT Dorothy Savine. Sym. Mgr(614)761-1711.

15-17 "Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Detection and Restoration" at , Houston TX, API & NWWA Assoc. of GW Scientists and Engineers. 6375 Riverside Dr., Dublin, OH 43218 CONTACT (614)761-1711.

16 "Earthquake Hazards on the Cascadia Subduction Zone, Washington and Oregon" Dr. Tom Heaton for the Inland Geological Society Monthly Meeting at U.C Riverside Geology Building Room 1408 CONTACT Shirley (receptionist - Leighton & Assoc.) (714)788-5800.

28-30 "Critical Issues in Underground Storage Tank Management" at Doubletree Hotel, San Diego, NWWA Assoc. of GW Scientists and Engineers. P.O. Box 182039/Dept. #017/ Columbus, OH 43218 CONTACT (614)761-1711.

28-30 "Risk Assessment for the Ground Water Scientist" at Doubletree Hotel, San Diego, NWWA Assoc. of GW Scientists and Engineers. P.O. Box 182039/Dept. #017/ Columbus, OH 43218 CONTACT (614)761-1711.

DECEMBER 1989

1 "Environmental Site Assessments - One-Day Course", at Doubletree Hotel, San Diego, NWWA Assoc. of GW Scientists and Engineers. P.O. Box 182039/Dept. #017/ Columbus, OH 43218 CONTACT (614)761-1711.

2-5 "California Groundwater Association Convention" at , San Diego, California Groundwater Association, P.O. Box 14369, Santa Rosa, CA 95402-6369 CONTACT (707)578-4408.

3-9 "American Geophysical Union - Annual Meeting" San Francisco

6-7 "Elsinore Fault in the Coyote Mtns., Lake Cahuilla, Yuha Desert, and the Superstition Mtns. and Coyote Creek faults" Friends of the Pleistocene 1990 field trip. CONTACT: Dr. Tom Rockwell (619)558-6159.

18 "Hazard Management Regulations" at , Los Angeles, Environmental Resource Center.

19 "Current SARA III & OSHA Regulations" at , Los Angeles, Environmental Resource Center.

Other Local Meetings

Coast Geological Society: Dinner meetings every third Tuesday of the month, October-June; American Legion Hall, 83 S. Palm St., Ventura, CA.

Los Angeles Basin Geological Society: Lunch meetings third Thursday of every month; now at Luminarias Restaurant, Monterey Park, CA

Northern California Geological Society: Lunch meetings monthly by announcement, San Ramon, CA

San Joaquin Geological Society: Dinner meeting second Tuesday of every month except July-September, American Legion Hall, 2020 "H" Street, Bakersfield, CA

South Coast Geological Society, Inc.: Dinner Meetings first Monday of each month, Revere House, 900 West First Street, Tustin, CA

Inland Geological Society, Dinner Meeting third Thursday of each month, San Bernardino County Museum, Orangetree, Redlands, CA

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It's Time to Renew Your Annual Fees for the AEG Southern California Section.

Your annual fees to AEG International do not include the Section fees. The \$20.00 fee covers the operation of the section through publishing & mailing the monthly newsletter, paying for expenses of program speakers, meals for students at meetings, and the expense of our lobbyist in Sacramento.

You will not receive an invoice for renewal other than the notice located here. This notice will be printed here for the November, December, January and February issues. You will notice on your mailing label, to the right of your name, the month and year when your fees will be due. Past this date you will no longer receive copies of the section newsletter. You can ignore this notice if you made the effort of renewing. Members are, however, encouraged to participate at any time of the year.

To renew, send a check in the amount of \$20.00 made out to "AEG" or "Association of Engineering Geologists" to the Section Secretary/Newsletter Editor at the address below. Please note any change of address on the mailing label or the form to the right.

Name _____ Phone _____
School or _____
Company _____ Fax _____
Address _____
City _____ State _____ Zip _____
_____ Preferred Mailing Address _____

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