NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

OCTOBER MEETING ANNOUNCEMENT

DATE: **Wednesday, October 25, 2000**

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

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

RESERVATIONS: **Leave your name and phone number at 925-294-7530 anytime before the meeting.**

SPEAKER: **Dr. Frank J. Picha, Consultant, Walnut Creek, CA.**

SEDIMENTARY BASINS AND PETROLEUM SYSTEMS IN TERMS OF GLOBAL TECTONIC CYCLES

Worldwide exploration for the remaining undiscovered hydrocarbons requires a good understanding of geology and petroleum systems of many diverse provinces of the world. In order to see the critical aspects of any hydrocarbon habitat and predict potential new plays, various concepts must be integrated into a unifying interpretative system. Obviously, the sedimentary basins, their tectonic and depositional history and classification, represent such a principal category to which all other aspects, including elements of the petroleum system, such as source rock, generation, migration, and entrapment of hydrocarbons, are related.

The modern definition and classification of sedimentary basins and associated petroleum systems is principally based on concepts of plate tectonics. The plate tectonic cycle, in its initial divergent setting, begins typically with intracratonic rifting, followed by opening of oceans and development of passive continental margins. Subduction, continental collision, and orogenesis mark the second, convergent part of the cycle. During the course of the plate tectonic cycle, various sedimentary basins and related petroleum systems evolve in this dynamic global system. The hydrocarbon potential of each principal basin is determined by its tectonic and depositional history, which relates to succession of critical stages of the plate tectonic cycle: rifting, sagging, drifting, subduction, and collision. Among many types of basins, the rift and intracratonic rift-sag basins, and passive continental margins of the divergent settings, the foreland basins and fold and thrust belts of the convergent settings, and some borderland basins of the transform margins represent the most petroliferous provinces of the world. The petroleum systems, including all processes from source rocks deposition to final entrapment of hydrocarbons, evolved in a single stage of a plate tectonic cycle, e.g., in simple rift basins, or during two or more stages of a cycle, e.g., on passive continental margins with stages of rifting, sagging, and drifting. In some cases, the formation of a petroleum system even extends over several stages of two different plate tectonic cycles. Various types of sedimentary basins and related petroleum systems based on these concepts will be demonstrated on examples from North and South America, Africa, Europe, and Asia. Maps of sedimentary basins of Africa and South America as examples of application of the plate tectonic classification of sedimentary basins on a global scale will also be presented.

Definition of sedimentary basins and petroleum systems in terms of plate tectonics not only enables better categorization and integration of data, but also

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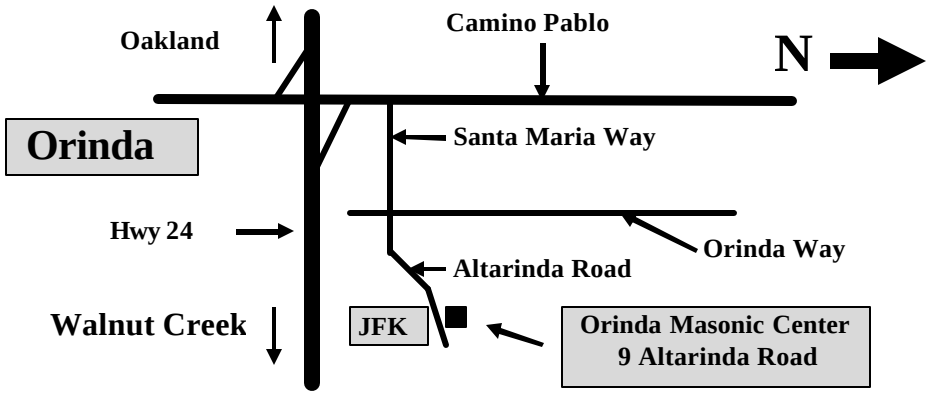


serves as a predictive tool in evaluation of various properties and in search of new potential hydrocarbon plays. Well-defined hydrocarbon habitats of certain plate tectonic setting will serve as potential models for other basins and exploration plays.

