

# NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



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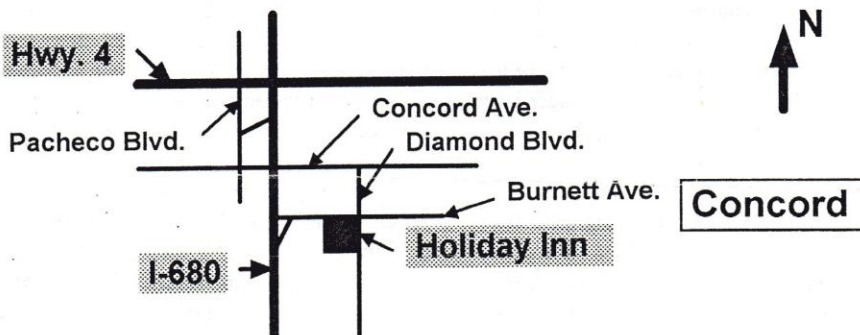
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## JUNE MEETING ANNOUNCEMENT

- DATE:** Thursday, June 19, 1997
- LOCATION:** Holiday Inn, 1050 Burnett Ave., Concord, CA.
- TIME:** 6:30 p.m. Social; 7:00 p.m. talk (No Dinner)  
Cost is \$5.00 per person
- RESERVATIONS:** Leave your name on the recorder at 510-842-0592 anytime before the meeting.



**SPEAKER:** Rick Caskey, CIS Coordinator  
Chevron Overseas Petroleum, Inc.

## TENGIZ: CHEVRON'S CASPIAN PROJECT

The Tengiz Oil Field, at the south side of the Pri-Caspian Basin, on the north shore of the Caspian Sea, was discovered by the Soviets during deep drilling in 1979, and substantially developed by them in the 80s and early 90s. Surface dimensions of the field are 25 by 19 kilometers, with an estimated oil in place of 25 billion barrels, and an ultimate recovery of 6 to 8 billion barrels. The oil is high quality at 42 degrees API but development is complicated by 18 percent hydrogen sulfide in the associated gas, and 12,000 PSI reservoir pressure. The current view is that the Tengiz reservoir represents a sedimentary accretional mound similar to the modern Bahama banks. Large normal faults separate the central platform from the flanking carbonate debris slopes. Newly acquired modern production information indicates a very complex, heterogeneous reservoir.

(continued on back page of newsletter)

## Sierran Uplift Scrutinized at May NCGS Meeting

It has been several years now, but the NCGS finally booked a return engagement of popular Bay Area regional geologist **Dr. David L. "Davey" Jones**, Professor Emeritus at U.C. Berkeley. An audience of about 30 crowded into a meeting room at the Concord Holiday Inn on the evening of May 15th to hear Davey expound on the night's topic: "**Uplift of the Sierra Nevada: Fact or Fancy?**"

Dr. Jones began his informal presentation with a discussion of uplift tectonics, generally associated with crustal thickening and crustal dynamics; and its counterpart exhumation, the exposure of formerly deep-seated rock types that is normally affiliated with crustal stretching. He pointed out two contrasting types of uplift: *rock uplift*, involving the exposure of deep-seated rocks; and *topographic uplift*, which is quite difficult to document. The Sierras are an excellent example of topographic uplift that occurred in two phases--the uplift of the plutonic (batholith)-metamorphic complex in the late Mesozoic, and the Tertiary uplift addressed so well by renowned geologist Waldemar Lindgren at the turn of the Century. The main focus of Davey's talk was the commonly held notion that the topographic asymmetry of the Sierras--a gently sloping western flank rising to nearly 8000 feet in the north and to over 14000 feet in the south, only to plunge steeply several thousand feet over tens of miles on the east--was caused by block tilting of the range, with its east side up.

The Sierras have an interesting history, beginning with syntectonic intrusion of mafic plutons into metamorphosed turbidite sediments in the north at ~130 to 140 m.y. ago, followed by undeformed granodiorite intrusion comprising the main body of the batholith ~80 to 100 m.y. ago. A small cluster of plutons in the easternmost part of the complex date back to Triassic times. The eroded surface of these crystalline rocks can be contoured, and traced by drilling and aeromagnetic/gravity surveys into the subsurface of the Sacramento Valley. This surface suddenly changes to a steeper slope where the range meets the Great Valley sediments. This "hingeline" is exposed at Folsom, and is a depositional contact that has remained within 100 meters of sea level since the Mesozoic. The sudden slope change in the basement erosional contact west of the hingeline indicates the Great Valley subsided.

