Pacific Petroleum Geology

NEWSLETTER

Pacific Section • American Association of Petroleum Geologists

July & August 2018

PSAAPG Students making waves, & Another Great Oil Field Story

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2018-2019 Officers

COVER PHOTO: View Across the Santa Clara River Valley. Photo taken from the pristine Sespe Oil Field. Courtesy of Sergey Piletski.

"Geologists on the whole are inconsistent drivers. When a roadcut presents itself, they tend to lurch and weave. To them, the roadcut is a portal, a fragment of a regional story, a proscenium arch that leads their imaginations into the earth and through the surrounding terrane."
— John McPhee, Annals of the Former World.

- CONTACT THE EDITOR at editor@PSAAPG.org
- 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.

Dear Pacific Section AAPG Members,

Hello Petroleum Geologists!

It is my honor to serve you as President of the Pacific Section for 2018-2019. I see it also as a great responsibility and opportunity. Let me tell you why I feel this way.

First, let's start with the honor. You may not know it, but the Pacific Section has an esteemed history. It was the very first Chartered Section of the National AAPG and formed during a time of major discovery in California. The first geology department at an oil company was formed by Bill Orcutt at Union Oil Company in Los Angeles at the turn of the century. Santa Maria Valley, Kern River and Midway-Sunset were discovered, and then there was a slew of great discoveries in the 1920's (including Huntington Beach, Long Beach, Torrance, Inglewood, etc.). Pacific Section geologists found and developed entire oil fields that had their production from "shale" nearly a century before the "shale revolution" took hold in its present form across the rest of North America. The legacy of Pacific Section petroleum geologists' contribution extends far beyond economic geology to include breakthroughs in the broader disciplines of paleontology, biostratigraphy, stratigraphy, deepwater sandstone depositional processes and architecture, diagenesis and structural geology… just to name a few.

Second, the responsibility. During the past year as President-Elect, I had the opportunity to observe the work of the Executive Committee (Excom) during bimonthly meetings and more frequent email communications. Wow! I have served on a lot of committees and boards, but this group's commitment and efforts are impressive. I learned an enormous amount from working with and observing last year's President Mike Nelson, Vice President Mike Clark, Treasurer Simmie Chehal, Editor-in-Chief Vaughn Thompson, Secretary Tim Gross, Publications Coordinator Larry Knauer, Convention General Chair Becca Schempp, and the other hard-working Chairs, Liasons, Delegates, Presidents of affiliated societies, and volunteers at the annual convention that are too many to name here (but, I wish I could).

This group of extraordinary people has impressed me with their dedication and service and they followed earlier generations of generous and diligent geologists. They handed me a strong, vigorous organization in good fiscal shape that I will do my best to preserve and help flourish.

Third, the opportunities. We are at critical time for the profession, industry and society. Oil and gas will continue to be the predominant source of energy for the USA and the world. Even with impressive (and important) growth of alternate energy and in the tremendously increased efficiency and cleanliness of nearly all aspects of energy use, natural gas and oil will continue to be the predominant energy source for long past our lifetimes due to growth in global need. New technologies and targets have recently turned the conventional petroleum world upside down. However, California industry retrenched in recent years, with declining employment of petroleum geologists and limited opportunity to generate or test bold and innovative ideas. This seems to be turning around. I believe that prospects are improving, and we will need more experienced professionals to return to work, need to engage and excite more students, need to continue to reach out and work with other communities and government agencies, and then we will be able to explore new opportunities and understandings for the benefit of all.

I hope that the Pacific Section AAPG will play a role in this future. I look to you for help and suggestions.

Richard Behl
PSAAPG President, 2018-2019

2018 PSAAPG NEWSLETTER has gone DIGITAL!

In a continual effort to reduce overhead and provide meaningful programs to our membership and the community, PSAAPG have decided to go DIGITAL. For those members still wanting hard copies of the newsletter, please email greg.thompsn@gmail.com or write to us at Pacific Section AAPG, P.O. Box 1072, Bakersfield, CA, 93302.

PSAAPG Membership Directory

The PSAAPG website will have a members-only password-protected membership directory available on March 1, 2018. Please email greg.thompsn@gmail.com if you do not want your name listed. There will also be a checkbox for this on the PSAAPG membership renewal form that goes out before the end of this year.