Dr. Frank J. Picha has forty five years of continuous experience in geology. He received his B.A., M.S., and Ph.D. degrees in Geology, Chemistry, and Sedimentology from Charles University, Prague, Czechoslovakia. His professional career has included posts with the Geological Survey of Czechoslovakia, the University of Wisconsin, Kuwait University, Gulf Oil Co., the University of Houston, Chevron Overseas Petroleum, and Sproule International Limited. He specializes in sedimentology, structural geology, regional geology, and petroleum geology. During his career, he interpreted geology, and hydrocarbon potential of various sedimentary provinces including Alps, Carpathians, Dinarides, Hellenides, Apennines, Rocky Mountains, Great Basin, Ouachitas, and Oman Mountains. He also conducted work in Kuwait and Southeast Asia, interpreted the hydrocarbon potential of Eastern Europe and the former Soviet Union, and produced maps of sedimentary basins of Africa, Middle East, and South America based on concepts of global tectonics. He published numerous papers on regional geology, stratigraphy, structure, petroleum geology, and environmental geology, lectured at universities, conventions, and conferences, and organized and led field trips. He is a member of AAPG (Chairman Central and Eastern European Distinguished Lecture Sub-Committee and Member House of Delegates), the European Association of Geoscientists and Engineers, the Geological Society of America, and the Northern California Geological Society (Counselor, Programs).

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

***REMINDER: If you have not paid your 2000-2001 NCGS membership dues, please do so <u>as soon as possible</u>. Dues forms are available from* Dan Day *at* dday@nrmc.com *or at* 925-294-7530. <u>Please mail checks to the address specified on the form</u>.**

NCGS Fall 2000 Calendar

Wednesday, October 25, Masonic Auditorium, Orinda, CA
Frank Picha, Consultant, Walnut Creek, CA
Sedimentary Basins and Petroleum Systems in Terms of Global Tectonic Cycles

Saturday, October 28, 2000
Chalk Bluff Field Trip (see flyer in this newsletter)
Led by ***David Lawler, Dr. David Jones,*** and ***Rudy Kopf*** (Staff of the Farwest Geoscience Foundation)

Wednesday, November 29, Masonic Auditorium, Orinda, CA, or Site TBA . . . . .NCGS FAMILY NIGHT
Joint Meeting with Bay Area Geophysical Society
Chris McKay, NASA Ames Research Center, Mountain View
Landscape Geomorphology and the Search for Water on Mars: Implications for the Development of Life

Saturday, December 2, 2000
Chevron 3-D Visualization Demonstration at Chevron Park, San Ramon (see flyer in newsletter)
Presented by ***Bob Kieckhefer*** and ***Vernie Green*** **(COPI)**, and ***Frank Picha***, Consultant

Friday, December 8, 2000, Chevron Park, San Ramon, Room A-1012, 11:30 am to 1:00 pm
Marlon Downey
Predicting the Future (tentative title)
Hosted by Chevron Overseas Petroleum, Inc. **All details pending; please check future newsletter postings.**

Saturday, January 27, 2001, 9:00 am at site TBA **(Please check future newsletters for details)**
Caldecott Tunnel Field Trip
Leader TBA (Trip is being arranged by **Jean Moran,** Stetson Engineers)
A trip including a movie of the tunnel construction, a trek through tunnel air ducts, and local geology synopsis

Bay Area Geophysical Society Fall 2000 Calendar

Ernie Majer of Lawrence Berkeley National Laboratory will talk about "Application of Seismic Methods For Imaging Fractures."**November 2, 2000**.

David Lumley of 4th Wave Imaging will deliver the SEG Fall Distinguished Lecture. The talk will be about "The Next Wave in Reservoir Monitoring: The Instrumented Oilfield". **November 9, 2000**

Chris McKay of NASA will talk about "Landscape Geomorphology and the Search for Water on Mars: Implications for the Development of Life." Tentatively scheduled at the Orinda Masonic Auditorium on **November 29, 2000**. Exact time and place TBA. This is a joint session with the Northern California Geological Society.

Joel Walls of Rock Solid Images will talk about attributes. Exact title and time TBA, **Fall 2000**

Robert H. Tatham of U.T. Austin will talk about Multicomponent Exploration Technology. **Tentatively February 2001** Exact title and time TBA.