The presentation shifted to mineral geobarometer studies conducted by George Brimhall on various plutonic rocks from the northern Sierra Batholith. Brimhall's studies of mineral suites from the intrusives give the depths at which the plutons crystallized. The pattern that emerges reveals greater uplift (deeper intrusion) for intrusives on the western margin of the Sierras than in the younger undeformed granitoid terrains to the east. Independent studies by Jason Saleeby of Caltech yielded emplacement depths of 24 km. for plutons exposed in the southern Sierras. The northern Sierras experienced greater uplift on the west during late Mesozoic times. Uplift ended in pre-Eocene times.

The crust in Nevada was ~70 km. thick by the end of the Cretaceous, and was at an elevation higher than the Sierran terrain. *Basin and Range crustal thinning commenced ~15 m.y. ago, preceded by Oligocene crustal heating and rhyolite eruptions that formed the tuffs of the Valley Springs Formation unconformably overlying the Eocene Auriferous Gravels.* The andesitic volcanoclastic deposits of the Mehrten Formation were in turn laid unconformably onto the Valley Springs Formation ~4 to 10 m.y. ago. A projection of the basal contact of the Mehrten eastward intersects the Sierran crest at about 7000 feet, consistent with its interpretation as an ancient erosional surface with a gentle dip of 1 to 1.7° westward. The subsequent deep canyon-cutting that has occurred along the western flanks of the Sierras post-dates the Mehrten, and is a key feature used to support the block tilting theory of Sierran uplift. Dr. Jones dismissed this argument by suggesting that the water released by melting Sierran glaciers during the Ice Age was sufficient to erode deep canyons without calling upon major uplift to supply the energy gradient. Davey interprets the steep eastern slope of the batholith as an artifact of Basin and Range crustal extension, with the eastern block down-dropped relative to the Sierras.

Davey's theory meets strong opposition from two camps that favor major Sierran uplift in the late Tertiary. One is paleobotanical evidence provided by Daniel Axelrod's exhaustive studies of plant fossils in Nevada, which indicate low elevations and a wetter subtropical climate there in the early Tertiary, a conclusion that prohibits any significant mountain barriers to the west at that time. The late Cordell Durrell argued a Nevadan source for chert cobbles in the Auriferous Gravels, which similarly requires a lower Sierran terrain to transport the cobbles to their current location. Davey's personal examination of Nevadan cherts has thus far failed to find a match with those in the Auriferous Gravels.

Dr. Jones' talk on Sierran uplift is a reminder that there can often be more than one interpretation of what might seem to be straightforward geological features. His theory proposes major Sierran uplift in pre-Eocene times, with minor localized Tertiary block faulting, and shaping of the steep eastern Sierran scarp by mid-Cenozoic Basin and Range extension. The late Tertiary deep canyon-cutting was accomplished by post-Mehrten glacial meltwaters on a gently sloping fossil erosional surface topographically similar to the Valley Springs-Mehrten unconformity.

Our many thanks to Dr. David Jones for his stimulating discussion of an alternative scenario for Sierran uplift. His presentation conveniently provided an introduction to the structure, lithology, and chronology of the Sierra Batholith and the overlying Tertiary sediments, in anticipation of the June 14-15th "*Gold Deposits of the Sierra Nevada*" field trip. This talk was specifically scheduled by our Program Chair, **Don Hill**, as a prelude to that trip. Thanks for your excellent timing, Don!

## Nominations for 1997-1998 Executive Committee

<b>President:</b>	John Karachewski	<b>President-Elect:</b>	Dan Day
<b>Vice President:</b>	Don Hill (Field Trip Chair)	<b>Secretary:</b>	Clark Fenton
<b>Treasurer:</b>	Ed Simonis	<b>Program Chair:</b>	Don Lewis
<b>Scholarship Chair:</b>	Roger Greensfelder		
<b>Counselors:</b>	Dieter Letsch (Programs)	Bob Horwath (Field trips)	
	William Bailey (Programs)	Greg Bartow (Field trips)	
	Tim Ault (Field Trips)	Frank Picha (Programs)	

If you would like to nominate someone for any of these positions, or would like to serve as Scholarship Chair (must not be affiliated with an academic institution), please contact either **Mel Erskine** at 510-234-6214 / fax: 510-234-5371 / E-mail: [merskine@holonet.net](mailto:merskine@holonet.net), or **Ray Sullivan** at 415-338-7730 / fax: 415-338-7705.

