

Pacific Section • American Association of Petroleum Geologists

September & October 2015



Historic Development of Fracturing and Hydraulic Fracturing Part IV – The Rise of the Unconventionals

NOTE: SJGS Dinner Meeting LOCATION CHANGE (p. 20)

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Pacific Petroleum Geology Newsletter

Tony.Reid@crc.com

Dear Pacific Section AAPG Members,

I would like to thank the immediate Past President, John T. Williams and the members of the Executive Committee for leading us through what has proven to be a very eventful year. The outgoing members of the Executive Committee include Dan Schwartz - Past President, Jonathan Allen - Vice President, Malcolm Allan -Secretary, and Cameron Campbell – Treasurer. Jon Schwalbach also completed his 3-year tenure as the Pacific Section representative to the AAPG Advisory Council. I would also like to thank the Committee Chairs and Members, the 2015 Conference Committee, the Foundation, and all of our volunteers; without your dedication and efforts, our Section would not be able to function. Thank you all.



Members of the past Executive Committee that will continue through 2015-2016 include John T. Williams – *Past President*, Rebecca Greenberg DeMarais – *Treasurer*, and Vaughn Thompson – *Editor*. We welcome the following incoming members to the Execu-

tive Committee: Bob Horton – *President-Elect*, Laura Bazeley – *Vice President*, Shane Peterson – *Secretary*, and Lisa Alpert – *Treasurer-Elect*. Tony Reid will represent Pacific Section for the next three years on the AAPG Advisory Council. Congratulations and thanks to you all. I am also honored and excited to be working with, and getting to know, the many members of the Committees, Foundation, and the multitude of volunteers that make this organization world class.

The year ending June 30, 2015, was a remarkable year for Pacific Section, and I look forward to an equally exciting 2016.

When I arrived back in California about 10 years ago, one of the critical issues facing our organization was succession planning. At that time it was not clear who would be leading the organization in the future and how we would maintain and grow our membership. There was, and still is a very dedicated core of PSAAPG members that have worked tirelessly over many years to ensure the health, continuity and longevity of our society (there are too many to name here, but we all know who they are). And, here we stand, a decade later, with a thriving community of Young Professionals and student members that will provide the leadership required to keep our Society thriving. Many of these early career scientists are taking an active role in the governance of PSAAPG and planning for its future. PSAAPG recognized their effort last year with the establishment of the Young Professional Distinguished Service Award, and increased funding for the Imperial Barrel Award and Northridge Student Job Expo. None of this would have been possible without our members, the Foundation, our supporters and faculty members in the Sectional schools, colleges, and universities. You should feel a tremendous sense of accomplishment, and I thank you all! From my vantage point today, I see a strong group ready to take us forward, but it will not be without its challenges.

We watched as the price of oil collapsed midyear 2014 causing a plunge in the number of working rigs in our Section. Many of us remember the price drop in 2008; fewer remember the 1998 dip or the crash of the mid 1980's. Drilling is the lifeblood for so many of us, and it has been painful to watch the rig count decline as far as it has in the past six months. Nobody knows what the future holds, but it appears that our industry is planning for a period of sustained lower oil and gas prices.





My concern for PSAAPG in the near term is what effect the current oil price collapse may have on our membership and a succession plan that relies heavily on students and Young Professionals. PSAAPG membership is already at a critically low level, and we need to focus on growing it in the coming years. Membership in PSAAPG and AAPG brings many benefits, and during difficult times like these, it provides an invaluable lifeline to experts, mentors, and training opportunities. As budgets are cut, our organizations can provide lower cost training alternatives through our educational programs and publications. While some members question the relevance of professional societies in this new age of technology and communication, I welcome their sense of community and professionalism. Our societies offer early career geoscientists the opportunity to network, develop personal contacts and build business networks that help them to weather industry downturns like the present one.

If the oil price collapse was not enough, the petroleum industry is facing another major challenge, the ubiquitous push to replace hydrocarbons with renewable energy sources. This effort to demonize hydrocarbons has been especially strong in the West Coast, with California taking a leadership role in driving towards a hydrocarbon-free economy. For instance, Senate Bills 350 and 32, if enacted, would not only have a dramatic impact on our industry, but will have broader repercussions on the entire California economy. The public needs, and deserves, frank and open discussion based on facts and data. Instead they are receiving information skewed by partisan politics and special interest groups. PSAAPG can assist in this discussion by providing information and resources to assist our membership in the full spectrum of engagement, from grassroots discussions with neighbors and friends, to active participation in broarder industry and political decision-making forums. We, as an organization, need to actively support our members who are courageous enough to become engaged in these discussions and forums. I look forward to working with the PSAAPG Leadership Team, and the Legislation and Public Affairs Committee to develop a path forward for our organization.

