Los Angeles 3D Survey
Leads to Deep Drilling
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Plains Exploration & Production Co.

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I was talking with Reinhard Suchsland, a past President of PSAAPG recently on the subject of the Pacific Section. He asked me “how has the year gone?” I blurted out – it’s been darn busy and I wish I could have spent more time on the subject. Reinhard being one of the “elder statesmen” of our organization took me by the hand (over the phone) and tried to talk some sense into me. You know, he said, if you want something done give it to someone who’s busy. We’ve all heard this before but he’s right. Almost to a person everyone has been maxed out by their non-PSAAPG duties, yet somehow we got a lot done. All the people that I have interacted with this year have been a pleasure and the work that was accomplished by them, outstanding. I am very satisfied with the year and hope that we have nudged the organization forward just a bit and helped to satisfy our membership. Of course, we dropped a few balls, but at least we saw where they fell and are comforted by the fact that there’s a new crop of overachievers ready to help.

Without question the greatest success for the Pacific Section during the past year was hosting the National Convention. It was a fantastic event, whose effects will be with us for years to come. A good sign for all of us hoping to retire some day was the large number of students on hand. A heartfelt thanks to Dalton Lockman, Kay Pitts and all those associated with the convention for working so hard to make this a success. Other notable accomplishments for this year’s PSAAPG executive committee include revamping both the Newsletter, and Website, creating a new Editor-in-Chief position, and realigning the Treasurer’s duties to make this position more tenable.

To all those people that helped move the year forward during board meetings, committee meetings, national AAPG and elsewhere, thank you. People like John Minch, Mike Ponek, Jon Kuespert, Melissa Kolb, Randy Stephenson, Karen Blake, Don Clarke, John Armentrout, Mel Erskine, Mark Yarlot, Adam Mahan, Muriel Norton, and Sandra Szymanski. A final special thanks to all those “old hands” out there who have been helping Presidents over the years. These include Larry Knauer, Bob Lindblom, Kay Pitts, Joan Barminski, Mark Wilson, Tom Hopps and Steve Sanford. These folks helped in a myriad of ways behind the scenes to make sure I was doing what was needed.

At our August meeting of the PSAAPG executive committee I’ll be handing the gavel on to Jon Kuespert, who will succeed me as section President for 2007-2008. As I wish him and the incoming executive committee all my best for a smooth and successful 2007-2008, I will be nice to think about the past year and watch the new one unfold.

Thanks
Mike
Message from the Editor
Karen Blake

We revamped the newsletter and website - with some more work to go. The Editor position is now, thanks to the membership, an elected position on the Executive Committee.

What’s next?

The 2007-2008 year will need an appointed Editor when the new board convenes. If you have an interest, this is the time to make contact with a Board member. I will work with the new Editor to ensure a smooth transition and continue to improve the content on the website.

What a year!

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kathysmith@arrival.net
### Pacific Section AAPG

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### Election Results

- Foundation Trustee: Mark Wilson, Consultant, Won, Ran unopposed
- PSAAPG Constitution and Bylaws: Create the office of Editor in Chief as an elected position with a 2 year term - Passed
- We had 161 ballots returned out of about 450 mailed out. A 36% return is very good.
San Joaquin Geological Society
Society of Exploration Geophysicists

Annual Fall Classic Golf Scramble and Barbecue
Friday, September 7, 2007

Golf Tournament at Kern River Golf Course (Near Lake Ming)

Family BBQ and Raffle at the Kern County Museum
Onsite BBQ Featuring Tri Tip and all the Fixin’s

- Happy Hour at 5:00 PM
- Dinner at 6:00 PM
- Adults $18.00
- Students $10.00
- Children $5.00

Please RSVP by Tuesday, September 4, 4:00 PM (For BBQ) — Help the Planners
(BBQ is NOT prepaid, you may pay at the event)

BBQ RSVP & Golf Questions: Curtis Conway (curtisconway@arrival.net), Brian Rangel
(PacSels@arrival.net) or Katy Smith (KathySmith@arrival.net) Phone: (661) 322-1171

--- Cut on Line and Mail in Golf Reservation ---

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Contact email: Contact Phone:

Return Form and Checks to: Curtis Conway c/o SJGS, P.O. Box 1056, Bakersfield, CA 93302
Los Angeles 3D Survey Leads to Deep Drilling

DALTON LOCKMAN
Plains Exploration & Production Co.
Los Angeles, USA

Most 3D seismic surveys are designed and shot with little concern for movie studio lots, 10-lane freeways, or privacy fences. But when Plains Exploration & Production Co. (PXP) decided to acquire seismic data over the 81-year-old Inglewood Field—the first onshore 3D survey ever conducted in the Los Angeles Basin—the company knew it would be anything but a typical seismic shoot. The field is located in the Baldwin Hills area in the heart of one of the nation’s largest and most populous metropolitan areas (Figure 1). Oil production was there long before the buildings, streetlights and asphalt that have since crowded in and around the field. It is now a few square miles of pump jacks and stock tanks surrounded by urban sprawl. Downtown Los Angeles is only six miles to the east, and Los Angeles International Airport is a short drive south.

LA is the place of movie stars and limousines, not seismic crews and vibrator trucks. But when PXP evaluated ways to add value to its 100-percent-owned Inglewood Field, 3D seismic emerged at the top of the list. So in late 2002, the company began planning a 21.3 square-mile 3D survey that stretched over parts of three municipalities, Los Angeles, Inglewood and Culver City, as well as portions of unincorporated Los Angeles County. In addition, the survey area fell inside the jurisdiction of several state and local regulatory agencies. Within the survey area was a major motion picture studio, a college, two large cemeteries, interstate freeways 10 and 405, condominium complexes, a maze of traffic-congested streets, and thousands of residences and businesses.

Although the Inglewood 3D survey field operation was a major undertaking that was not without numerous technical and cultural challenges, the end results have been very favorable. After acquiring and processing the 3D data, PXP initiated a drilling program in 2004 targeting largely untested deeper Miocene-aged turbidite sands below the shallow main productive intervals. The first of those wells came on line in the first quarter of 2004 averaging an initial daily rate of 800 barrels of oil equivalent. Since then, two dozen additional deep wells have been drilled with a 100 percent success rate, and placed on production making a combined 2500-3000 barrels of oil a day.

Inglewood Field history. The 1200-acre Inglewood Field was discovered in 1924 by Standard Oil of California (Chevron). The primary development focus was on the Vickers and Rindge zones at vertical depths of less than 4000 ft. These distal turbidite reservoirs are water and gravity drainage driven, with crude oil typically ranging between 14 and 29 degrees API gravity. Waterflooding had been initiated in 1954 targeting the Vickers and Rindge zones. At the time of the 3D survey, 1400 wells had been drilled in the field, with 338
active producing wells and 142 injectors. Before kicking off the deep drilling program, the field had produced 350 million barrels of oil cumulative, with 90 percent coming from the Vickers and Rindge.

Stocker Resources, a predecessor company to PXP, acquired the field in 1990. Oil and gas production had been on a gradual decline throughout the 1980s, but production rates were improved after Stocker assumed ownership and applied its ingenuity and expertise on production engineering, facilities issues, and hydrocarbon saturation mapping. Subsequent new well drilling indicated that geologic structure was a dominant factor in accurately identifying potential areas in the reservoir with untapped reserves.

In early 2001, PXP undertook a significant effort to resolve the field’s structural complexity, including extensive reservoir characterization and 3D geologic modeling to analyze structure and stratigraphy, fault geometries, sealing mechanisms, Vickers/Rindge waterflood conformance, and remaining hydrocarbon potential. Despite the field’s age, it was apparent that it held considerable oil potential. In fact, the 350 million barrels of oil the property had produced were estimated to be only 35 percent of the original oil in place.

However, 3D seismic was needed to delineate prospective areas within the complex geology where additional hydrocarbons could be developed. Although a few 2D lines had been shot in the field, 3D data had never been acquired in the LA Basin, except for an offshore survey near the THUMS islands project in Long Beach Harbor. As originally conceived, the Inglewood Field survey was designed to image faulting and compartmentalization in the shallow Vickers and Rindge zones, but the design was ultimately revised to include imaging underlying zones at vertical depths to 10,000 ft.