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## Upcoming Meetings of the Association of Engineering Geologists, San Francisco Section

Meetings are held the second Tuesday of the month at Sinbad's restaurant, Pier 2 on The Embarcadero in San Francisco unless otherwise noted. Social hour at 6PM, dinner at 7PM, speaker at 8PM.

Cost: \$25 members, \$30 nonmembers.

Contact [BMathieson@aol.com](mailto:BMathieson@aol.com) about student discounts.

**June 10** -- Dana Brock:

*"Using Guided Horizontal Wells to Remediate Soil and Groundwater."*

**July 8** -- Panel discussion with Bay Area city and county geologists including Jim Baker and Bill Cotton.

**August 12** -- Richard L. Meehan:

*"The Floods of 1997."*

**September 9** -- Panel discussion with environmental regulators:

*"Is it Clean Yet?"*

**October** -- No meeting; see you at the AEG Annual Meeting in Portland!

**November 20 (special date)** -- Joint meeting with ASCE:

*"Devil's Slide Bypass: Over, Under, and Through Views."*

### CCGO Organizing Meeting Held May 4th

The California Council of Geoscience Organizations held a meeting in San Jose on May 4, 1997. This council is an attempt to unite California-based geoscience organizations to address political issues in the state that affect professional geologists and their work. The NCGS requires permission from its parent organization, the AAPG Pacific Section, to participate officially in the CCGO. Many NCGS members actively support the CCGO in concept and have expressed the need for stronger geoscience representation in Sacramento. With this in mind, the NCGS newsletter will continue to inform its members of CCGO activities, unless otherwise prohibited by the AAPG Pacific Section. Information on the CCGO can be obtained from **Betsy Mathieson** at 408-297-6969 / fax: 408-297-7716 / e-mail: [Bmathieson@aol.com](mailto:Bmathieson@aol.com).

## Ron Crane Receives the A.I. Levorsen Award

Retired Chevron geologist and NCGS member **Ron Crane** was the 1996 recipient of the **A.I. Levorsen Award** for Best Paper at the 1996 AAPG Pacific Section Meeting in San Francisco. Ron won for his presentation "*Geology of the Mount Diablo Region.*" He also gave a second talk on the "*Geology of the East Bay Hills.*" Both were the result of a 3-year remapping project of 26 quadrangles from American Canyon on the north to the Diablo Range on the south, and the Hayward Fault on the west to the Great Valley to the east. Ron, assisted by Craig Lyon, has presented his work at an NCGS meeting, and both led two very popular Mount Diablo Field Trips for the NCGS in the Spring of 1995. The Mount Diablo trip was also featured during the May, 1996 AAPG Pacific Section Meeting. Ron's work has received high compliments from his fellow NCGS members and co-workers at Chevron. It is truly a monumental piece of work that brings together several independent studies of this fascinating region. Copies of the geologic maps can be obtained from H&L Hendry in Concord.

## Obituary

It saddens us to report that **James M. Kirby**, a long time member of the NCGS, passed away on April 16, 1997 at his home in Vallejo, CA., at the age of 96. Mr. Kirby graduated from Stanford University, Phi Beta Kappa, in 1924, and worked for Standard Oil and its subsidiaries as a field geologist from 1924 until his retirement in 1963. For more information about Mr. Kirby, please contact his stepdaughter:

Joetta Bunter  
2980 redwood Rd.  
Napa, CA. 94558-4132  
(707) 226-7832

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## 1997 NCGS Scholarship Recipients

The following college students have been awarded scholarship grants by the NCGS:

**Deirdre Scholar**; University of California, Santa Cruz -- \$500

*Pocket Beaches of the Northern California Coastline: Their Role in Sediment Transport*

**Daniel A. Parsons**; Sonoma State University -- \$300

*Granitoid Blocks in the Franciscan Complex, California*

**Andrew Eriksson**; San Francisco State University -- \$250

*Correlation of Mio-Pliocene Tephra Units in the Western Los Medanos Hills and Their Tectonic Implications*

The NCGS and its members congratulate the students for winning these grants, and offer their encouragement toward the completion of their research projects. We would also like to thank **John Sciacca** for his role as NCGS Scholarship Chair in selecting the awardees over the last several years. Your efforts are very much appreciated, John!