A multitude of challenges await us in the coming year, but for those of us who measure our experience in decades, this road is not new. Whether the current downturn lasts a few more months or a few more years, we will come out of it a stronger industry and a stronger organization. It will take all of us working together to keep PSAAPG strong and healthy, and I encourage everyone with ideas to contact me or any of the other Executive Committee members. This is your organization.

Thank you. **Kurt Neher** PSAAPG President, 2015-2016

Dear friends and colleagues,

Another New Year for PSAAPG has begun, and it is my pleasure to serve you for another year as Editor of the PPG.

I would like to thank the outgoing President, John T. Williams, for his generosity and leadership over the past year! And, I would like to welcome Kurt Neher, incoming President of PSAAPG. I know I speak for all of us at PSAAPG, when I say that we look forward to you leading us this year.

The PSAAPG handover celebration was conducted on August 14th, 2015, and was graciously hosted by Tom and Lydia Hopps at their home in Ventura, CA (see front cover photo). It was a fun evening shared by the outgoing and incoming PSAAPG leaders. John handed out awards and gifts and made his final President's speech while handing Kurt the President's wooden staff. Kurt proceeded with an enlightening speech

about the relevance of professional societies and the importance of continuity within the Leadership of PSAAPG.

Thank you for the opportunity to serve as your editor, and please continue sending in photos, letters, notes, and stories.

PS. It is with great sorrow that I inform you that our friend Phil Ryall passed away on August 20th, 2015. Phil was a wonderful friend, community activist and leader for so many of us. We will miss you Phil.

Sincerely, Vaughn

General Announcements:

- September 16th, 2015: SJWLS Fall BBQ hosted by Corelab at their Bakersfield facility. *Kindly RSVP to Erika Bowen to ebowen@slb.com no later than Monday September 14th.*
- September 25th, 2015: SJGS Golf Tournament see page 8 for details!
- Please mark your calendars for the annual Woolley Golf Tournament & BBQ being held on Friday 9th October, 2015 at Elkins Ranch Golf Course, Fillmore, CA. *Please see the Coast Geological Society web-site for further details!*

NEWS! New California Legislation poses direct threat to PSAAPG and its members:

Pending Senate Bill 350 (Clean Energy and Pollution Act of 2015) seeks to arbitrarily mandate a 50% petroleum reduction in transportation and fuels in CA by 2030. We, the Excom of PSAAPG, recommend that you become more aware and knowledgeable of this pending legislation, and contact your legislator. Please submit your letters and comments at: *http://findyourrep.legislature.ca.gov/*

PSAAPG generally does not engage in political discussion, however, new pressure from outside interest groups and political agendas is increasingly affecting our business and community. We encourage our members to become actively engaged in communicating the importance and necessity of California's oil and gas industry.

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NOTE: SJGS Dinner

Meeting LOCATION CHANGE (p. 20)

Teaching the Next Generation's Teachers

PSAAPG provided the room, STEMdelivered.org provided the content, Gold Coast Science Network provided the teachers, and AAPG Foundation provided the funding. The village is taking on the challenge of educating the teachers of our next generation of geologists.

Thanks to everyone for making the day a success!

And a special thanks to the geoscientists who participated in the workshop, and those who came by to welcome the teachers. Those who participated were provided with guidance on how to be effective when visiting the classroom.

Maps, posters, textbooks, rocks and fossils, donated by many in the geo-community, were gratefully received by our educators. Thank you to those who donated these items.

The fault models, hands-on activities, and classroom ready lesson plans, designed by Dr. Debbie Bereki, were provided to all educators. Well, at least, almost all the activities were.

The California beach was thought to be the perfect setting for studying longshore wave action. We planned this activity when Debbie and I walked the beach late last year. It was a cool cloudy evening, with a slight offshore breeze. A few seagulls were gullying about. Okay, baby gullying, the sand dunes were not that large.