For more information, check the BAGS website at http://sepwww.stanford.edu/bags/

September NCGS Speaker Discusses Early Life Forms Preserved in Archean Rocks

The NCGS opened its 2000-2001 season with an excellent talk on the status of research into the origins of microbial life by **Dr. Dawn Sumner** of the U.C. Davis Geology Department. Dawn joined the Geology faculty at UCD in 1997, and has spent her academic career pursuing the origin of early life through detailed morphological and stable isotopic studies of fossil evidence preserved in Precambrian rocks. She summarized her studies at the September 27th NCGS meeting with a talk entitled ***Tracing the Early Evolution of Life in the Rock Record.***

Dawn's research has taken her to the 2520 m.y. (2.5 billion year old) Gamohaan Formation of the Campbellrand-Maimani Platform of the Transvaal Supergroup, South Africa. This weakly (<200ºC) metamorphosed carbonate unit is part of a carbonate platform complex structurally similar to Bahamas platform. This formation contains well-preserved morphological evidence of two distinct microbial communities that display two difference types of calcite nucleation (precipitation structures). The structures alone cannot provide us with the evolutionary keys to these organisms. Scientists must search for chemical fingerprints that reflect the biological conditions under which these creatures lived. The best device for accomplishing this task in these ancient Archean rocks is the stable isotope carbonate chemistry. Stable isotope techniques use sophisticated analytical hardware to determine the relative proportions of nonradiogenic isotopes of such elements as oxygen, hydrogen, carbon, and sulfur in geological materials. All elements a composed of atoms with the same chemical characteristics but different weights. Chemical reactions often favor one atomic weight over another, thus *fractionating* the atoms and creating by-products with a different stable element chemical composition that the reacting compounds. Variations in stable isotope chemistry are often easy to detect and can be a definitive signature of a particular reaction process. Biological processes frequently create extreme isotopic changes in geological materials that are specific to those activities.

To differentiate substances derived from organic versus inorganic processes, Dawn utilized stable carbon isotope data from the carbonate structures she identified as having an organic origin. John Grotzinger of MIT and NASA helped her with these analyses. Plots of carbon isotope analyses of material from biological and inorganic processes clearly show that the organic mechanisms resulted in carbonates depleted in the heavier carbon-13 isotope. The structures that Dawn focused on are microbial mat structures similar to the stromatolites now forming in very restricted environments in western Australia, and preserved in very limited outcrop exposures up to Precambrian in age. Stromatolites are bacterial and algal communities that form hummocky layered structures in intertidal channels by trapping carbonate mud between upward-growing organic layers. These structures bear a similarity to those that Dawn examined, and are considered to contain important biochemical information. Unfortunately, in spite of modern analogues, scientists are still not sure how they formed.

The structures that Dawn is studying reveal complex growth architectures that reflect both the bacterial activity in the community as well as environmental Archean conditions. The communities grew both vertically and as horizontal draping mat structures. The gray calcite cement in between black-colored microbial communities exhibit a herringbone texture that is thought to hold clues to the chemistry of the water it precipitated from. The herringbone texture forms serrate bands oriented approximately perpendicular to the proposed growth direction. Similar structures have been observed in hydrothermal pools in Yellowstone National Park as filamentious microbes influencing in situ carbonate precipitation. But many of the bushy or frond-like features have no modern day analogues to explain the apparent biologically-derived textures. Researchers interpret some of these phenomena as vertically growing biological communities bounded by horizontal, laminated mat-like organic communities. The growth model requires a biological process with pore water diffusion around the communities that was slow enough to retain the fractionated carbon values in the interstitial carbonate fill. The best preserved microbial structures contain the keys to determining how early life evolved, and how biological activity influenced the evolution of the earth's atmosphere. But more work is needed to separate the effects of temperature, biochemical reaction rates, aqueous chemistry, low grade metamorphism, and chemical fractionation on the isotopic chemistry of these carbonates.

The NCGS thanks Dr. Dawn Sumner for sharing her research activities into the origins of life with its members. Her presentation revealed some astonishing structures in ancient Archean carbonate platform rocks that arguably contain vital information on the early development of terrestrial life. She frankly discussed some of the research areas that require additional examination, and proposed several technical approaches that should help provide clues to biological processes that developed under what are now rather poorly understood environmental conditions. Several of her graduate students are currently working on various aspects of these problems.