# ***MINUTES OF MAY 4, 1997, CCGO ORGANIZING MEETING***

(held at Betsy Mathieson's house in San Jose, 9:45 AM - 4:30 PM; Jim Jacobs led meeting)

## **I. INTRODUCTIONS OF ATTENDEES:**

Bob Tepel (Past President, AEG)  
Karen Grove (President, SEPM Pacific Coast Section)  
Betsy Mathieson (Chairman, San Francisco Section, AEG)  
Russ Pfeil (individual; member of AIPG and GRA)  
Jim Jacobs (President, AIPG-California Section and President, GRA-S.F. Bay Branch)  
Tridib Guha (President, Northern California Geological Society)  
Dave Dawdy (American Institute of Hydrology - California Section)

## **II. APPROVAL OF MINUTES OF 3/23/97 MEETING**

Approved as written.

## **III. REVIEW OF TENTATIVE SCHEDULE ADOPTED AT THE LAST MEETING (WITH REPORT OF BILL KEESE'S COMMENTS) : BYLAWS COMMITTEE**

No report given.

May '97 adoption of bylaws postponed until June. Betsy will ask Dave Bieber to e-mail draft bylaws to all on contact list. Russ Pfeil expressed a concern that businesses will want a vote if they're going to give money (plan is that only member geoscience organizations will be able to vote). We intend to promote business contributions on the strength of our mission statement, vision statement, strategic plan, and other material. Contributors are welcome to suggest different courses of action at any time and to "vote" with their contributions; if they do not like what we've done one year, they may choose not to contribute the following year.

In Article 2.2.1 of Bylaws, need to change "individual members" to "donors."

## **IV. INCORPORATION MATTERS**

Deferred until next meeting, after report of Bylaws Committee

## **V. INTRODUCTION AND DISTRIBUTION OF DRAFT STRATEGIC PLAN: STRATEGIC PLANNING COMMITTEE**

**Presented by Jim Jacobs, Committee Chairman**

Strategic plan development is just beginning. Jim has been concentrating on talking to people about potential Executive Directors for CCGO. Ray Seiple, semi-retired from the CDMG, was recommended. Jim distri-

buted copies of Ray's resume. Ray could be ED and lobbyist. He may be interested in doing some volunteer work for CCGO in the near future. We'll try to have our next organizing meeting in Sacramento so he can attend. Jim will contact Dave Bieber, Brian Lewis, and Ray Seiple to schedule meeting and find a location.

Russ has written strategic plans and will help Jim as a member of the committee.

Bob Tepel will compile information from a booklet on strategic planning and forward to Jim and Russ for committee's use. Jim and Russ will prepare CCGO Draft Strategic Plan.

Discussed interaction with academic community. Jim wondered whether CCGO could provide students with career guidance. May want to offer employer/employee connection on a CCGO web page, for possible nominal fee, or just as a benefit of membership.

Karen will talk to her colleagues and will report on ideas for interaction with the academic world. What can academic geoscientists offer CCGO and vice versa? Tridib will also talk to Ray Sullivan at SFSU.

## **VI. REPORT ON THE STATUS OF DEVELOPMENT PLAN : DEVELOPMENT PLANNING SUBCOMMITTEE**

No report given.

Betsy will contact committee members and ask status of plan.

Regarding funding, Jim thinks CCGO could get \$10/member from AIPG but probably only \$5/member from GRA.

Tridib reported that NCGS and other AAPG affiliates need AAPG's permission to be involved officially in CCGO. Mel Erskine offered to look into that.

Russ is concerned about having to contribute to CCGO through multiple organizations. When the question came up at an earlier meeting, someone pointed out that individuals who contribute to CCGO through several member organizations have more clout. But in fact, CCGO dues do not have to come from individuals' dues to the member organizations; CCGO dues can be funded by profitable short courses or field trips hosted by the member organizations.

**LUNCH BREAK** (backyard potluck BBQ, then field trip to see house damaged by landslide on bank of Coyote Creek)

## **VII. OTHER TOPICS**

Idea: List all member organizations' meetings on a CCGO web page.

Tridib is aware of at least three examples of illegal use of an RG stamp and one ethics violation of which several members of the Board of Registration for Geologists and Geophysicists are aware. The group suggested Tridib take at least one of the RG stamp violations to the District Attorney and that he attend a meeting of the BRGG and speak on the ethics violation during the period for public comment on items that are not on the agenda. CCGO can include an item in the strategic plan to advocate enforcement of the Geologists and Geophysicists Act. CCGO can make complaint forms available, and can have a future Sacramento representative follow up on complaints.