In our mind's eye, we saw blue skies and white crested waves lapping on the glistening sand, as teachers threw oranges out into the sea. We planned to time the oranges, as the bobbed down the coastline, making their way to Mexico. Okay, not technically correct, but what does the mind's eye know.

The vision gave way to reality. The skies were blue. The sand did glisten. And our breeze, our breeze rated a 'Near Gale' on the Beaufort wind scale - resistance felt walking against wind, and certainly flying oranges. Priceless.

Karen Blake Executive Director STEMdelivered.org





San Joaquin Geological Society Annual Fall Classic Golf Scramble and Barbeque

Early SJGS foursome line up a putt





Friday, September 25th, 2015

1. Golf Tournament at Sundale Golf Course Breakfast and a BBQ lunch courtesy of Halliburton Chuck Wagon And Schlumberger BBQ'ing little Hoagies and Chicken sticks

7:30 am Shotgun Start \$95/Person

Includes: Green Fee, Cart, Breakfast, Lunch, Drinks & Tee Prizes

2. Family BBQ and Prizes at the Kern County Museum BBQ Dinner prepared by Drew Hutto

Dinner to include Brisket, Pork Ribs, Pulled Pork, and Tri Tip with all the fixin's

Happy Hour at 5:00 PM Dinner at 6:00 PM

Adults \$25.00 Students \$10.00 Children \$5.00

Please <u>RSVP</u> by Tuesday, September 22ND (For BBQ) – Help the Planners (*Prepay online at http://sanjoaquingeologicalsociety.org/or you may pay at the event*)

BBQ RSVP: John Abeid @ John.Abeid@chevron.com or online

| Golf Tournament Entry Form | Registered Players | Golf \$ | BBQ\$ |
|--|---------------------------|---------|-------------|
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| SJGS | Golfer 2 | | |
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| | Total \$ | | |
| September 21, 2015 | Contact email: | Con | tact Phone: |
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Historic Development of Fracturing and Hydraulic Fracturing Part IV – The Rise of the Unconventionals (1980s to Present)

Foreword: This article represents the fourth and final chapter of *The Historical Development of Fracturing and Hydraulic Fracturing* by Stephen M. Testa. PSAAPG is grateful for this series and all the work that Stephen put into telling almost 100 years of history in such a concise and enlightening manner. Thank-you Stephen!

Introduction

History tells us everything has a story. In looking back at the historic development of what we currently refer to as well stimulation techniques and strategies, we have observed the technological advancement from the use of explosives and guns (1820s-1930s), the introduction of acids and agents such as napalm, the development of the Hydrafrac Process of the late 1940s and early 1950s, and going nuclear during the 1960s (Testa, 2015a, 2015b and 2015c). During the 1940s, we also observed the beginning of the age of the petroleum engineer and in the 1960s what would become a political movement – peak oil. Part IV of this saga brings us to the period defined by the rise of the unconventionals.

We live in an unconventional and alternative world. This alternate universe reflects a global push away from the conventional to the unconventional and alternative energy resources. It began with significant technological advances in the 1980s causing us to re-evaluate what we thought of as unconventional, which is progressively becoming conventional and "relevant."

Unconventional Resources

Unconventional resources are characterized as hydrocarbon reservoirs that have low permeability and porosity, rendering production of gas and oil from such reservoirs difficult. With the advent of horizontal drilling and fracture stimulation techniques, among many other important insights and innovation, came the rise of the unconventionals (Figure 1). These innovative techniques may be performed to enhance recovery, and even more so in an unconventional setting. An interesting statistic is that only about one-third of the worldwide oil and gas reserves are conventional in nature – the remainder are unconventional which includes tight gas, coalbed methane (CBM), methane hydrates, shale gas, shale oil, and, heavy oil and tar sands (Figure 2). It was not that many years ago when such unconventional resources were considered inaccessible or virtually nonexistent as a potential energy source. During the 1990s, not many exciting techniques were visible to the novice; however, by 2000 slight increases in the production of natural gas was being observed (Figure 3), and continues to this day. When it comes to energy, in some strange but wonderful twist of fate, we now live in an unconventional and alternative world. The rise began in the 1990s but not without a significant role played by the advancements made in horizontal drilling technology and some federal assistance during the mid-1980s.

