Pacific Petroleum Geology

NEWSLETTER

Pacific Section • American Association of Petroleum Geologists

November & December 2015

Triangle Zones, Traps, New Officers, and Goodbye to 2015.

2015-2016 Officers

Staff

COVER PHOTO:
Northeast dipping strata of the Monterey Formation at Chico Martinez Creek, northern Temblor Range, Kern County. East flank of the northern Temblor Range is dominated by a steep northeast regional dip that 2D seismic lines shows is underlain by southwest dipping strata at depth. Opposing dips are interpreted to be separated by the southwest dipping Temblor Range thrust.
Photo courtesy of Thom Davis.

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- Images (graphics, photos, and scans) must be at least 300 dpi resolution. Text should be at least 600 dpi.
- Scanned photos, illustrations (line art) or logos should preferably be submitted as a .tif, .gif, or .bmp; .jpeg is OK.

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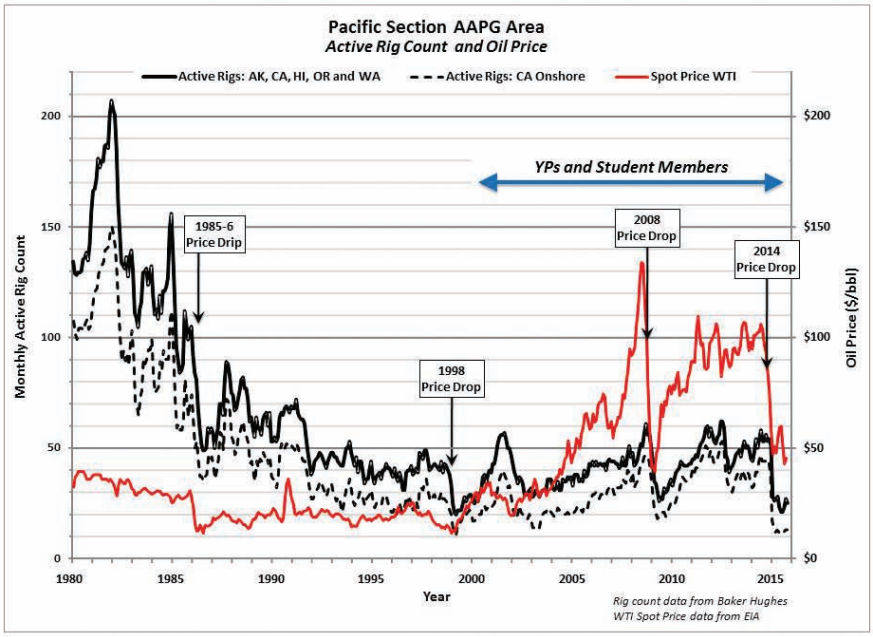
Dear Pacific Section AAPG Members,

I am writing this month's newsletter as I fly back to California from Houston where I attended the 2015 AAPG Business Meeting. Like most of you, I am always shocked by the vast number of airline travelers these days, and the fact that planes are always full to capacity. We all have become accustomed to the ease and efficiency of airline travel as evidenced by the fact that the number of passengers worldwide has been increasing at 6% per year over the last decade based on data collected by the World Bank. Many have pointed out that the size of the earth has been effectively reduced as a result, and I doubt that we will ever want to give up this ability to travel nationally or internationally for pleasure or business. Fossil fuels make all this possible. The airline industry continues to make jet engines more efficient and improve scheduling to reduce overall costs and number of flights, but replacing aviation fuel with renewables will not happen in the foreseeable future. I applaud the airline industry for their continued focus on efficiency, even if I may not fit comfortably, or really even at all, in the coach section of many aircraft in operation today. Still, I would rather sit uncomfortably for a few hours instead of any of the alternatives. Thank goodness for fossil fuels.

Many PSAAPG members have attended AAPG Leadership Days in the past, and our section has always had good attendance at this annual gathering. The current low price environment, however, has had an impact across our entire industry, including professional organizations. AAPG Leadership changed the structure of this annual meeting to be more cost-effective and focused. The AAPG Business Meeting will not replace the AAPG Leadership Days, but will be an alternative meeting format. AAPG is currently discussing whether Leadership Days will occur every other year or every third year. Needless to say, the Business Meeting was an effective and efficient format. Even with this smaller meeting PSAAPG had a strong presence. Attendees, aside from me, included Tony Reid, Pacific Section Advisory Council representative, Jonathan Allen, YP Committee Co-Chair, Anne Draucker, President-Elect, Energy Minerals Division, and Dan Schwartz. Dan has been chosen as a candidate for AAPG Vice President, Sections. The election will be in 2016, and the successful candidate will serve a two-year term beginning in 2016. There are many other PSAAPG members taking an active role in AAPG at the national and international level. This is how a healthy professional organization based on volunteerism should work, and I thank all of you.

Some of the key issues discussed at the 2015 AAPG Business Meeting included transitioning students to full membership, maintaining and growing our membership pipeline, streamlining the governance of our society, maintaining and potentially growing the benefits offered to members and affiliated societies, and the relationship of Sections and Regions to the larger AAPG organization. The current low price environment is effecting the entire industry, including AAPG. These issues take on greater importance not only for AAPG but also for our own Section as any potential price recovery moves further into the future. Expect to see more discussion on these topics in the future.

(Continued on next page)



In the last newsletter I discussed the recent oil price collapse and the impact on drilling activity in the hydrocarbon provinces that comprise Pacific Section AAPG. I have updated the chart I presented then, and have included it here. I will include this in my future letters in order to track price and drilling activity in our Section. In the last two months, the drilling activity has remained steady but at a very low level. Oil price, however, has continued to slide. The average monthly WTI spot price remained at or above $50/bbl through July, but in the last two months it has slipped into the mid $40s/bbl. The general consensus is that this downturn will last longer than originally expected, making it similar to the mid 1980's price collapse as opposed to the sharp price drop in 2008. The rig rate responded quickly to the price drop, but companies were reluctant to take immediate action with respect to employment levels. That has changed. We have seen the impact across our industry, and companies continue to announce planned layoffs and cost reduction programs. Employment of petroleum geoscientists in the Pacific Section has been impacted as well, and there may be further reductions. These are hard times for everyone, but particularly difficult for those who are unfamiliar or have not experienced the boom and bust cycles for which our industry is famous.

The last 15 years, up until the price collapse in midyear 2014, have been a good time for our industry and for geoscience employment. It is precisely these last 15 years that comprise the experience base of our YPs and Student members. Many of our members have been through times like these, and have survived and thrived. To our YPs and Student members, I ask that you reach out to these individuals for support, guidance and mentorship. They learned to cope with the vicissitudes of this industry and may provide you with invaluable perspective and insight. To our more experienced members, those that have survived these cycles, I ask that you reach out to our Student members and YPs to help them cope with the uncertainty and potential stress that comes with these downturns. There is a wealth of talent and potential in these younger members, and they provide the future of our profession and society.

It has been a difficult year for our industry, and we can only hope things will improve in 2016. I wish you all a wonderful holiday season, and may you enjoy it with family and friends. See you in 2016!

Thank you.
Kurt Neher
PSAAPG President, 2015-2016

Philip L. Ryall

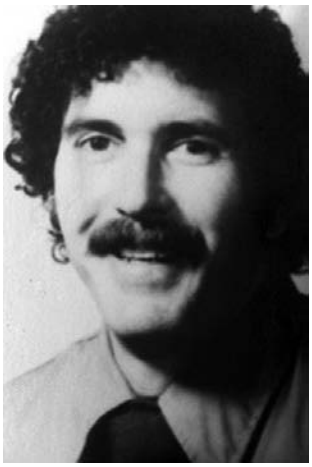
Phil Ryall was born in Yakima Washington on July 7th 1934 to Albert Lloyd Ryall and Mary Elizabeth Ryall (Newton). He spent his youth there and in Harlingen Texas hunting and fishing. In 1949 the family moved to Fresno, California where he attended Roosevelt High School.

Phil began college at Fresno State in 1952. The following year he volunteered for service in the U.S. Army. He was sent to Korea where he fought to free the Korean people. When the war ended he reenrolled in what was now Cal State University Fresno. While he attended school, he worked on trail crews in the High Sierras which was the source of many good memories.

Graduating as a Petroleum Geologist in 1959 he hired on with Core Lab briefly then on to Shell Oil Co. In 1972 he began consulting and drilling prospects around California. In 1980 he started Stockdale Energy Co. which concentrated mostly on drilling natural gas prospects in Northern California. In 1987 with the help of an investor he started Stockdale Oil and Gas which he built into a successful company. Recently he was helping to grow another successful local company E & B Resources.

Among his many hobbies were fishing for trout in the Sierras, especially Huntington Lake, duck hunting anywhere, hiking and his beloved tennis as part of the dawn patrol.

During his life he served many causes and professional organizations, including the API, CIPA, AAPG, SJGS, as well as serving as a Boy Scout scoutmaster building memories and making friends that lasted to the end of his life. Phil never missed an SJGS monthly dinner and was always eagerly involved in discussions before and after talks.