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

NCGS Fall Field Trip

Chalk Bluff Preserve Field Trip

Saturday, October 28, 2000

Led by David Lawler and Rudy Kopf, Farwest Geoscience Foundation

The Farwest Geoscience Foundation (FWGF) staff would like to invite you to participate in a morning to afternoon (10am to 4pm) field trip on Saturday, October 28 to visit the proposed site of the Chalk Bluff Preserve - a unique geological/botanical preserve in the heart of the Northern Mines Region of the Sierra Nevada about 7 miles southeast of Grass Valley. The FWGF staff have worked with the private landowner and an assemblage of local organizations for the last 6 years to aid create of the 200 acre preserve, which will be under the stewardship of the Nevada County Land Trust, FWGF, and Nature Conservancy.

The preserve contains the type locality of the ancient Eocene Chalk Bluff Flora, whose ancient record of a diverse tropical paleoflora serves as a worldwide scientific standard. The Chalk Bluff Preserve is located 7 miles east of Nevada City, Nevada County, California. The preserve borders both Tahoe National forest and BLM-managed public lands. We shall stop at the historic You Bet townsite area overlooking the You Bet hydraulic mines for a brief talk on the local history of the area. The remainder morning will be spent touring along the "Panorama Trail" on top of SugarLoaf Hill, Chalk Bluff. We shall then visit the Chalk Bluff "Hanging Gardens" area and eat lunch at this idyllic spot. Later in the afternoon we shall visit the cavernous inlet area of the You Bet Mine - sluicebox tunnel - that represent the site of processing vast quantities of gold-bearing sands and gravels during the 1860's to 1880's. We shall reassemble at our vehicles at 3pm and return to Nevada City by 4 pm.

Time: **Saturday, October 28, 2000**

Meeting Place: Rood Government Center Building, Nevada City, CA at 10:00 am SHARP!!!!

Directions: The Nevada County Government Center is 1/2 mile west of the intersection of Highway 20 and 49 on Highway 49 on the north side of Nevada City. Exit right on Maidu Drive (this is the access road to the government center, then park in the parking spaces on the left side of the front steps. Park your vehicle and assemble on the front steps of the Government Center. We shall reassemble/carpool into to transport participants. **San Francisco Bay Area and East Bay participants need to allow 3 hour drive to arrive in time...leave no later than 7am!! or spend Friday night at a motel in Grass Valley or nearby Nevada City.**

PLEASE NOTE: ***Bring your hiking boots, casual field clothes, LUNCH, knapsack, hat, and rock hammer (if you own one) - FWGF will supply a variety of cold drinks.***

Cost: **$10 per person**. Includes a map of the Tertiary age, gold-bearing Ancestral Yuba River System and a brief handout on the Chalk Bluff Preserve. **Note: trip will be on rain or shine !!!.**

********** REGISTRATION **********

Please RSVP by Wednesday, October 25th, to **Tridib Guha** by E-mail at aars@ccnet.com or by phone at **(925) 363-1999**. Let him know how many people you will be bringing to the field trip and leave a daytime phone number where you can be reached. Participants will pay the $10 trip fee on October 28th at the meeting place in Nevada City. **He will also help form car-pools out of the Bay Area for those interested in car-pooling to the Preserve.**

For more information or questions - call David Lawler at **(916) 606-9694** (cell phone)

Geology and 3-D Demonstration of Tengiz Oil Field and Absheron Prospect, Caspian Sea

Hosted by Chevron Overseas Petroleum Inc.

3-D Visualization Center, San Ramon, CA.

Saturday, December 2, 2000

9:30 a.m. to 12:00 noon

No cost; please register before Thursday, November 30th (see below)