Horizontal Drilling

The technology of horizontal drilling moved into the arsenal of the oil industry in the early 1980s (EIA, 1993). Horizontal drilling is the process of drilling a well from the surface to a subsurface location just above the target oil or gas reservoir called the "kickoff point", then deviating the well bore from the vertical plane around a curve to intersect the reservoir at the "entry point" with a near-horizontal inclination, and remaining within the reservoir until the desired bottom hole location is reached (Figure 4). The modern concept of non-straight line, relatively short-radius drilling, dates back at least to September 8, 1891, when the first U.S. patent for the use of flexible shafts to rotate drilling bits was issued to John S. Campbell (Patent Number 459,152; Figure 5). I may have forgotten to mention that the prime application described in the patent was dental engines. The patent also carefully covered use of his flexible shafts at much larger and heavier physical scales "My invention relates more particularly to the flexible driving-shaft or cable used in dental engines; but it is also applicable to flexible shafts or cables of larger size such, for example, as those used in engineers shops for drilling holes in boiler-plates or other like heavy work. The flexible shafts or cables ordinarily employed are not capable of being bent to and working at a curve of very short radius ..."

The first recorded true horizontal oil well was drilled near Texon, Texas, and was completed in 1929 (Popular Horizontal, 1991). Another was drilled in 1944 in the Franklin Heavy Oil Field, Venango County, Pennsylvania, at a depth of 500 feet (Yost et al, 1987). China also tried horizontal drilling as early as 1957, followed by the Soviet Union. Generally, however, little practical application occurred until the early 1980's, by which time the advent of improved downhole drilling motors and the invention of other necessary supporting equipment, materials, and technologies, were attained. Notably, downhole telemetry equipment brought some kinds of applications within the imaginable realm of commercial viability (EIA, 1993). Tests, which indicated that commercial horizontal drilling success could be achieved in more than isolated instances, were carried out between 1980 and 1983 by the French firm Elf Aquitaine in four horizontal wells drilled in three European fields: the Lacq Superieur Oil Field (2 wells) and the Castera Lou Oil Field, both located in southwestern France, and the Rospo Mare Oil Field, located offshore Italy in the Mediterranean Sea (EIA, 1993). In the latter instance, output was considerably enhanced. British Petroleum would subsequently commence early production wells using horizontal drilling techniques in Alaska's Prudhoe Bay Field, which turned out to be a successful effort to minimize unwanted water and gas intrusions into the Sadlerochit reservoir.

Federal Role

To understand the technological advances being made during the 1970s and 1980s, the federal role in investment following price controls and subsequent shortages in the 1970s, deserves mention. The federal government, in response to declining natural gas production, invested in many supply alternatives, including the Eastern Gas Shales Project (EGSP), and the annual FERC-approved research budget of the Gas Research Institute (GRI). GRI was funded by a tax on natural gas shipments from 1976 to 2000. The Department of Energy (DOE) partnered with private gas companies to complete the first successful air-drilled multi-fracture horizontal well in shale in 1986. Microseismic imaging, an important input to both hydraulic fracturing in shale and offshore oil drilling, originated from coalbed research at Sandia National Laboratories.

The EGSP lasted from 1976 to 1992 and focused on extending and improving recoveries in known productive shale gas areas, particularly the greater Big Sandy Gas Field of Kentucky and West Virginia. Two technologies, which had been developed previously by industry for shale gas formations, were applied: massive hydraulic fracturing and horizontal drilling. In 1976 two engineers for the federally funded Morgantown Energy Research Center (MERC) patented an early technique for directional drilling in shale.

Tax credits and rules which benefited the industry in the 1980 Energy Act were also provided by the federal government. Gas production from Devonian shales was exempted from federal price controls, and Section 29 tax credits were given for unconventional gas, including shale gas, from 1980 to 2000.

The work of GRI and EGSP increased gas production in the southern Appalachian Basin and the Michigan Basin. However, in the late 1990s shale gas was still widely viewed as marginal to uneconomic without tax credits. With expiration of the tax credits, shale gas provided only 1.6% of US gas production in 2000. The EGSP had tested a wide range of stimulation methods, with DOE concluding that stimulation alone could not make the eastern gas shales economic. The US Geological Survey in 1995 noted that future production of gas from the eastern shales would depend on future improvements in technology. However, according to some analysts, the federal programs had planted the seeds of the coming shale gas boom.

Mitchell Energy began producing gas from the Barnett Shale of North Texas in 1981, but the results at first were uneconomic. The company persevered for years in experimenting with new techniques. Mitchell Energy would later abandon a foam frac method developed by EGSP in favor of nitrogen gel-water frac method.