Bob Tepel suggests CCGO approach local agencies and suggest they encourage their reviewing geologists to file complaints when they see evidence of poor geologic work.

Dave Dawdy suggests getting attorney Eugene Bass to write an article on potential liabilities of complaint filers. Betsy will determine how to contact him (he writes for ASCE).

Jim thinks CCGO Officers' and Directors' insurance may be necessary. Also for Executive Director. Bob suggests individuals get riders on their homeowners' insurance instead.

Betsy brought up discussion that (1) some of Bob Tepel's early draft CCGO wording was watered down to please GRA (and similarly diverse organizations), (2) GRA was not represented at the last meeting, and (3) some of those present last time were leaning toward strengthening wording advocating protection of registration and seeing if GRA would accept.

Jim says he and Brian Lewis support registration of geologists, but rest of GRA may not. Maybe should have affiliate group of non-geologists with some interests in common with geologists.

Dave Dawdy says AIH has hydrologists who are neither geologists nor engineers, who would like registration for hydrologists, including geohydrologists. AIH tests applicants and issues certification for hydrologists.

Bob does not want to fragment registration; the purpose of registration is to protect the public. He gave an example of fragmentation: soil scientists want to be licensed to practice geology in the vadose zone (e.g. they think they should be the professionals required to investigate and clean up soil contamination in the vadose zone).

CCGO may want to influence the Board of Registration for Geologists and Geophysicists on the requirements for registration (e.g. perhaps require completion of coursework for degree in geology but not an actual degree).

Russ says CCGO may want to evaluate the rigor of various licensing and certification programs and issue a white paper for public use.

Betsy reported that the Southern California Section of AEG will want strong support from CCGO for maintaining registration of geologists, although they may be willing to consider minor modifications.

Dave Dawdy says AIH is very interested in CCGO's broad concept. They're also interested in developing tests for licensing of hydrologists.

Bob will contact University of Arizona Hydrology Department to ask what's included in their curriculum.

## VIII. REVIEW OF ACTION ITEMS

- Betsy will ask Dave Bieber to e-mail bylaws to everyone on contact list.
- Betsy will put Tridib Guha and Dan Day (and anyone else accidentally dropped) back on database.
- Betsy will resend CCGO Part I message to Russ Pfeil.
- Jim will contact Dave Bieber, Brian Lewis, and Ray Seiple to schedule next meeting in Sacramento area, probably in late June, and find a location.
- Bob Tepel will compile information from booklet on strategic planning and forward to Jim Jacobs and Russ Pfeil for committee's use.
- Jim and Russ will prepare CCGO Draft Strategic Plan.
- Betsy will contact Development Committee members and ask status of development plan.
- Betsy will determine how to contact Eugene Bass.
- Bob will contact University of Arizona Hydrology Department to ask what's included in their curriculum.

## IX. SCHEDULING OF NEXT MEETING

Meeting will be held Sunday, June 22, at Dave Bieber's office in the Sacramento area. Directions and an agenda will be sent in early June.

Minutes prepared by Betsy Mathieson 5/27/97.

Betsy Mathieson  
CCGO Communications Volunteer  
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## An Adventure in Paradise

I suppose it was bound to happen sooner or later. Not that I cared, mind you, but when my wife Laura came up with a one week vacation to Hawaii as a payoff for her sales contest, she requested that I expound on our geological adventures with our fellow travelers, Dave and Linda Waterman, in the NCGS newsletter. Not that any of us, including myself (the only pedigreed geologist in the group), are outstanding students of volcanology. But we all agreed that a trip to the "Big Island" will surely captivate even the most stubborn spouse who staunchly resists any attempts by their better part to get them to go out and look at "stones" with them.

The island of Hawaii is the largest of the eight major islands forming our 50th state, and is a volcanologist's playground. As we landed at Keapole Airport on the Kona coast, I thought we were going to touch down on a fresh lava flow! The runway and airport are literally bulldozed out of flows which ran down the slopes of Hualalei volcano less than 200 years ago. They are devoid of vegetation and look as if they were erupted yesterday. Our home base was on the northwestern Kohala coast. From there we toured the local sites, and set out on our most adventurous trip, which was to circumnavigate the island and stop at Hawaii National Park.