He is survived by Marilyn R. Sproule, the mother of his 3 children; Son Bruce, daughters Anne (Rick) Henry and Susan Ryall. He was proud grandfather to 8 and great-grandfather to 6.

A well respected, honest, and fun-loving man. He will be missed by many. Phil passed away peacefully Thursday the 20th of August after a very short illness.

A "Celebration of Life" for Phil was held on Saturday the 12th of September at the Bakersfield Racquet Club.

Harold Burk Myers

1926-2015

On September 24, 2015, "Hal" passed away peacefully of natural causes at the age of 88 in Ventura, CA, with family at his side.

He was born on December 14, 1926 in Santa Monica, California to Harold Sellers Myers and Marie Wilhelmina Burk.

He graduated from Laguna Beach High School in 1944 and earned his Bachelor of Science Degree in Geology from the University of Nebraska.

He was accepted into the Masonic Lodge as a young man and maintained membership as a Freemason throughout his life, affiliated with Saddleback Laguna Lodge #672.

His career as a petroleum field geologist took him to many places, including the Philippines, the North Slope of Alaska and his favorite, the off-shore drilling rig, CUSS 1.

He was an active member of the Coast Geological Society and the American Association of Petroleum Geologists.

He participated in the Ventura community through the Riverview HOA and Ventura County Science Fair.

A memorial at a yet determined date is to be held at Scott's Flat Lake, California, his favorite place to fish.

Hal is survived by his wife, Rosalie, step-son, step-daughter, son in law and two grandchildren.

Fred Kasline

Fred Kasline passed away peacefully in his sleep on October 4, 2015. Preceded in death by his loving wife Faris (Miller) Kasline earlier this year. Fred's gentle soul, caring heart, trusted words of wisdom and his sharp sense of humor will be missed by his loving family and friends. Fred was born in Spokane, WA. He graduated from Washington State University and continued to be a faithful supporter of his Fraternity, Alpha Tau Omega.

He worked for the State of California for 37 years retiring as the Supervisor of the Division of Oil and Gas.** Fred enjoyed reading and the daily Cryptoquotes and Word Jumbles . Also preceded in death by his parents Theodore and Marie (Alpers) Kasline, his siblings, Gertrude Gregory, Marie Smith, Clarence Kasline, daughter Sylvia Riemann and his first wife Frances (Dwyer) Kasline. Remembering him with love and admiration are his son, Robert Kasline (Jacquie), daughters Linda Grant (Greg) and Ann Donnell. Grandchildren Mark Riemann (Mollie), David Riemann (Dana), Paula Lyons (Tom), Elizabeth Sergi (Ben), Mark Kasline (Tracy), Michael Kasline, Tyler Grant, Marshal Grant, Bryson Grant and Sydney Donnell. Fred was also blessed with 12 great-grandchildren and 1 great-great-grandchild. We love you Dad, Daddy, Grandpa, Uncle Fred and Dear Friend. Memorial service will be held on Monday October 19th at Mt. Vernon 8201 Greenback Lane, Fair Oaks CA. 95628 at 10AM. In lieu of flowers or donations we would like to offer to you Fred's advice on living a long and happy life "Eat breakfast every morning and all things in moderation".

**He was the 1st Deputy Supervisor in Dist. 6 -

Published in *The Sacramento Bee* on Oct. 14, 2015

Dear friends and colleagues,

2015 is all but a couple of months from over! I wish you all a very happy end of year.

A rollercoaster year does not begin to describe the challenges we have faced as an industry this past year. We, as a community, have really stepped up to the challenge and made hay from a bad situation.

Our local Oil and Gas companies, Aera Energy, California Resources Corporation and Chevron Corporation continue to sponsor events, help our students and provide for our community. We thank them for their continued support. Employee and society volunteers have had to double efforts to keep all of our programs running successfully, and they have done a great job at it.

Two recent successful events highlight the dedication of our geological community: the annual SJGS golf tournament and the Northridge Student Expo.

The SJGS golf tournament was held on Friday, 25th September, 2015 at the Sundale Golf Course. This was the 9th year PacSeis hosted the event. This was a tough year, yet Kathy Smith and all of her volunteers managed to pull off an immensely successful occasion. Twenty teams played in the scramble, and SJGS would like to thank all the volunteers and local companies for all their support.

The second event was the eighth annual PSAAPG West Coast Student Expo at California State University, Northridge on 2 & 3 October, 2015. Three companies, Aera Energy, California Resources Corporation and Chevron Corporation, together with PSAAPG, sponsored the event. Please read the full article on page 21.

Happy holidays,
Vaughn

General Announcement:

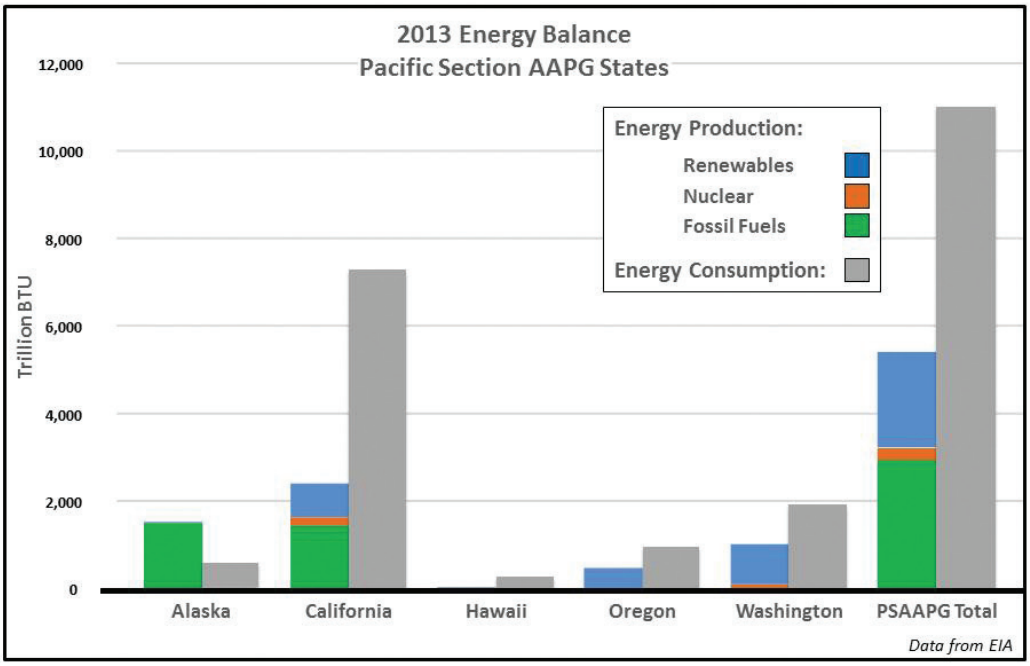
Bill Bartling, 61, of Bakersfield, has been appointed area district deputy in the Division of Oil, Gas and Geothermal Resources at the California Department of Conservation.

Bartling has been president at Aspectus Energy Consulting since 2015, where he was president from 2005 to 2008. He was general manager at OptaSense Borehole Imaging Services from 2014 to 2015, president and chief executive officer at SR2020 Inc. from 2008 to 2014 and founder and chief technology officer at Ambrose Oil and Gas from 2007 to 2010. Bartling was senior director of market strategy at Silicon Graphics Inc. from 2000 to 2005, manager of technical computing at the Occidental Petroleum Corporation from 1998 to 2000 and senior vice president of software engineering at CogniSeis Development from 1996 to 1998. He held several positions at the Chevron Corporation from 1981 to 1996, including supervisor for exploration, supervisor for production and research, geologist and geophysicist.

Bartling earned a Master of Science degree in geology from San Diego State University.

Did you know...

Energy consumption in the states that comprise the Pacific Section of AAPG is more than double the total energy produced by those same states. Surprisingly, in terms of per capita energy consumption, California, due to its large population and nice weather, ranks near the bottom of all states at number 48, just above Hawaii. By itself however, the state of California comprises more than half of the consumption of the Pacific Section states. Alaska is the only state in PSAAPG that produces excess energy, but for the last decade its oil production has been in a steady decline of about 6% per year.



President-Elect

Robert Horton

CSUB, Professor

PRIOR SERVICE

- PSAAPG, Convention Technical Session Chair, 1991
- AAPG House of Delegates, 1991-1997
- AAPG HoD Alternate Delegate, 1997-2003, 2012-2015
- AAPG HoD Rules Committee, 1994-1996
- AAPG HoD Credentials Committee, 1996
- AAPG Distinguished Lecturer Committee, 2000-2003
- AAPG Committee for Preservation of Core Samples 1996-2001
- AAPG Annual Meeting, Topical Session Convener, 1996, 2001
- SJGS President, VP, Sec, range from 1986-1991
- SEPM Pacific Section, Vice President, 1994-95
- California Well Sample Repository, Director, 1995-present
- AAPG, A. I. Levorsen Award, 1993
- AAPG Pacific Section, Outstanding Educator Award, 1997
- 21 Publications and 63 Convention Presentations

Vice President

Laura Merrill Bazeley

WZI Inc.