MUNGER MAP BOOKS

The CA Well Sample Repository is seeking donations of MUNGER MAP BOOKS. The collection is incomplete, so any donations would be kindly appreciated!!! Please contact Larry Knauer at laknauer@aol.com

From Tar Seeps to Anticlines and Back: The History of the Sespe Oil Fields

by Michael S. Clark
Consulting Geologist, Bakersfield

The Sespe oil fields are five separate, yet similar, oil pools, deep in the heart of California's Transverse Ranges that are some of the most fascinating and historically important of the many oil fields in the Golden State – fascinating because these fields sit in a unique and beautiful area of spectacular rock outcrops and tar seeps that has attracted generations of outdoorsmen and oil seekers. Historically important because the Sespe is also a land of steep, unforgiving terrain that has challenged the engineering skills of oil entrepreneurs for more than a century – the roads they built bearing silent testimony to the ruggedness of the land (Photo 1).

Photo 1: Hauling supplies into the Sespe oil fields near the turn of the century. This road, which is still the main access to the wells, is just as steep and treacherous today as when it was first built, over one hundred years ago.

This unusual combination of oil riches and rough terrane has resulted in a rich history that spans the growth of the California oil industry from its beginning in the 1870s right up to the present.

Nestled in the Topatopa Mountains, which represent the uplifted northeast rim of the Ventura basin (Figure 1), the lands surrounding the Sespe fields are wild and remote with shear canyon walls and chaparral-covered hillsides once frequented by California Condors. Most of this region was set aside in 1947 as the Sespe Condor Sanctuary. Today, it is part of the Sespe Wilderness Area—public lands with restricted access that include most of the undrilled acreage surrounding the oil fields. This protected status has suppressed wildfires that in the past thinned a thick, in some places nearly impenetrable, brush that blankets the region. As a result, the Sespe area has not burned since 1917 and now represents the last mature sagebrush forest in southern California.

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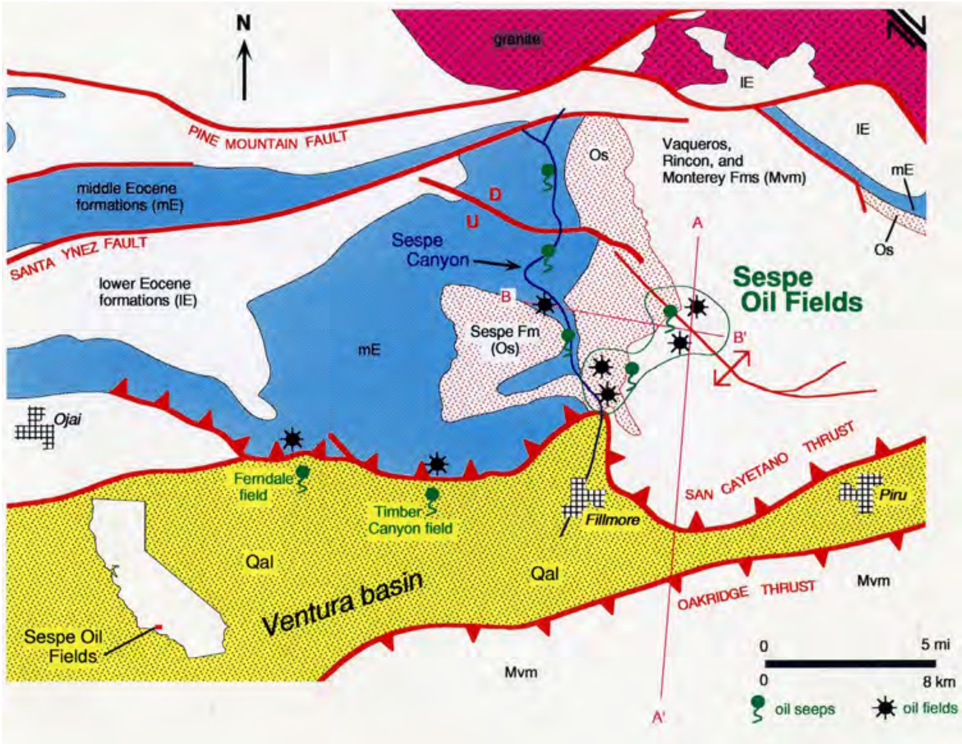

Figure 1: The San Cayetano thrust marks the southern boundary of the Sespe oil fields and thrusts the Topatopa Mountains southward over the Santa Clara River Valley. The rugged terrain evident in Photos 1-6 results largely from recent, rapid uplift along this thrust.

Spectacular cliffs line the lower canyon of Sespe Creek, a deep chasm in the Sespe Wilderness that dramatically exposes three thousand feet of Tertiary sedimentary section (Photo 2).

Photo 2: Three thousand feet of Tertiary sedimentary section are spectacularly exposed on the walls of Sespe Canyon.
The redbeds on the canyon rim are the basal Sespe Formation, the most prolific of several oil-producing zones in the fields.