Throughout the 1990s, GRI partnered with Mitchell Energy in applying a number of other technologies in the Barnett Shale. In 1991, Mitchell Energy completed the first horizontal frac in the Texas Barnett shale. This project was subsidized by GRI and funded by a federal tax on gas pipelines. The first attempts at hydraulic fracturing horizontally in the Barnett Shale, and Mitchell's later experiments with horizontal wells, were not economically successful.

Mitchell achieved the first highly economic fracture completion of the Barnett Shale in 1998, by using slick-water fracturing. According to the US Geological Survey: "It was not until development of the Barnett Shale play in the 1990s that a technique suitable for fracturing shales was developed." It was not until 2005 that horizontal wells being drilled in the Barnett Shale outnumbered vertical wells being drilled. By 2008, 94 percent of the Barnett wells drilled were horizontal.

Summary

The pursuit to stimulate well production goes back to the Civil War during the 1860s, leading to the development of hydraulic fracturing techniques in the 1940s and horizontal drilling techniques in the 1980s. As with many things that enhance our quality of life, well stimulation techniques and strategies, in a large part initiated, were also developed within the military establishment – explosives, guns, use of agents such as acids and napalm, and even nuclear. Federal investment in research, and a persistent entrepreneurial spirit of independents shaped the changing energy landscape we have been experiencing over the past couple of decades. From initial successes in the 1980s, horizontal drilling continued to be undertaken with increasing frequency by more and more operators, and is being applied to a multitude of geological and reservoir drilling applications. By 1993, domestic horizontal wells have been planned and completed in at least 57 counties or offshore areas located in 20 States, focused almost entirely on crude oil. With the success of the Barnett Shale in the late 1990s natural gas from shale has been the fastest growing contributor to total primary energy (TPE) in the United States, and has led many others in the southeast (Arkansas' Fayetteville Shale and Louisiana's Haynesville Shale), to pursue shale deposits, with more to follow. No less than 25 current shale plays, and six prospective plays, were noted in the lower United States as of 2015 (Figure 6; American Petroleum Institute, 2015).

It is estimated that hydraulic fracturing will eventually account for nearly 70% of natural gas development in North America (National Petroleum Council, 2011). The U.S. Energy Information Administration (EIA) in 2015 reported that dry natural gas production in the U.S. increased by 35% from 2005 to 2013 resulting largely from the development of shale gas resources (including natural gas from tight oil formations) in the lower 48 states

The EIA (2015) summarized:

Growth in U.S. energy production, led by crude and natural gas, and only modest growth in demand reduces U.S. ٠ reliance on imported energy supplies.

A strong growth in domestic crude oil production from tight formations will lead to a decline in net petroleum imports, and growth in net petroleum product exports in all Annual Energy Outlook cases.

In 2017, the U.S. will transition from being a modest net importer of natural gas to a net exporter.

What more needs to be said!

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Worldwide Hydrocarbon Resources (BBOE)



Figure 2. Worldwide hydrocarbon resources. Note conventional resources make up less than a third of the total.



Figure 1. Schematic diagram of the different types of onshore natural gas plays. Conventional resources are buoyancy-driven hydrocarbon accumulations, with secondary migration and structural and/or stratigraphic closures. Unconventional, continuous gas accumulations, in basin centers and transition zones, are controlled by expulsion-driven secondary migration and capillary seal (USDOI, 208).



Figure 3. U.S. dry natural gas production in trillion cubic feet and billion cubic feet per day for shale resources which as of 2015 remain the dominant source of U.S. natural gas production growth (EIA, 2015). Note shale gas production becomes significant by 2010, and projected to be dominant by 2040.

Figure 4. Greater length of producing formation exposed to the wellbore in a horizontal well (A) than in a vertical well (B). (EIA, 1993).



Figure 5. J.S. Campbell flexible driving shaft (U.S. Patent 459,152, September 8, 1891).



Figure 6. Shale gas plays in the lower United States (American Petroleum Institute, 2015).