Senior Technical Advisor

PRIOR SERVICE

- Secretary and President of the San Joaquin Geological Society, Secretary of the Pacific Section AAPG, Newsletter Editor from 1988 to 1991
- Co-chair the DEG session at the PSAAPG Annual convention. 2014 & 2015
- She has authored and co-authored a number of technical presentations for AAPG, PSAAPG and SJGS

Secretary

Shane Peterson

Chevron E&P, Geologist

PRIOR SERVICE

- Committee Member Annual Pacific Section Student Chapter Leadership summit 2014
- Committee Member Annual PSAAPG Convention 2014
- SDSU Student Chapter -Member at large 2010-2012

Treasurer-Elect

Lisa A. Alpert

Aera Energy LLC

Exploration Geophysicist

PRIOR SERVICE

- Member of AAPG, SEG, AGU, GSA

A Q&A with Dan Schwartz, standing for AAPG Vice President Sections

Tell us about yourself:

Hi, I'd like to introduce myself, I'm Dan Schwartz, a geologist by training and practice, and currently Manager of Strategic Business Development and Innovation for Aera Energy LLC, in California.

I grew up in Southern California, and attended Oregon State University for a couple of years before transferring to The University of California, Berkeley, where I received my Bachelor's Degree in Geology in 1974. I then went to The University of Texas at Dallas, and received my PhD in Geology in 1978. That same year, I joined Shell at the Bellaire Research Center and started a 35+ year career with Shell.

I had the opportunity to work a very wide range of projects and held a variety of positions at Shell. I did research on siliceous and clastic reservoirs, managed research and development/production teams in Texas, California and Aberdeen working onshore US fields as well as offshore Texas & Louisiana, California, Alaska, Africa, Brazil, and the North Sea. I also managed exploration efforts for deep water Morocco, directed business development and finance efforts internationally, and achieved the position of Chief Geologist for Shell Oil and Chief PE (Chief of Chiefs) for Shell International – Houston. In 2009 I was seconded from Shell to Aera Energy to help with growing Aera's portfolio. I lead the Monterey Shale play team and became Exploration and Appraisal Manager in 2012. In 2014, I retired from Shell and joined Aera full time, assuming my current role.

When and how did you decide to become a geologist? And why?

My path to becoming a geologist was laid early in my life. My brother and I used to hike into the Santa Monica Mountains near our home and the family travelled to national parks and to go see my eldest brother, a career officer in the submarine service. I was an avid rock collector and weighed down many a suitcase with "samples" from beaches, rivers, volcanos, canyon walls and road cuts. My parents were in the furniture business and in the 60's rock and mineral specimens were the hot item for home décor. I hi-graded my found collection with purchased samples and discovered a real interest in how they formed and what they were good for. After High School, I wanted to be an oceanographer and chose geology as the path to get there. At Berkeley I had a course from Fred Berry that really pulled all the pieces together for me. We had to combine stratigraphy and structure, surface and subsurface information, and sedimentary petrology to figure out where to drill a well to find hydrocarbons on a shoestring budget. I was hooked….I also got the right answer to the problem.

What has been your experience with AAPG?

I have been associated with AAPG for a long time, both technically and by service at all geographic levels. Throughout my career I have given over 20 presentations, posters, workshops and field trips at AAPG and SEPM meetings. In 2016 I will be honored with the A.I. Levorsen award for my presentation on the Monterey at the PSAAPG meeting in Oxnard.

On the service side, I established and personally fund an Opportunity Scholarship for geology students at UTD; I was general chair for a PS-AAPG meeting in 1991; was a member of the technical advisory committee and am a member of the education committee. I was PS-AAPG president, and continue to be deeply involved, along with my wife Cynthia Huggins, in the PS-AAPG scholarship fund; supporting and attending the West Coast Student Expos recruiting program, and hosting and participating in the Pacific Section IBA competition.

What is the main issue facing the profession today?

The big challenge is the convergence of low oil prices, company cost cutting, and the changing demographics of our profession. Companies are cutting back significantly, via severance packages to their 55+ employees. This has accelerated the departure of a great deal of knowledge from the companies and forced younger staff to assume increasingly responsible positions. We also find that training and research departments in companies have been significantly trimmed, which is causing a gap in the ability to actually transfer critical knowledge to these less experienced employees. In a time when regulation and community involvement in our business is getting more intense, there is a growing challenge to ensure that we can deliver technically sound decisions across the industry.

How can you help AAPG be a better association?

I believe we are in a position to add real value to the profession. I can see how critical it is for us to provide training and real skill development to younger staff that need timely, high quality classroom training, workshops, and field courses. I also see how critical it is for us to provide up to date and relevant publications and services (GTWs, forums, certifications, etc) to the members. I am concerned that we are adding many new ways to deliver content, but there is limited guidance on timeliness and applicability. I hope I can provide clarity of purpose as VP Sections. I know I bring a willingness to listen and discuss, and a desire to act and test new concepts (like joint section meetings), but also have the guts to say when something has run its course and should be stopped.

Why did you agree to stand for office?

I have benefited greatly from my nearly 40 year association with AAPG. I am actively engaged at the national and section level in many initiatives to share best practices and try to get joint activities going across societies and between sections. I truly care about the new generation of geologists coming into the industry. I want to help AAPG position itself to be the indispensable resource for petroleum geologists of the 21st Century. I also want to make sure that those geoscientists are willing and able to help AAPG succeed.

Structural wedge with a hydrocarbon prospective triangle zone, west-side of the San Joaquin Basin (WS), California: implications for untested large traps

Thom Davis, Geologist, Ventura, CA

This article presents a structural model and conventional play concept for a portion of the west-side of the San Joaquin basin (WS) that, if valid, adds significantly to its hydrocarbon potential by providing additional area containing untested large traps with known reservoir and source rock units. The WS of the San Joaquin basin, California is a folded and faulted belt that has produced and proven reserves totaling 11.7 BBO as of 2005.[1] The WS is located between the San Andreas fault and the relatively undeformed central trough of the San Joaquin basin and includes the Temblor Range and the southern Diablo Range (Fig. 1). Despite the great number of exploration wells along the WS the potential for additional conventional oil discoveries is likely due to the rich source rock units such as the Monterey, Tumey, and Kreyenhagen shale units, and the structural and stratigraphic complexity of the area that offer a variety of trapping situations assisted by an active and very prolific petroleum system.[2] Structural complexity and other seismic acquisition issues prevent a clear image of much of the WS, but ironically the poor imaging can be appreciated as an exploratory positive that has allowed traps, even large ones, to remain untested. The conventional structural play in the San Joaquin, despite its years of success, has had less recent interest due to the geologic perception that little prospective "running room" remains to hold moderate to large traps, and the difficulty of mapping such prospects, both dependent on using a realistic structural model to overcome the poor seismic imaging. Structural studies show a fold and thrust belt structural style involving a northeast-directed wedge model best explains the late Cenozoic structural geometry and kinematic evolution of the WS than previous models. [3 4 5]

Much of the recent exploration and renewed interest in the San Joaquin basin, and in other oil basins of California, has focused on the unconventional shale plays especially in the Monterey Formation and the results to date have been disappointing; and recent drilling in the deeper portions of the San Joaquin basin where the source units are thermally mature has not overcome the disappointing results.[6 7 8] It is fair to say that significant questions remain about the commercial viability of the Monterey Formation as a resource play, and probably the other shale units as well. The unconventional shale play's lack of success does not diminish the importance of these rich source rocks units and their prolific petroleum systems for other play types, and shows that traps containing migrated hydrocarbons (the conventional play) have been the most successful play for the basin, and for now provide the lowest-risk and least expensive untested prospects. One such newer conventional play is the result of overthrusting associated with the late Cenozoic age fold and thrust structural style common to many of California's oil basins. Overthrusting increases the prospective "running room" by repeating proven reservoir and source rock units, increases source rock burial and hydrocarbon maturity, and increases the number of untested subthrust anticlines and other concealed structural traps available to capture the migrated hydrocarbons.[9 10]

Wedge model interpretation of the WS of the San Joaquin basin

Geologists exploring in highly deformed areas such as the WS of the San Joaquin basin commonly rely on structural models to map, assist poor seismic reflection imaging, and develop prospects. The convergent wrench fault model has been the dominate structural model for the WS for the last half century to explain the large oil trapping folds and their relationship to the nearby San Andreas transform fault. [11 12] Convergent wrench faulting is characterized by distinctive structural elements such as oblique-slip, reverse-faults that steepen with depth into a master strike-slip fault, positive flower structures, and the footwall area available for exploration is limited (Fig. 2A). A more realistic and data-based model of the structural style of the WS, and other areas of southern and central California with late Cenozoic convergent deformation, is a strain-partitioned transpressional belt characterized by pure strike-slip along the San Andreas fault, and small fold and thrust belts subject to pure shear to either side of the San Andreas fault. [3 13 14 15] In addition, the fold and thrust belt interpretation provide a more optimistic view of California's future petroleum potential as the larger thrust sheets do not steepen with depth, but flatten with depth, and consequently conceal extensive footwall area with untested subbasins and structures.