Romance in the deep. The field contains more than 5000 ft of stacked pay zones in medium- to fine-grained sandstones, siltstones and shales. The geologic structure is a plunging anticline with complex faulting, with most faults acting

![Figure 2. Inglewood Field stratigraphic column](image)

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as seals, creating petroleum traps. Figure 2 shows a stratigraphic column of the field. For depth reference, the bottom of the Rindge is at ±4000 ft, with the bottom of the Sentous at ±10,000 ft.

In the late 1930s and early 1940s, Tidewater Oil (Texaco) successfully drilled 16 deep wells targeting the Sentous zone on a 35-acre lease it owned within the Inglewood Field area. In the 1960s Standard Oil exploited the Moynier zone and conducted a pilot water flood within the Moynier. Outside of that, however, little effort had been invested historically in testing structures below 6000 ft, as indicated by Figure 3, a 3D rendering of the locations of well bores drilled prior to 2003.

Obviously, drilling over the years had concentrated on the shallow Vickers (1500-1700 ft thick) and Rindge (900-1000 ft thick) reservoirs, but the deep zones provided the romance for the 3D acquisition project. PXP hoped to use the 3D data to not only increase Vickers/Rindge production, but also add reserves and a field development component from the deeper intervals. The green layer in Figure 3, representing the Sentous (200-1000 ft thick), is the primary target for the current deep drilling program.

The first step was conducting a 3D feasibility study, including shooting a new 2D test line in the fall of 2002. The objectives were to determine whether 3D would even work from a geoscientific perspective considering all the topographic factors and subsurface complexities; assess the relative cost-versus-benefit value of acquiring 3D data over the entire field; evaluate potential data quality, surface access and permitting problems; and test acquisition parameters to assist in planning and designing the full-field 3D survey.

Importantly, the feasibility study also provided a test case for resolving access and permitting issues-major concerns given the survey’s location and number of governmental and regulatory agencies involved. Fortunately, the results not only indicated encouraging results for 3D data acquisition across the entire stratigraphic section—including the deep Moynier-Sentous zones—but also revealed that permits could be acquired within a reasonable time frame with planning and diligence.

So in late 2002, Trace Energy Services was contracted to acquire the 3D data. The survey design work was started immediately, with the permit process beginning in November and continuing through March 2003. The data were acquired in April and May 2003.
When the feasibility study was initially proposed, the idea was to design the survey to obtain high-quality data in the shallow sections to assist in optimizing waterflooding, but PXP quickly realized the greatest value was in imaging both shallow and deep intervals to fully explore the field's remaining potential. Consequently, the project was redesigned as a "hybrid" 3D survey using different offset geometries to accurately image from the top of the Vickers all the way to the bottom of the Sentous. (End Part 1)
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When: The competitive oral sale will begin at 9 a.m. on August 09, 2007.

Where: The sale is held at the Bureau of Land Management, Colorado State Office, 2850 Youngfield Street, Lakewood, Colorado 80215. Parking is available.

Wyoming State Office
5353 Yellowstone Road
Cheyenne, Wyoming 82009
P.O. Box 1828
Cheyenne, Wyoming 82003-1828
http://www.wy.blm.gov

When: The competitive sale will begin at 8:00 a.m. on Tuesday, August 7, 2007. The sale room and receiving room will open one hour earlier so you can register and get your bidding number.

Where: We will hold the sale at the Holiday Inn, Convention Center, 204 West Fox Farm Road (I-80 and US85), Cheyenne, Wyoming.

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Alaska Geological Society
www.alaskageology.org

Luncheon meetings are held monthly September through May, usually on the third Thursday of the month, at the Anchorage Hilton (500 W. 3rd Avenue) from 11:30 a.m. to 1:00 p.m. The cost is $17 (members with reservations) or $20 (members without reservations and nonmembers). For reservations, call the AGS reservation voice mail at 907-258-9059 or contact David Hite at hiteconsult@acsalaska.net by noon on Monday before the meeting.