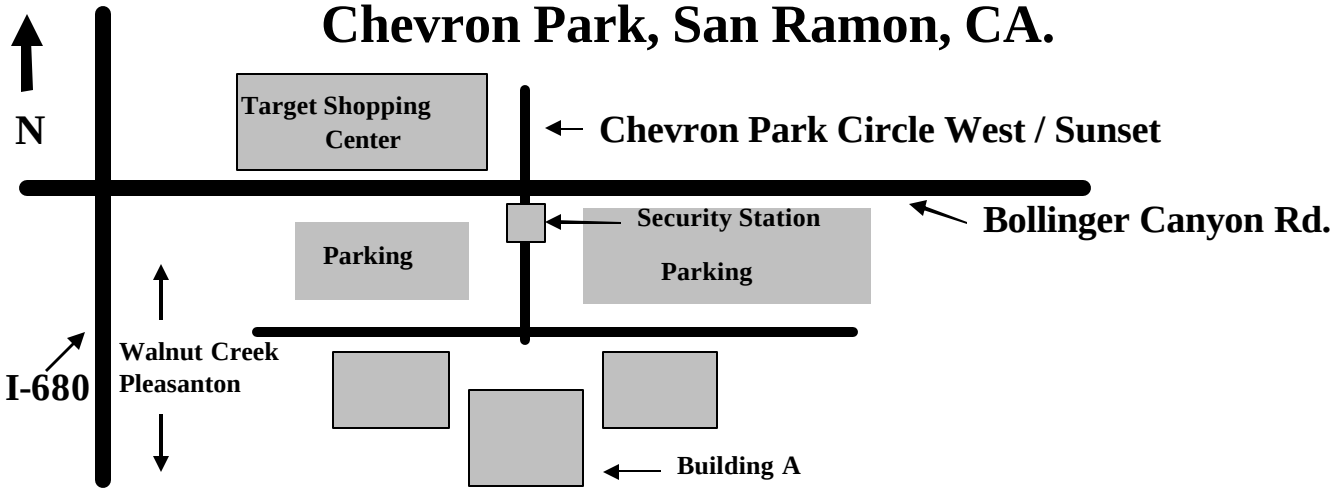
Chevron Overseas Petroleum Inc. (COPI) relies on state-of-the-art computer technology in its exploration and production of oil and natural gas outside of North America. One of the company's 3-D Visualization Centers is in COPI's headquarters in San Ramon. Powered by an SGI Onyx computer, this center has a 25-foot-wide screen on which groups of earth scientists can view seismic and well data, reservoir simulations, and other large data sets. Two large COPI projects from the Caspian Sea region will be presented to NCGS attendees in the Visualization Center.

First, **Bob Kieckhefer** will show 3-D seismic data and will review the Absheron prospect, in the deep-water Caspian Sea offshore Azerbaijan. This prospect is a large 4-way dip-closed anticline in Plio-Pleistocene clastic sediments, located between a 4-billion-barrel oil field and a recent major gas discovery. Though simple, the anticline is broken by several sets of minor extensional faults whose en-echelon pattern suggeststhat a minor component of left-lateral shear is deforming the compressional fold. These minor faults are easily mapped in the 3D seismic data using Chevron's proprietary software. Submarine channels are also imaged well on the 3D data. Recent site-hazard work has delineated highly reflective recent flows from the prospect's quite active mud volcano. Chevron and its partners TotalFinaElf and SOCAR plan to drill the first well early in 2001.

Next, **Frank Picha** will present 3-D seismic data and will review the geology of the onshore Tengiz field, in western Kazakhstan, just east of the northern Caspian Sea. This field, discovered by the Soviets in the 1970s, is a Middle Devonian-Carboniferous carbonate platform capped by Permian salt. The producing carbonate reservoirs with recoverable reserves of several billion barrels of light oil are at a depth greater than 4 kilometers. The production is complicated by high pressure and high sulfur content in the associated gases. The joint-venture company Tengizchevroil, owned 50% by Chevron and the remainder by Exxon-Mobil, KazakhOil, and LukOil, has operated the field since April 1993 and currently produces over 200,000 barrels of oil per day. The 3-D seismic data over the Tengiz oil field also reveal interesting channelized depositional systems in the Jurassic and Cretaceous portion of the stratigraphic section. These fluviatile to shallow marine channel sands and associated facies represent an important hydrocarbon play elsewhere in western Kazakhstan.

Attendance will be limited! In order to provide access to this center on a weekend, **Chevron security requires you to register for this event no later than Thursday evening, November 30th. Register before November 30th by leaving your name and a phone number where you can be reached on the NCGS voice recorder at 925-294-7530.** *Food and drink are strictly prohibited in the Visualization Center, and smoking is not allowed in any Chevron building.*

Directions: *Exit I-680 at Bollinger Canyon and go east one block to the stoplight at Chevron Park Circle West. Turn right into Chevron Park and park in the right-hand parking lot. Proceed to Building A through the Main Lobby entrance. The security guard at the reception desk will give attendees clearance badges.* **Frank Picha** *and* **Bob Kieckhefer** *will escort the group to the Visualization Center for the 3-D demonstration.* ***For more detailed directions to Chevron Park, San Ramon, call*** **Dan Day** ***at*** **925-294-7530.**



AAPG Foundation
Energy Resources Library

As announced in the April 2000 issue of The AAPG Explorer the AAPG Foundation Library has joined the Oklahoma Department of Libraries (ODL) system, making our collection available for online searching. By being online, the Library with over 4000 volumes of books, journals, and non-print material is now available for online title searching.