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Most fold and thrust belts have a wedge-shaped, cross-sectional profile with a taper thinning towards the undeformed basin as the does the WS of the San Joaquin basin (Fig. 2B). The wedge grows basinward by internal thrust faulting and folding, and deformational progression is akin to the material being moved by a bulldozer or snowplow.[16] Thrust faults within the wedge need not have the same direction of movement (vergence), and the resulting geometry is commonly characterized by a master backthrust (roof thrust) and a sole thrust with opposing vergence that creates a distinctive triangle zone (Fig. 2B). At the south end of the Diablo Range the northeast-dipping Antelope Valley thrust presents an excellent surface exposure of a backthrust (Fig. 3) located along the top of the basinward-directed wedge making the WS. Mapping by the author shows that other large back thrusts are present along other portions of the WS; for instance, the Temblor Creek thrust in the Temblor Range (Fig. 1), and the Waltham Canyon fault west of Coalinga anticline in the Diablo Range.[3]

The wedge model was first proposed by in 1988 to explain the structural development of the northern portion of the WS, and the 1983 Coalinga earthquake (Mw=6.5) and its relationship to the Coalinga anticline (Fig. 1).[3 4] In the Coalinga area the wedge creates a triangle-zone geometry with a subthrust anticline(s) that involve mostly Cretaceous- and Jurassic-age rocks with little oil potential. In this study the wedge model is applied to the Antelope uplift portion of the WS that is present between the northern Temblor Range and North Belridge oil field (Fig. 4). At the Antelope uplift the wedge involves Tertiary rocks that are known source and reservoir units making the Antelope uplift more prospective than the Coalinga area.

Structure of the Antelope uplift

The Antelope uplift is an area of lower Tertiary strata exposed at the surface or present in the shallow subsurface as shown by numerous shallow oil and gas wells and seismic reflection surveys (Fig. 4). To the author's knowledge the structural geometry and origin of the uplift has never been questioned despite its great size, structural relief, and dissimilarity to the nearby large oil-trapping anticlines. This article presents a regional cross section (Fig. 5A) that utilizes fault-ramp folding such as fault-bend and fault-propagation folds, and cross section balancing constraints to make an interpretation of the Antelope uplift and the WS.[17 18 19 20] The cross section interpretation, while not unique and untested by drilling is valid as it can be retrodeformed (Fig. 5B), and shows the possible structural geometry beneath the uplift and its untested hydrocarbon potential.

There is no evidence of strike-slip faults intersecting the cross section line that lies east of the San Andreas fault, and that allows 2D restoration of the strata to their undeformed geometry in the direction of convergent strain (along the cross section line) as shown by fold axes and thrust faults. Restoration of the cross section and matching the hanging wall and footwall ramps and flats provide a test of the validity of the interpretation. The cross section integrates several reprocessed 2D seismic lines, well data, and surface geology (Fig. 4). The broad crest of the uplift and its northern, eastern and southern limbs are shown by contouring the top of the Temblor Formation, and the west limb of the uplift is a regional syncline, cored with Monterey Formation, that lies along the foothills of the northern Temblor Range. Upper Tertiary and Quaternary strata are absent or thin across the Antelope uplift as a result of late Cenozoic folding and erosion, and the uplift lies within an earlier and broader uplifted block, i.e., the "Antelope Valley peninsula" whose Oligocene to early Miocene age history is recorded by non-deposition, erosion, and stratal onlap.[21]

Seismic Line B shows detail of the northeast-dipping limb of the Antelope uplift and its large amount of structural relief. Regional mapping of the limb show it is a part of a large structure that involves much of the upper crust, and is more important to the development of the WS than the small faults that cross the uplift's crest and toe. Line B also show that the folding and uplift involves strata as young as late Miocene, and folding and uplift occurred during latest Miocene and Pliocene time and before deposition of the relatively unfolded Quaternary age Tulare Formation. The northeast-dipping limb formed a deformational front that developed before the Quaternary age anticlines at Lost Hills, and North and South Belridge that have a different geometry and smaller size than the older Antelope uplift (Fig. 4 & 5A). The leading edge of the pre-Quaternary deformational front, which lies along the base of the limb, is interpreted to lie above the wedge tip (WT) as shown in the generalized model shown in Fig. 2B. The absence of significant pre-Quaternary deformation to the northeast of the uplift limits the possible fault-ramp fold and fault-slip configurations that could make the uplift, and in the cross section is interpreted to be the back-side of fault-bend fold developed in the hanging wall of a roof thrust that the here is called the Shale Hill thrust (SHT).

(Continued on next page)

Line C crosses the northern Temblor Range where the surface geology is dominated by a northeast-dipping panel of strata of Cretaceous through Miocene age (Fig. 4). Seismic Line C reveals a large panel of southwest-dipping strata directly below the northeast surface dip (Fig. 7), and this abrupt change in dip is interpreted to be a large southwest-dipping convergent fault referred to as the Temblor Range thrust (TRT). The surface and shallow subsurface geology restrict the TRT to reaching the surface along the trough of the regional syncline that occur along the foothills of the Temblor Range. Similarly the northeast dipping SHT is restricted to reaching the surface along the synclinal trough, and the opposing thrusts form an untested triangle zone capped by Monterey Formation. Field examination of the "syncline" show its trough is complexly faulted with no bedding continuity between opposing limbs, and the trough is a likely a zone for TRT and SHT to "daylight" and juxtapose Monterey Formation originally deposited miles apart.

The western portion of Line E (Fig. 8) also shows the northeast-dipping panel of strata that dominates the northern Temblor Range, and southwest-dipping reflectors at depth are separated by the TRT. The line lies south of the portion of the Antelope uplift dominated by shallow depth, lower Tertiary strata (Fig. 4). Along the eastern portion of line E the surface and shallow subsurface geology consist of a thick section of folded and faulted Monterey Formation. The line reveals the triangle zone formed beneath the TRT and SHT and the opposing dips of large subthrust anticline. A nearby exploration well drilled in 1946 to nearly 11,000 ft and projected into the line reached the very top of Temblor Formation and had numerous oil shows. Well core dips are consistent with the well drilling into the northeast limb of the anticline.

The stratigraphy of the triangle zone below the SHT and TRT can be postulated by two methods that indicate the zone should involve known reservoirs and source rock of late Cretaceous through Miocene age: 1) Geologic units within the footwall block have approximately the same structural relief as the undeformed units to the east in the central trough once slip is removed along the Quaternary age Lost Hills thrust as shown in Fig. 5B. 2) The stratigraphy, including the producing oil reservoirs, of the Cymric oil field can be mapped northward using deep well data and strike seismic lines (Fig. 9). These geologic units plunge northward and beneath the lateral ramps forming the southern edge of the Antelope uplift and into the triangle zone.

The better imaged seismic lines plus a few exploration wells as shown in Fig. 8 show the triangle zone and subthrust area beneath the Antelope uplift are folded into anticlines and synclines as would be expected in this area of significant convergence. Untested anticlines subthrust could range from 1,000 to 10,000 AC of closure based on structural modeling of the numerous reprocessed 2D seismic lines (most not shown here). For comparison, Elk Hills oil field-an anticlinal trap, has a maximum productive area of about 21,170 AC with produced and reserves totaling 1,392 MMBO. The subthrust area as presented here adds about 18% to the WS capable of holding large traps (the footwall area of the uplift is approximately 80,000 AC while the WS trend of large oil fields is about 440,000 AC). The exploration potential of the footwall block is further enhanced by deep thrust burial of known source rock units that should provide sufficient hydrocarbon maturity from below the uplift and short distance migration pathway from kitchen to traps. It is possible to apply the wedge model concept to other portions of the WS given the presence of back thrusting in the Temblor Range and other areas of the west side, and such an approach should provide even more prospective "running room" for large untested traps along the WS.

Acknowledgements

The author would like to recognize and thank the following companies for granting permission to show data and interpretations: Seismic Exchange Incorporated, Pacific Seismic Incorporated, and Badlands Energy, Inc. Reprocessing of the 2D seismic was done by Tricon Geophysical, Inc.

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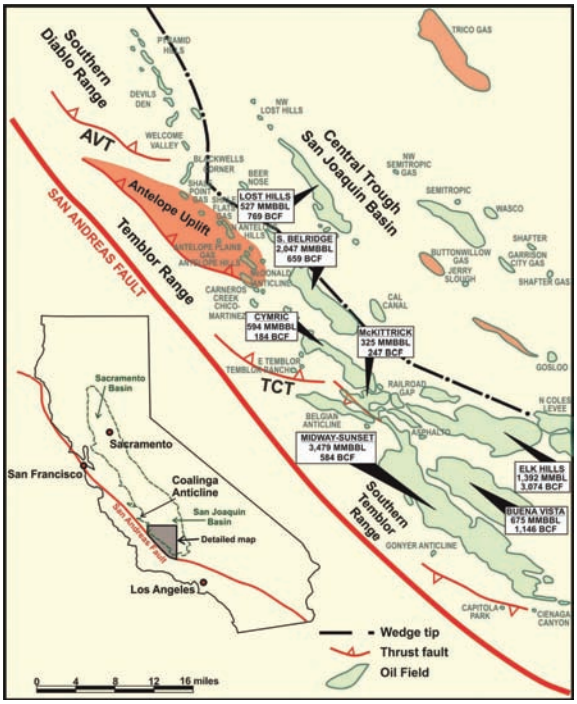

Fig. 1. On the left is a map of the State of California showing the most prolific oil producing area along the west-side of the San Joaquin basin (WS). Detailed map on the right shows this area with cumulative and proven reserves for the larger fields (but not including Coalinga anticline) as of 2009[1], location of the Antelope uplift, northeastern edge of de-formed wedge (wedge tip), and some of the major backthrusts within the wedge. The exploration play presented here adds an additional 18% to the area of the WS capable of having large traps.