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> > Questions welcomed at (916) 445-9686



SPWLA Field Trip led by AAPG members Dry Run and Wet Run -or- Albert Hammond proved wrong

The Society of Petrophysicists and Well Log Analysts (SPWLA) held their Annual International Symposium, hosted by the San Joaquin Well Logging Society (SJWLS) of Bakersfield, in Long Beach, California, July 18-22, at the Long Beach convention center. A highlight of the event was an outstanding field trip, held Saturday July 18th, and co-led by AAPG members: Don Clarke, independent consultant, and Dan Schwartz, Aera Energy. 71 participants from around the world attended. The field trip focused on the unique geology of the Los Angeles basin, with its' prolific urban and offshore production interspersed amongst infrastructure and cities, home to some 12 million people. Geology examples observed and topics discussed included:

- a. Los Angeles Basin architecture, faulting, and urban oil and gas production nestled in between multi-million dollar residences in the Signal Hill Area;
- b. Superb outcrops of channelized turbidites at San Clemente;
- c. More turbidites and some structure in the vicinity of Dana Point; and
- d. A variety of mudstones and fine-grained formations along the Newport Coast.

The dry run for this field trip was conducted in late May, in typical beautiful California weather: sunny clear skies and the high 70's. Ironically, it rained up to 0.33 inches during the field trip, proving successful singer/songwriter (but failed climatologist) Albert "It never rains in Southern California" Hammond wrong.

The SJWLS and SPWLA are grateful for the volunteer time and efforts, and shared expertise, of both Dan Schwartz and Don Clarke.

Thomas Howard President SJWLS 2013-2016



Mr. Don Clarke, Independent Consultant, and field trip Co-Leader.

www.mrlphotobako.com

Michael R Lewis Photography

Michael R Lewis Commercial Photography

661-246-8466 mrlphoto@yahoo.com 1527 19th Street, Suite 332 Bakersfield, Ca 93301





GEOLOGICAL LOGGING INC. 9229 Beatty Drive, Suite B Sacramento, CA 95826 Telephone 916-452-9570 Cell 952-8975 Fax 452-9573 geolog@sbcglobal.net (Continued on next page)

ERNIE BURROUGHS President/Owner Registered Geologist No. 1628



Dr. Dan Schwartz, Aera Energy, explaining LA Basin architecture. Signal Hill, CA. Light rain in the distance.



Flowing water fall near Dana Point, CA.



Mr. Terry O'Sullivan, SJWLS Symposium Planning and Organizing Committee Chairman, examining slump folds in turbidite series near San Clemente, CA.





Complex Geological Structure near Dana Point, CA.

17th ANNUAL "THE WOOLLEY" GOLF TOURNAMENT & BBQ

Sponsored by Coast Geological Society



PROVIDING <u>SCHOLARSHIPS</u> IN THE NAME OF <u>JOHN J. WOOLLEY</u> THROUGH THE COAST GEOLOGICAL SOCIETY (an affiliate of Pacific Section AAPG)

Friday, October 9, 2015

ELKINS RANCH GOLF COURSE – 1386 Chambersburg Road, Fillmore, CA Check-In and Start Times to be Announced

- GOLF -- "SCRAMBLE" Format \$110/person (includes BBQ Dinner)
- Shotgun Start! On-Course Contests! Prizes!
- Not Golfing? Attend BBQ Dinner for only \$20/adult
- Exciting Raffle & Awards to follow tournament at the BBQ
- Multiple sponsorship levels available

For more information or to save your spot, email:

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or go to:

www.coastgeologicalsociety.org

"Thanks for coming by!!"



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

September 15th, 2015, 6:00pm Speaker: Dr. Robert Anderson, Jet Propulsion Laboratory "An Early Earth-like Mars: What Have We Learned from the Mars Science Laboratory Rover (MSL), Curiosity Mission"

October 20th, 2015, 6:00pm Speaker: Matthew Kirby, Cal State Fullerton "Lake Sediments Reveal The Long History of California's Past Droughts" Please mark your calendars for the annual Woolley Golf Tournament & BBQ being held on Friday 9th October, 2015 at Elkins Ranch Golf Course, Fillmore, CA.

Please see the Coast Geological Society web-site for further details!