The Kona-Kohala coast, and the entire western windward side of the island, is dry and sparsely vegetated. A drive from Kohala eastward took us steadily higher in elevation, and into mists reminiscent of San Francisco on a foggy day. We passed the King Ranch, a 260,000 acre spread that is the largest in the U.S., and traversed the northern slope of Mauna Kea, the highest point in the islands (and the Pacific Ocean) at 13,796 feet. As we descended toward the eastern coast, the climate was humid and overcast, in stark contrast to the mostly clear and dry western side. The hillsides along the eastern coast are covered with grasses and dotted with trees similar to the hills in the Bay Area. Lush tropical vegetation, however, flourishes in the steep stream canyons cut into the coast by myriads of streams cascading to the ocean. We made a brief stop at Akaka Falls, a state park on the way to Hilo that gives visitors a breath-taking look at a 450 foot waterfall thundering off a lava cliff. The colorful plants in this jungle paradise are a sight to behold.

After a lunch stop in the port town of Hilo, we headed southwest to Volcano National Park. The weather remained humid and overcast as we entered the park. It has a small visitors center which shows hourly videos of the Kilauea eruptions, and a fairly complete selection of literature on the islands, both technical and tourist oriented. Across the street in a grove of trees is Volcano House, built right on the brink of Kilauea Caldera. The view from its observation deck at the crater rim is very impressive: a 3½ mile wide depression with numerous columns of steam and sulfurous fumes emanating from vents in the crater floor. This begins the 13 mile Crater Rim Drive, which took us to several vantage points around its perimeter. We gazed into the smaller Halemaumau crater on the southwest side of the caldera, observed the southwestern rift zone where it intersected the rim, crossed recent (c.a. 1974) lava flows, got drenched in steam spewing out of a small vent off the road, and followed the 20-mile long Chain of Craters Road down to the sea. Everywhere the lava was fresh and frozen into swirls and ripples. This road ends abruptly where flows from the now active eastern rift zone crossed it in 1990, putting it out of service. As dusk fell, we could see the eerie reddish glow of erupting lava reflecting off the low cloudcover 9 miles away.

Our return trip to Kohala that night was even more exciting--only because my wife was driving. Laura should be designing amusement park rides, not managing insurance agents. I really shouldn't criticize her navigational skills, however. You can tell the California tourists in Hawaii because they drive 90 miles an hour on these two-lane roads, while the natives creep along at a snail's pace. A few hours later we were safe in our rooms talking excitedly about the sites we saw that day.

Even a week is not enough time to get the full "Big Island" experience. This sparsely populated paradise is a welcome retreat for those who loath the pandemonium of Oahu and Waikiki. We sensed the native Hawaiians on this island are proud of their heritage, and they have gone out of their way to preserve some of the artifacts that remain from the Polynesian culture. The small towns dotting the coastline also give the visitor a feel for the natural lifestyles of their inhabitants. We suggest a visit to Hawaii for a stimulating and educational experience that will please the seasoned earth scientist, and still keep a less geologically inclined spouse and family happily occupied.

Aloha!

Dan Day

Since the joint venture was signed in April 1993, the project has encountered and overcome numerous hurdles:

- production has increased from 50,000 BOPD to a current 160,000 BOPD from 27 Soviet-era wells.
- the safety record has improved substantially.
- a creative and extensive marketing effort has eliminated the marketing bottleneck
- the recently signed Caspian Pipeline Consortium should allow continued growth of sales at favorable netback.
- the project has produced income for its partners.
- an aggressive field development program will be self-funded.

Chevron's confidence in the project was recently validated by the addition of two partners in the project: Mobil which purchased half of the Kazakhstan government interest for a net 25%, and Lukoil which purchased a net 5% interest from Chevron, which continues to hold a majority 45% interest.

These various aspects of Chevron's unique venture in Kazakhstan will be presented at this meeting.

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**Rick Caskey** is the CIS Coordinator for Chevron Overseas Petroleum, Inc. In that role he coordinates activities and facilitates communication among Chevron's business interests in the Former Soviet Union, and provides liaison between those activities and the management of Chevron Overseas.

Rick graduated from University of Utah with a BS in physics in 1970, and a Ph.D. in geophysics in 1974. Most of Rick's professional career has been with Chevron in the Bay Area. He began with Chevron as a geophysical interpreter in 1974 and explored areas of California and Alaska for Chevron USA. After a two year turn in Houston as seismic processing liaison for CUSA's Western Region, he returned to the Bay Area in 1980 for Development Geology work, and then assumed the job of Division Geophysicist of Alaska and West Coast Divisions. Joining Chevron Overseas in 1990, Rick was supervisor of Development Geophysics, and Project Manager for the Azerbaijan Project before assuming his present role.

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