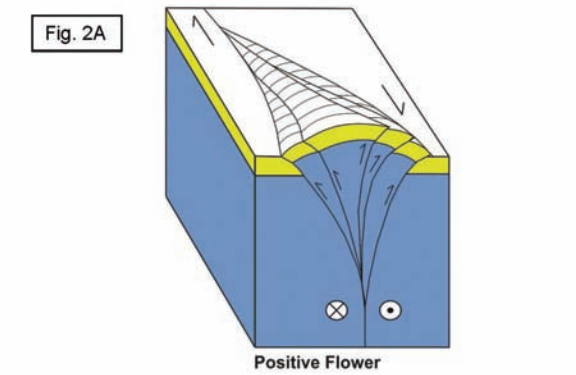

Fig. 2A. Model of a convergent wrench fault making a positive flower structure. A flower structure is characterized by distinctive structural elements such as oblique-slip reverse-faults that steepen with depth into a master strike-slip fault. In general the exploration area below a reverse fault in a flower structure setting is more limited in size relative to the area below a thrust fault that flattens with depth.

Fig. 2B. Model of a convergent wedge form-ing a triangle zone [22] within a fold and thrust belt. Model has been modified for the WS. Repetition of source and reservoir rocks and the presence of concealed subthrust traps in a fold and thrust setting offers more exploration potential compared to flower structure settings.

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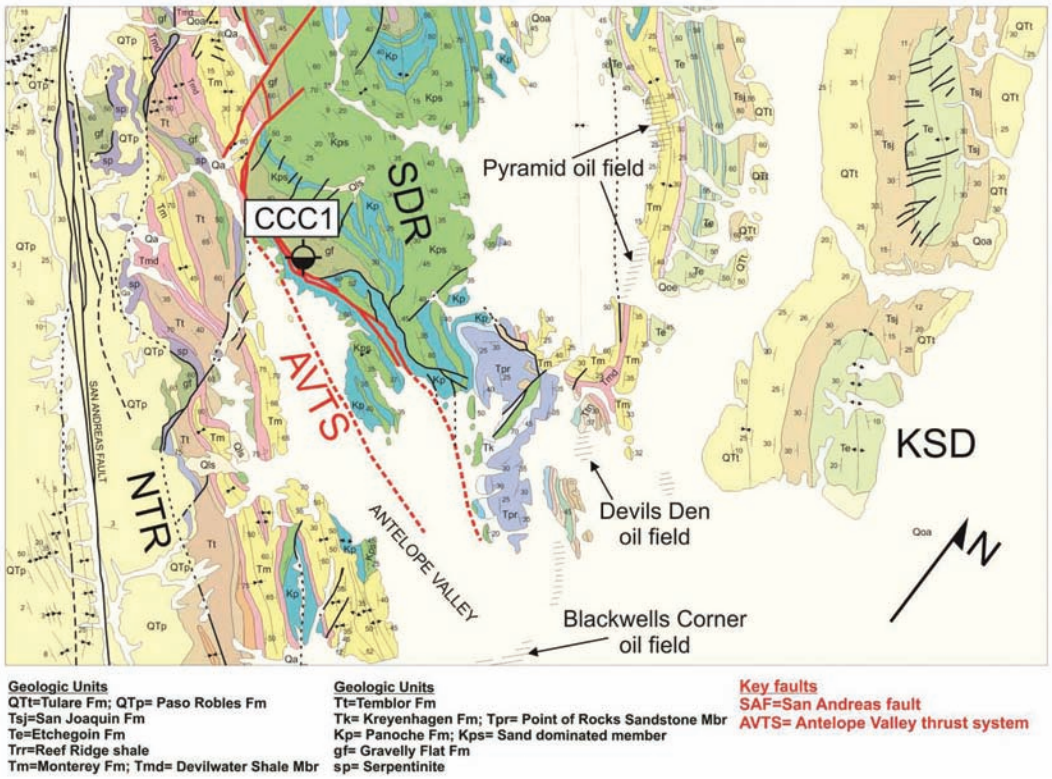

Fig. 3. Surface geologic map of the Antelope Valley portion of the WS [23] showing a set of northeast-dipping backthrusts (AVTS=Antelope Valley thrust system). The structurally lowest member of the system places Cretaceous and Jurassic rocks over the Miocene Monterey Formation. The Conoco Cholame Cattle Company #1 well (CCC1) spudded in the hanging wall of the AVTS, cut the thrust(s), encountered Monterey Formation directly below the lowest thrust, and showed the lowest member of the AVTS has a dip of 20 to 30 degrees to northeast and under the southern Diablo Range. Other abbreviations: KSD=Kettleman South Dome, NTR=Northern Temblor Range, and SDR=Southern Diablo Range

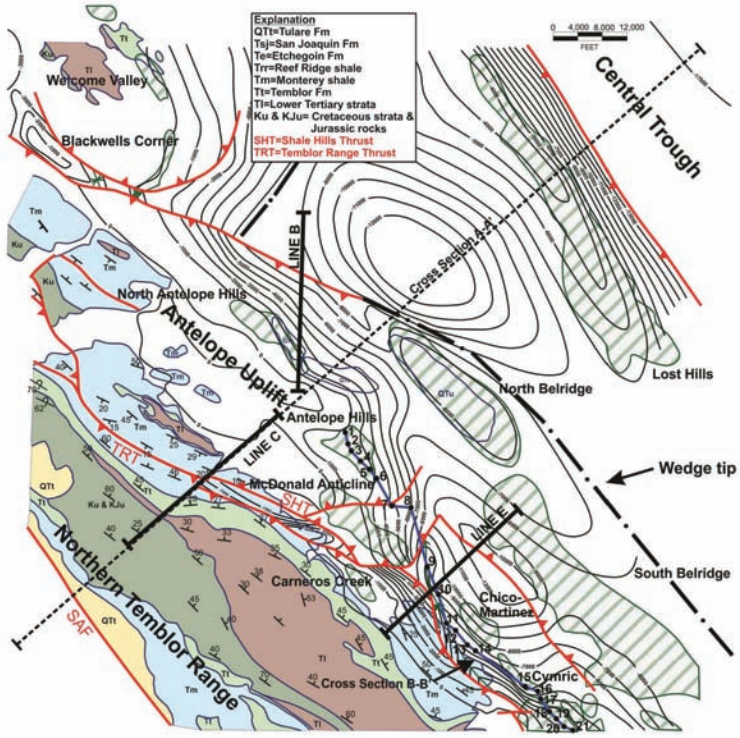

Fig. 4. Map showing the surface geology of the northern Temblor Range, the shape of the Antelope uplift, local oil fields (green cross-hatch) and the location of the wedge tip (dash-dot line). Abbreviations: key surface units=black lines, key faults=red lines, subsurface contours on top of Temblor Fm=black lines with depth values. 2D seismic Line B (Fig. 6), Line C (Fig. 7), and Line E (Fig. 8). Geologic cross sections: A-A' (Fig. 5) and B-B' (Fig. 9).

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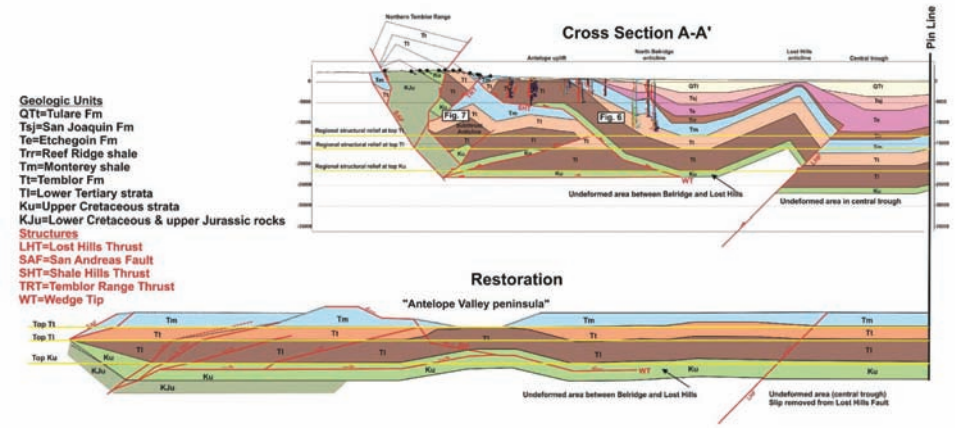

Fig. 5A. Regional cross section A-A' across the Antelope uplift portion of the WS. The interpretation shows the uplift to be a southwest-vergent fault-bend fold above a northeast-directed structural wedge. The uplift is the result of a large ramp in SHT surface and the SHT is roof thrust to the wedge. The portions of the cross section constrained by nearby 2D seismic lines are labeled as Figs 6 & 7. Note the extensive and untested triangle zone between the TRT and SHT. The triangle zone has known source and reservoir rocks based on the undeformed structural relief of formation tops (restoration), well to well correlation (Fig. 9), and strike seismic lines extending southward to the northern portion of Cymric oil field. See text for further details of interpretation.