If you haven't used the services of the AAPG Foundation Library, we invite you to do so. You can search the new database by going directly to our Web address http://www.aapq.org/foundation/library/index.htmI and at the bottom of the page click the "Impact Online Book Search" link.

If you don't find what you're looking for in our library database ("AAPG Holdings") you can expand your search to encompass all of the libraries within the Oklahoma Department of Libraries system.

In addition services of the library include geological database searches, reference work, and photocopies. Call us with your request and we'll be happy to help.

AAPG Foundation Energy Resources Library
P.O. Box 979, Tulsa, OK 74101
Phone: 918-560-2620 / Fax: 918-560-2642
Email: *library@aapg.org*
Librarians: Mary Kay Grosvald (8:30am-12:30pm)
Karen Piqune (12:30-4:30pm)

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Science 2001 Lectures

Lawrence Livermore National Laboratory will present a series of scientific lectures for the public entitled "Science 2001." The series is designed to address current topics in science and strives to make these concepts accessible to members of the community.

The lectures will take place one Thursday a month at the **Livermore High School Performing Arts Theater**, which is located at 600 Maple Street. All lectures are geared toward the general public and begin at 7 pm and are free.

Here is a schedule of guest lectures:

October 19, 2000 - ***"Science Based Decision Making in the Tahoe Basin,"***
by Charles R. Goldman, Professor of Limnology in the Department of Environmental Sciences at U.C. Davis.

November 16, 2000 - ***"The Origin of San Francisco Bay,"***
by Kenneth R.Lajoie, retired, U.S. Geological Survey.

January 25, 2001 - ***"Unraveling the Human Genome,"***
by Stephen Dilly, Vice President of Medical Affairs at Genentech.

February 22, 2001 - ***"Magnetic Levitation,"***
by Dick Post, retired Lawrence Livermore physicist.

March 29, 2001 - ***"El Nino and Global Climate Change,"***
by Michael McPhaden, Senior Research Scientist for the Pacific Marine Environmental Laboratory, Seattle, Washington.

For more information about the series or to receive a brochure, call the **Public Affairs Office** at **925-422-3138**.

The Fifth International Conference on Corporate Earthquake Programs

November 7 - 9, 2000

San Jose State University, San Jose, CA

The recent earthquakes in Napa, California and Matsue, Japan have once again pointed out our vulnerability to earthquake damage. These earthquakes did not result in loss of life or major economic damage because the Napa Earthquake was relatively moderate in magnitude and the Matsue Earthquake occurred in a relatively unpopulated area. However, the Northridge (1994) and Kobe (1995) earthquakes illustrated how damaging major earthquakes can be, especially when they occur in urban and industrial areas. The Kobe Earthquake resulted in 6,500 casualties and over $120 billion in damage.

The Conference on Corporate Earthquake Programs Series was initiated in 1991, following the Loma Prieta Earthquake, to improve corporate earthquake mitigation, response, and recovery programs by bringing together private sector risk managers, earthquake hazard reduction professionals, and researchers, from both the public and private sectors, throughout the world. This conference facilitates technology and information transfer, thus improving not only the state-of-the-art, but also the level of implementation of earthquake protection programs in the private sector. Exhibits of technical products that have been developed for earthquake hazard reduction are also planned.

This is the only international conference devoted to the earthquake programs of businesses and industries.

Who Should Attend: Managers, emergency planners, facilities and risk management staff, public affairs and marketing staff, researchers, government officials responsible for earthquake and disaster planning.

Conference Sponsors: Solectron Corporation, City of San Jose, QuakeSafe Inc., Business & Industry Council on Emergency Preparedness & Planning, San Jose State University

For further information and to download a registration form, please visit the **Conference Website** at: **http://www.sjsu.edu/faculty/selvaduray/conference**

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WINTER QUARTER, 2001 LAND USE PLANNING COURSES OFFERED AT *UNI VERSITY 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 TBA, 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 (TBA), 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 TBA.

For more information or to enroll, call toll free (800) 752-0881. Or enroll online at www.universityextension.ucdavis.edu