2007 - 2008 Officers

TBA

Coast Geological Society
www.coastgeologicalsociety.org

Dinner meetings are held monthly September through June, usually on the third Tuesday of the month, at the Veterans of Foreign Wars Hall at 3801 Market Street in Ventura. Social hour starts at 6:00 p.m., dinner is served at 7:00 p.m., and the talk starts at 8:00 p.m. The cost of dinner is $15 (with reservations), $20 (without reservations), or $8 (students and K-12 teachers); the talk is free. For reservations, contact Dave Brown at 805.653.7975 or make reservations online at www.coastgeologicalsociety.org. Reservations should be made by 4:00 p.m. on Friday before the meeting.

2007 - 2008 Officers

TBA

Los Angeles Basin Geological Society
www.labgs.org

Luncheon meetings are held monthly September through November and January through June, usually on the third or fourth Thursday of the month, in the Monarch Room at The Grande at Willow Street Conference Centre (4101 E. Willow Street) in Long Beach. Lunch is served at 11:30 a.m., and the talk starts at 12:15 p.m. The cost is $20 (with reservations), $25 (without reservations), or $5 (students). Reservations can be made online at www.labgs.org or by contacting Ivan Aburto at iaburto@breitburn.com or 213-225-5900 ext. 234. Reservations should be made by Tuesday before the meeting.

2007 - 2008 Officers

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### Northern California Geological Society

**Contact:** David Bero

dbsquare@earthlink.net

Evening meetings are held monthly September through May, usually on the last Wednesday of the month, at the Masonic Center (9 Altarinda Road) in Orinda. Social hour starts at 6:30 p.m., and the talk starts at 7:00 p.m. (no dinner). The cost is $5. For reservations, contact Dan Day at 925-294-7530 (leave your name on the voice recorder any time before the meeting).

#### 2007 - 2008 Officers

TBA

### Northwest Energy Association

**Contact:** James Jackson

503-771-3887
digellar@msn.com

Luncheon meetings are held monthly September through May, usually on the second Friday of the month, at the Multnomah Athletic Club (1849 SW. Salmon Street) in Portland. Meeting time is at 7:30 - 9:00 am. The cost is $15. For information or reservations, contact Shelley Thomas at 503-848-2947 or Treck Cardwell at 503-226-4211 ext. 4681.

#### 2007 - 2008 Officers

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### Sacramento Petroleum Association

**Contact:** Rick Blake

925-422-9010

P. O. Box 571
Sacramento, CA 95812-0571

Luncheon meetings are held monthly January through November, on the third Wednesday of the month at the Hungry Hunter Restaurant (450 Berceu Drive) in Sacramento. The meetings start at noon. The cost is $16. For information or reservations, contact Pam Ceccarelli at 916-322-1110 or pceccare@consrv.ca.gov.

#### 2007 - 2008 Officers

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### San Joaquin Geological Society

**Contact:** Rob Negrini

negrini@csuch.edu

P. O. Box 1056
Bakersfield, CA 93302

Dinner meetings are held monthly October through June, usually on the second Tuesday of the month, at the American Legion Hall (2020 H Street) in Bakersfield. The icebreaker starts at 6:00 p.m., dinner is served at 7:00 p.m., and the talk starts at 8:00 p.m. The cost of dinner is $20 (with reservations) or $23 (without reservations); the talk is free. For reservations, contact Tracey Fleming-Reese at Tracey_Fleming-Reese@oxy.com or phone her at 661.763.6523.

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SJGS Sponsored Field Trip

La Brea Tar Pits

On February 9, 2007, the entire 3rd of the Cesar Chavez Science Magnet Elementary School went on a field trip to the La Brea Tar Pits. The trip was sponsored by a grant from the San Joaquin Geological Society. Normally there are no funds for 3rd grade field trips.

Rob Negrini, the Past-President of the SJGS, attended the trip and was impressed with how well the students behaved and, also, with how well prepared they were for the trip. They had just finished their first Earth Science unit and it showed. They were very attentive and had great questions for the well trained docents. The students will follow up the trip with a unit on evolution, so it was a well timed adventure. Money well spent by the SJGS.

NCGS DINNER MEETING

The adventures of Clarence King
(First USGS Director)
and his survey of the 40th parallel

Wednesday May 30, 2007
Speaker: Dr. James G. Moore, U.S. Geological Survey, Menlo Park (Retired)
6:00 pm at Orinda Masonic Center
(Reservations are required by May 25, 2007)
We are sorry but we will not be able to accommodate “Walk-Ins”

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