Figure 5B. Line-length restoration of cross section A-A' that shows WS strata in their relatively undeformed state (late Miocene). Restoration shows the "Antelope Valley peninsula[21]" that separated this portion of the WS into two subbasins that existed during the Oligocene and Miocene.

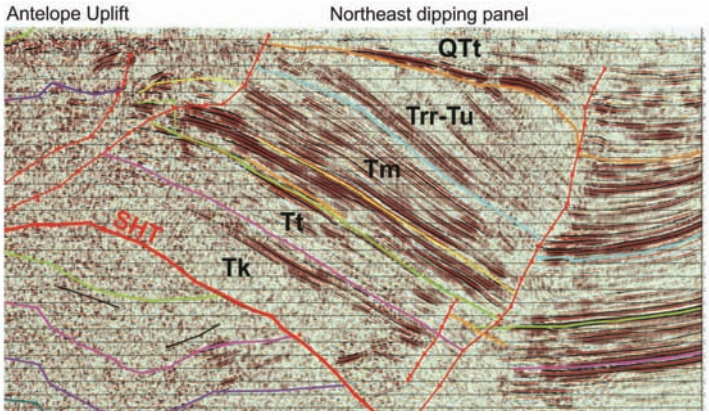

Fig. 6. 2D seismic line B. Line shows geometry and detail of the northeast limb of the Antelope uplift. Limb dip is interpreted to be caused by strata being translated up a ramp in the Shale Hills thrust (SHT) making a fault-bend fold above the thrust (this portion of line is only maging back-limb of fold. See text for details of interpretation. Geologic unit abbreviations: Tk=Kreyenhagen Formation, Tt=Temblor Formation, Tm=Monterey Formation, Trr-Tu=undifferentiated Reef Ridge, Etchegoin and San Joaquin Formations, and QTt=Tulare Formation.

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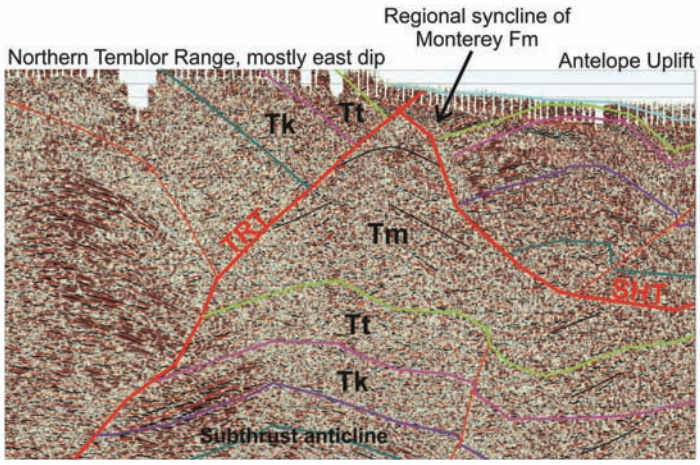

Fig. 7 (2D seismic line C). The surface structure of the northern Temblor Range is dominated by northeast-dipping strata, but line C and other similarly oriented 2D lines, show a large west-dipping panel beneath the range, and abrupt change in dip is caused by offset along the Temblor Range thrust (TRT). The opposing dips of the TRT and the Shale Hills thrust (SHT) form a triangle zone along the foothills of the northern Temblor Range and beneath the Antelope upift. See text for details of interpretation. Geologic units explained in Figure 6 caption.

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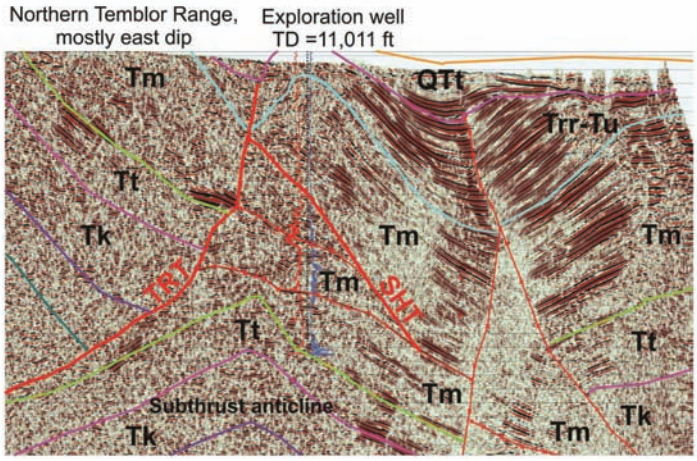

Fig. 8 (2D seismic line E). Line E images triangle zone between the Temblor Range thrust (TRT) and Shale Hills thrust (SHT). A nearby exploration well spudded in 1946 is projected into the seismic line and shows that the usually thick section of Monterey Fm (Tm) is due repetition by the SHT. Well reached the top of Temblor Formation near the bottom of hole, and a formation test across a 440 ft interval abreast of the Monterey and Temblor contact recoveredv gassy oil and salt-water. Hole was eventually abandoned due to drilling problems. See text for details of interpretation. Geologic units explained in Figure 6 caption.

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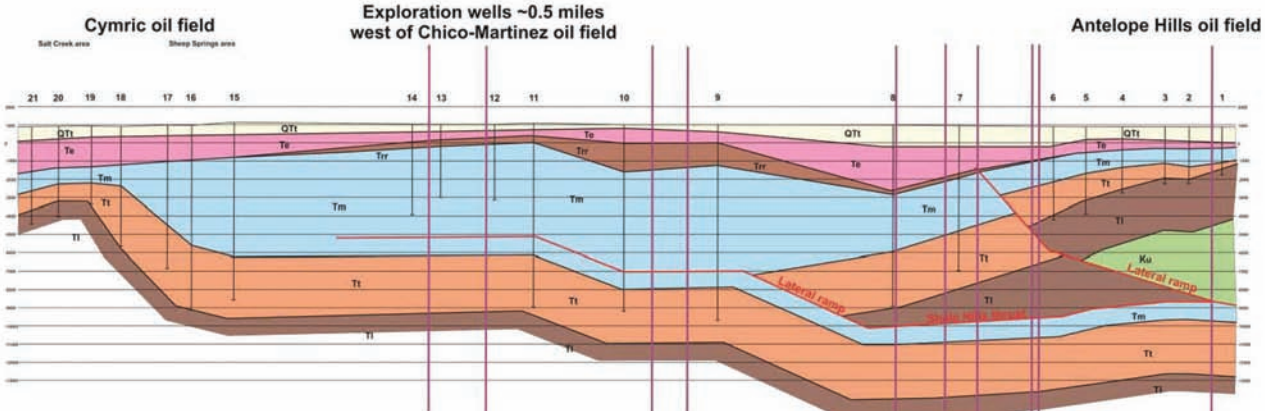


Fig. 9 (well to well cross section B-B', view is to the southwest). Footwall strata below the Antelope uplift is postulated by well to well correlation from the northern portion of Cymric oil field to beneath the uplift area. Wells are numbered and vertical purple lines are intersections of reprocessed 2D seismic lines that were used in mapping. Southern edge of Antelope uplift ends along lateral thrust ramps in the Shale Hills thrust system. See text for details of interpretation.

1=Shell, Hopkins A 48X
Sec 31,27S-20E / TD= 2,600

2=E&B Nat Res Corp, Voight 784-6
Sec6,28S-20E / TD=3,100

3=E&B Nat Res Corp, Voight 781
S6,28S-20E / TD=3,117

4=Shell, Williams 87-6
S6,28S-20E / TD=3,600

5=Texaco Incorporated, Phippen 10
S8,28S-20E / TD=4,773

6=Conoco Incorporated,
Continental-Texas F 1
S8,28S-20E / TD=5,144

7=Superior Oil, Theta 82
S17,28S-20E / TD=7,847

8=Ferguson&Bosworth, Toco 53X
S16,28S-20E / TD=9,769

9=Exxon Corp, T P Bacon 1
S27,28S-20E / TD=10,674

10=Laymac Corp, Bacon Hills 1-27
S27,28S-20E / TD=10,130

11=Atlantic Richfield Co, Shaw A1
S34,28S-20E / TD=10,038

12=Shell, Shaw 1
S2,29S-20E
TD=4,125

13=Coastal O&G, Chico Martinez1
S2,29S-20E / TD=4,010

14= Transco Oil, USL 1-2
S2,29S-20E / TD=4,888

15=Transco Oil, Richardson 46
S7,29S-21E / TD=9,643

16=Los Nietos Co, Richardson 77X
S7,29S-21E / TD=10,129

17=Los Nietos Co, Richardson 81
S18,29S-21E / TD=7,810

18=Chevron USA Inc, CWOD 633
S17,29S-21E / TD=6,540

19= Chevron USA Inc, Anderson 55
S17,29S-21E / TD=4,250

20=Rothschild Oil, Sheep Springs 1
S17,29S-21E / TD=4,921

21=Robert Lytle, Sheep Springs 4
20,29S-21E / TD=5,277

SUMMARY: 2015 PS-AAPG West Coast Student Expo

Dr. Kathleen Marsaglia
Dept. of Geological Sciences, California State Univ. Northridge,
1-818-677-6309 <kathie.marsaglia@csun.edu>

The Eighth annual PS-AAPG West Coast Student Expo took place at California State University, Northridge on 2 to 3 October 2015. Three companies sponsored the event: Aera Energy and California Resources Corporation at the Platinum Level, and Chevron at the Silver level. The Pacific Section of the American Association of Petroleum Geologists (PS-AAPG) was a sponsoring organization.