L.A. Basin Geological Society

LABGS welcomes everyone back from the summer break. September 24th, 2015, 11:30am Speaker: Susan Hough, USGS and Caltech "Recent work on the 1933 Long Beach earthquake"

October 22nd, 2015, 11:30am Speaker: Donald Gautier, USGS-retired "Petroleum in California -LA basin and its remaining recoverable petroleum"

Northern California Geological Society

September 30th, 2015, 7:00 pm Speaker: Dr. Gregory Beroza, Stanford University, Berkeley Seismological Laboratory - Lawson Lecture "Induced Earthquakes in the 21st Century"

October 28th, 2015, 7:00 pm Speaker: Dr. Robert I. Davies, Merced College "Living Above the Fossil Zoo: 23 Million Years of Geologic History Under the Central Valley"

November 18th, 2015 (1 Week Early), 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

October 1-3, 2015: NWEA Fall Symposium in Hood River, Oregon

Energy Infrastructure Preparedness for a Cascadia Mega-Earthquake Northwest Energy Association 2015 Fall Symposium – October 2-3, 2015 Hood River Inn, Hood River, Oregon



Targeted Audience: Regional utilities, municipal and state agencies, interested and concerned scientists and citizens.

Purpose: Learn about the history of mega-earthquakes and their geologic cause and the preparations underway or needed related specifically to energy infrastructure, transport corridors, storage facilities, and distribution systems for fuels and power.

Registration: Begins August 3, 2015 - Motel block available now (541-386-2200)

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.

San Joaquin Geological Society

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

P. O . Box 101288 Anchorage, AK 99510 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: President-Elect: Vice-President: Secretary: Treasurer: Past-President:
- Matt Frankforter Keith Torrance Monty Mabry Eric Cannon Alan Hunter Ken Helmold

mfrankforter@hilcorp.com ktorrance at apcservicesllc.com monte.mabry@bp.com eric_cannon@golder.com paleoman@mac.com ken.helmold@alaska.gov

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 |
|-------------------------|--------------------|
| Past President: | Bob Blackmur |
| Vice President: | Alastair Haddow |
| Secretary: | Eric White |
| Treasurer: | Theresa Heirshberg |
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| Webmaster/Tech Support: | Whit Skaling |

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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: Vice President Treasurer: Secretary: Scholarships: Jean B. Kulla Katherine Kovac Bert Vogler Graham Wilson Karla Tucker k2mobile@MSN.com kovac_km@yahoo.com hvogler@kleinfelder.com Gwilson@SHPI.net ktkr2@aol.com

| Northern California Geological Society | 9 Bramblewood Court | Contact: Barb Matz |
|--|-------------------------|-------------------------------------|
| www.ncgeolsoc.org | Danville, CA 94506-1130 | Barbara.Matz@CBIFederalServices.com |

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)

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NCGS Officers:

President: President-elect: Program Chair: Secretary Treasurer Membership Chair Newsletter Editor Field Trip Coordinator Past President Scholarships

Northwest Energy Association www.nwenergy.us

vacant John Karachewski Dan Day Phil Reed Tom Barry Mark Detterman Tridib Guha Phil Reed Phil Garbutt

Will Schweller

willschweller@yahoo.com vacant cageo@sbcglobal.net danday94@pacbell.net philecreed@yahoo.com tomasbarry@aol.com mdetter1@gmail.com tridibguha@yahoo.com philecreed@yahoo.com plgarbutt@comcast.net

P. O. Box 6679 Contact: Portland, OR 97228-6679 Jim Jackson or John Armentrout

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

Sacramento Petroleum Association

 P. O. Box 1844
 Contact: Jerry

 Folsom, CA 95630
 916-486

Contact: Jerry Reedy or Pam Ceccarelli 916-486-2643 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: Vice-President: Secretary Editor/Treasurer Jerry Reedy David Hartley Derek Jones Pam Ceccarelli JWR5532@aol.com drilmax1@aol.com djones@gasbiz.com 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.

| Ariel Auffant | aauffant@chevron.com |
|-------------------|--|
| Anne Draucker | AnneDraucker@chevron.com |
| Greg Gordon | gsgordon@aeraenergy.com |
| Courtney Marshall | Courtney.Marshall@crc.com |
| Beckie Burston | BeckieBurston@chevron.com |
| Jonathan Goodell | Jonathan.Goodell@crc.com |
| | Ariel Auffant Anne Draucker Greg Gordon Courtney Marshall Beckie Burston Jonathan Goodell |



Charles James , Curator on the left. Larry Knauer, Chevron, Chairman of the CWSR Board of Governors on the right.

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The Repository is located on the south side of the California State University, Bakersfield campus and is open Tuesday thru Thursday 8am-2pm. Appointments are required for core viewing or a tour of the facility. Please visit us on the web at **www.wellsample.com** for our complete catalog and fee schedule or call us at **(661) 654-2324**.



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