There were 103 students who registered to participate in the Expo: 28 Bachelor's, 61 Master's and 14 Doctoral students. This was a bit lower than the attendance at the 2014 event, with registered students hailing from 21 schools in 9 states: Brigham Young University, Cal Poly Pomona; CSU Bakersfield; CSU Fresno; CSU Fullerton; CSU Long Beach; CSU Northridge; Louisiana State University; Northern Arizona University; San Diego State University; San Francisco State University; UC Santa Cruz; University of Alaska Fairbanks; UCLA; UC Riverside; University of Cincinnati; University of Colorado, Boulder; University of Louisiana, Lafayette; University of Southern California; University of Texas at El Paso; and West Virginia University.

Forty students registered for the poster session held the morning of October 2nd. The posters were judged by a crew of company representatives, headed by Cynthia Huggins of Aera Energy. Awards included books donated by Pacific Section AAPG. The winners of the poster awards were as follows:

PhD	
First Place- Geology:	Shuvajit Bhattatcharya, West Virginia University
Second Place - Geophysics:	Rachel Lippoldt, USC
MS	
First Place:	April Knox, University of Alaska Fairbanks
Second Place:	Adam Piestrzeniewicz, CSU Fullerton
Third Place:	Kylie Caesar, CSU Fullerton
BS	
First Place:	Renee Wang, USC

Students and company representatives attended a luncheon and round-table discussion from 12:30-2:30pm hosted by Aera Energy and California Resources Corporation where the poster awards were made. Luncheon seating around large round tables facilitated company representative interaction with students. Company representatives addressed the students to highlight their companies hiring needs. At set intervals, company recruiters switched tables to maximize interaction with students. Afterwards, from 3:00 to 6:00pm, students and representatives continued to interact at the Company Booth Exposition. Saturday October 3rd was dedicated to student interviews with the companies from 8:00 am-5:00 pm. The companies made all of the arrangements for interview times with students prior to Saturday. All interviews occurred in rooms at the CSUN University Student Union.

22016 PS-AAPG West Coast Student Expo Plans

The **2016** PS-AAPG West Coast Student Expo is scheduled for **September 29-October 1**, and will again be held at the University Student Union, at California State University, Northridge.

Joan Barminski Named New BOEM Pacific Regional Director

New Regional Director Brings Over 30 Years of Federal Ocean Energy Experience

10-14-2015 WASHINGTON

Bureau of Ocean Energy Management (BOEM) Director Abigail Hopper today announced Joan Barminski as the Regional Director of the Pacific Outer Continental Shelf (OCS) Region. Barminski, who starts her position immediately, will be responsible for managing the development of energy and mineral resources on the U.S. Outer Continental Shelf (OCS) offshore California, Oregon, Washington, and Hawaii.

"Joan has many years of service with the Department of the Interior, working on aspects of the OCS energy program and on regional and national ocean policy initiatives," said Director Hopper. "Her collaborative management style, public engagement experience and her ability to seek out opportunities to strike a balance between resource development and environmental protection make her a perfect fit for overseeing our program in the Pacific."

Barminski will lead an office of scientists and program specialists responsible for managing 43 existing oil and gas leases offshore southern California and actively working with the states of California, Oregon, Washington, and Hawaii to provide access to offshore wind and wave energy resource development on the Pacific OCS.

Barminski began her federal career as an oceanographer with the U.S. Geological Survey in Washington DC. She has since held geoscience positions in the former Minerals Management Service North Atlantic and Santa Maria District Offices; management positions in the Pacific Region Field Operations and Production, Development & Resource Evaluation Offices; and as Deputy Regional Director.

In 2009, Barminski was appointed the Department of the Interior representative to the Executive Committee of the West Coast Governors Alliance on Ocean Health. When BOEM was formed in October 2011, Barminski was asked to manage the Pacific Region Office of Strategic Resources, which carries out the regional implementation of BOEM's energy and marine minerals programs.

Barminski, a California Registered Geologist, holds a B.A. in geology from Smith College and completed graduate work in coastal processes and marine geology at the University of North Carolina at Chapel Hill.

Barminski resides in Ventura, California, with her husband and children.

The Bureau of Ocean Energy Management (BOEM) promotes energy independence, environmental protection and economic development through responsible, science-based management of offshore conventional and renewable energy resources.

Alaska Geological Society

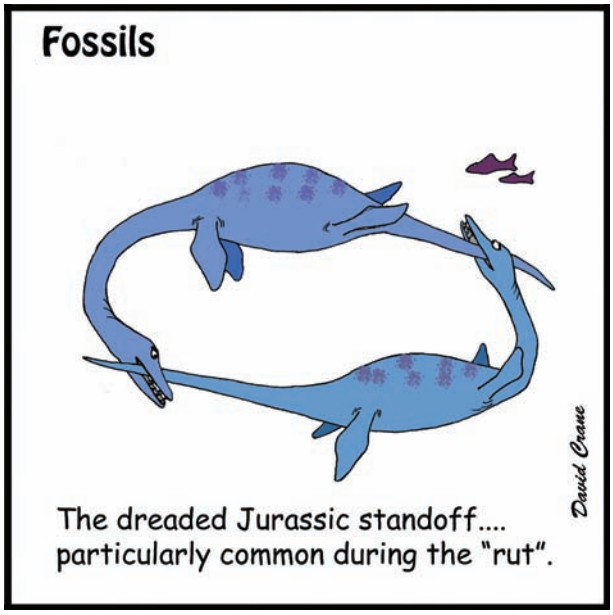
Alaska Geological Society luncheon meetings are held at the BP Energy Center in Anchorage, Alaska.
The meetings are typically scheduled on the 3rd Thursday of each month 11:30 AM – 1:00 PM

Coast Geological Society

November 17th, 2015, 6:00pm
Speaker: Dr. Andrea Donnellan (Jet Propulsion Laboratory, Caltech & University of Southern California)
"The Past, Present and Future of Understanding Earthquakes using Space Observations"

December 15th, 2015, 6:00pm
Speaker: Dr. John Harris (George C. Page Museum)
"Pleistocene Mammals of North America – examples from La Brea Tar Pits"

ANNOUNCMENT:
Woolley Golf Tournament:
The Woolley Golf Tournament has been rescheduled to Spring 2016.
Further details will be posted on the Coast Geological Society
web-site http://www.coastgeologicalsociety.org/.



L.A. Basin Geological Society

We have no meetings in November and December due to the holidays.

Northern California Geological Society

November 18th, 2015, 7:00 pm
Speaker: Dr. Andrea Foster, U.S. Geological Survey
"The Environmental Legacy of California's Gold Rush: Arsenic
and Mercury Contamination from Historic Mining"

Northwest Energy Association

The 2015-2016 lecture series for the Northwest Energy Association is a work in progress.
The current list of speakers and topics for the coming year include the following:
John Ewert, USGS, on the potential volcanic impact on energy infrastructure in the NW
Doug Boyer, BLM, on dam susceptibility to a Cascadia mega-earthquake event
Brian Butler on using tidal power as an alternative energy source
Max Rudolph, PSU, on the Lusi "mud volcano" (or drilling disaster) in Indonesia
Will Greenough on coal mining in Centralia - history and what's in store

Sacramento Petroleum Association

Speakers are needed, so if you or you know someone who would like to give a presentation at our monthly luncheon meeting, please let Jerry Reedy or Derek Jones know. All months (3rd Wednesday) are open. Jerry Reedy JWR5532@aol.com; Derek Jones djones@gasbiz.com

It is time for nominations for SPA officers. Elections will be next month.

(Continued on next page)

San Joaquin Geological Society

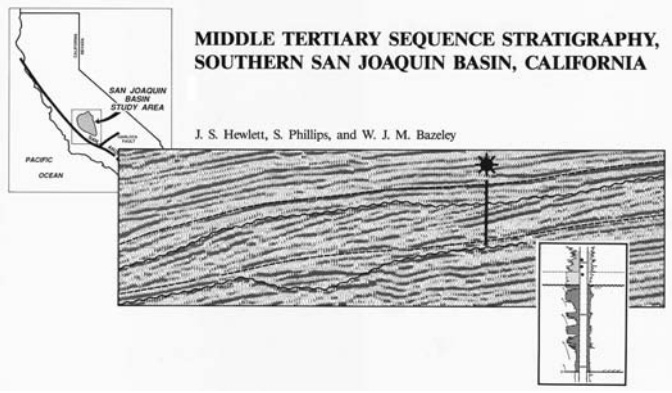
November 10th, 2015
Speaker: Matthew d'Alessio, Associate Professor at Cal State Northridge
"How does fault geometry affect fault behavior?"

December 8th, 2015
Speaker: Stephen Testa, Executive Officer at State Mining and Geology Board
"Hydraulic Frac'ing in California"

January 12th, 2015
Speaker: John Wakabayashi, Professor at Cal State Fresno
"The Franciscan Complex"

LOCATION CHANGE: The new dinner meeting location is the Eagle's Lodge at 1718 17th Street, Bakersfield, CA 93302. Talk announcements to follow soon.

PSAAPG Has A New Publication – MP 51



"This publication follows from a technical project in the ARCO sequence stratigraphy group in Plano, Texas. This study was published as an internal company research report in 1989 in the early days of sequence stratigraphy. Twenty-five years later, the authors chose to not alter the original text and figures except to satisfy a few publication requirements – we hope the studies contribute to understanding the future exploration potential of the southern San Joaquin basin."
Originally published in-house in 1989 by ARCO: Hewlett, J. S., Phillips, S., & Bazeley, W. J. M.

This is an 11" X 24" spiral-bound book with B/W and color figures, 73 p. (1st edited version)

To purchase this publication you may go to the PSAAPG.webpage (www.psaapg.org) and download the publication ordering form or you may contact Larry Knauer (PS-AAPG Publications Chair) at larryknauer@chevron.com. Cost is $85 + S&H.

Alaska Geological Society

www.alaskageology.org

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Contact: Eric Cannon
eccannon@gmail.com

Luncheon meetings are held monthly September through May, usually on the third Thursday of the month, at the BP Energy Center (1014 Energy Court) from 11:30 a.m. to 1:00 p.m. The hot lunch cost is $20 for members with reservations; $22 for non-members with reservations; and $25 without reservations. The box lunch cost is $13 for members with reservations, $15 for non-members with reservations, and $18 without reservations. 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.

President:	Monte Mabry	monte.mabry at bp.com
President-Elect:	Chad Hults	chadcph at gmail.com
Vice-President:	Steve Wright	vp at alaskageology.org
Secretary:	Dave Buthman	dbuthman at hilcorp.com
Treasurer:	Heather Heusser	heather.heusser at alaska.gov
Past-President:	Keith Torrance	keith.torrance at uicumiaq.com

Coast Geological Society

www.coastgeologicalsociety.org

P. O. Box 3055
Ventura, CA 93006

Contact: Bonnie Walters
805-795-9898

Dinner meetings are held monthly September through May, on the third Tuesday of the month, at Poinsettia Pavilion, 3451 Foothill Road 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 with reservations is $20 (members), $25 (non-members), or $10 (students and K-12 teachers).
For reservations, please email Eric White (secretary@coastgeologicalsociety.org), and should be made by 4:00 p.m. on the Friday before the meeting.

President:	Bonnie Walters	president@coastgeologicalsociety.org
Past President:	Bob Blackmur	pastpresident@coastgeologicalsociety.org
Vice President:	Alastair Haddow	vicepresident@coastgeologicalsociety.org
Secretary:	Eric White	secretary@coastgeologicalsociety.org
Treasurer:	Theresa Heirshberg	treasurer@coastgeologicalsociety.org
Membership chair:	Nick Kunstek	membership@coastgeologicalsociety.org
Webmaster/Tech Support:	Whit Skaling	webmaster@coastgeologicalsociety.org

Los Angeles Basin Geological Society

www.labgs.org

Contact: Jean Kulla
949-500-3095

Luncheon meetings are held monthly September and October; and January through June, usually on the fourth Thursday of the month, at The Grand 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 $25 (with reservations), $30 (without reservations), $20 for retired members, and $5 for students. Reservations can be made online at www.labgs.org or by contacting Graham Wilson at 562-326-5278 or GWilson@SHPI.net Reservations must be made prior to Tuesday before the meeting.

President:	Jean B. Kulla	k2mobile@MSN.com
Vice President	Jacqueline Chavez	Jacqueline.Chavez@crc.com
Treasurer:	Bert Vogler	hvogler@kleinfelder.com
Secretary:	Graham Wilson	Gwilson@SHPI.net
Scholarships:	Karla Tucker	ktkr2@aol.com

Northern California Geological Society

www.ncgeolsoc.org

9 Bramblewood Court
Danville, CA 94506-1130

Contact: Mark Sorensen
msorensen64@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).
For reservations, contact Dan Day at danday94@pacbell.net before the meeting.
Cost is $5 per regular member; $1 per student member; and $1 per K-12 teachers.

(Continued on next page)

NCGS Officers:

President:	Will Schweller	willschweller@yahoo.com
President-elect:	vacant	vacant
Program Chair:	John Karachewski	cageo@sbcglobal.net
Secretary	Dan Day	danday94@pacbell.net
Treasurer	Phil Reed	philecreed@yahoo.com
Membership Chair	Tom Barry	tomasbarry@aol.com
Newsletter Editor	Mark Detterman	mdetter1@gmail.com
Field Trip Coordinator	Tridib Guha	tridibguha@yahoo.com
Past President	Phil Reed	philecreed@yahoo.com
Scholarships	Phil Garbutt	plgarbutt@comcast.net

Northwest Energy Association

www.nwenergy.us

P. O. Box 6679
Portland, OR 97228-6679

Contact: Jim Jackson or John Armentrout

Luncheon meetings are held monthly September through May, on the third Thursday of the month, at the Multnomah Athletic Club (1849 SW. Salmon Street) in Portland, Oregon. Meeting time is at 11:45 AM to 1:00 PM (speaker about 12:15 PM). The cost is $25 for members and $30 for non-members. For information or reservations email NWEnergyAssociation@gmail.com, or our Postal Box: Northwest Energy Association, P.O. Box 6679, Portland, Oregon 97228-6679.

President	Bill Rodgers	wlrodgers@stoel.com
Vice-President	Laird Thompson	lbtfracs@gmail.com
Past President	John Armentrout	jarmenrock@gmail.com
Treasurer	Barb Portwood	bbportwood@gmail.com
Co-Treasurer	Jim Jackson	jackson.js@comcast.net
Secretary	Thomas Fauch	tsfouchbiz@gmail.com
House of Delegates:	John Armentrout, Anne Fix	

Sacramento Petroleum Association

P. O. Box 1844
Folsom, CA 95630

Contact: Jerry Reedy 916-486-2643 or Pam Ceccarelli 916-439-0400

Luncheon meetings held monthly January through November, on the third Wednesday of the month.
Location: Club Pheasant Restaurant in West Sacramento. The meetings starts at noon. The cost is $16 - $20.
For information or reservations, contact Pam Ceccarelli.

President:	Jerry Reedy	JWR5532@aol.com
Vice-President:	David Hartley	drilmax1@aol.com
Secretary	Derek Jones	djones@gasbiz.com
Editor/Treasurer	Pam Ceccarelli	pc626@comcast.net

San Joaquin Geological Society

www.sanjoaquingeologicalsociety.org

P. O. Box 1056
Bakersfield, CA 93302

Contact: Beckie Burston BeckieBurston@chevron.com

We have dinner meetings on the second Tuesday of the month at the Eagle's Lodge at 1718 17th Street, Bakersfield, CA 93302. There is an icebreaker at 6:00 p.m., dinner at 7:00 p.m., and a talk at 8:00 p.m.
Dinner is $25 for members with reservations and $30.00 for nonmembers and members without reservations. Students may attend for free.

President:	Ariel Auffant	aauffant@chevron.com
Past President:	Anne Draucker	AnneDraucker@chevron.com
President-Elect:	Greg Gordon	gsgordon@aeraenergy.com
Vice-President:	Courtney Marshall	Courtney.Marshall@crc.com
Secretary:	Beckie Burston	BeckieBurston@chevron.com
Treasurer:	Jonathan Goodell	Jonathan.Goodell@crc.com

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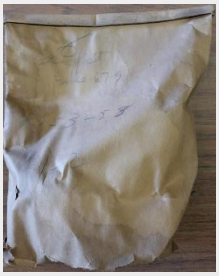
Step 1

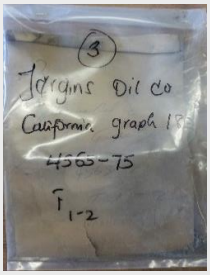
Wooden Crates with Samples

Step 2



Samples in Paper Bags from 1920's

Step 3



Samples Transferred into Plastic Bags

Step 4

Plastic Bags Placed into Boxes

Step 5

Boxes Placed on Shelf

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