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Interestingly, these cliffs contain the same rocks that produce oil and gas from the nearby Sespe oil fields, located less than two miles east of the canyon. Oil leaking out of subsurface reservoirs in the fields flows updip to oil springs and tar seeps at the base of the canyon walls. Tributary streams entering the main gorge also abound in seeps, some of which are home to *Helaeomyia petrolei*—the "so-called" petroleum fly that spends the maggot phase of its life cycle living in tar mats (Thorpe, 1930, 1931, and Kadavy et.al, 1999). For hundreds, perhaps thousands, of years these natural seeps have discharged oil into Sespe Creek.

Today the Sespe seeps produce only tar, but a few once flowed unusually high-quality oil that burned clean in lamps without refining. Swarms of prospectors flocked to the Sespe foothills in the late 1870s in search of new seeps. Their explorations ultimately led to discoveries of subsurface oil at the Tar Creek, Little Sespe Creek, Foot-of the-Hills (Coldwater anticline) and Topatopa Anticline fields in the Sespe foothills, and the Sections 23 and 26 Field in the main Sespe Canyon (Figure 2).

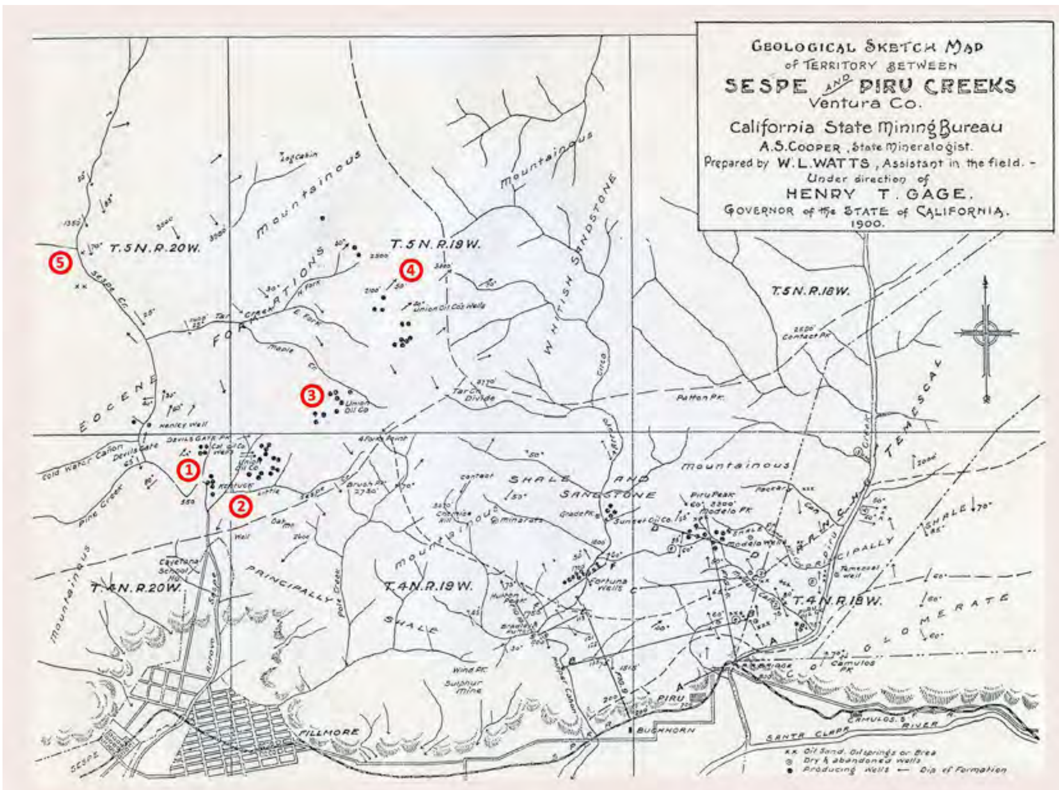

Figure 2: Although discovery and initial development of the Foot of the Hills (1), Little Sespe Creek (2), Topatopa (3), and Tar Creek (4) fields took place more or less independently, these areas now overlap to form the Sespe oil fields complex. The outlying Sections 23 and 26 field (5) was not discovered until 1905, five years after E. L. Watts of the California State Mining Bureau drafted the original version of this map (Watts, 1901).

Although much less abundant today than in the 1800s, these seeps still discharge significant volumes of oil, perhaps as much several barrels a day, into Sespe Creek, its tributaries, and the surrounding landscape.

Although discovery and initial development of these fields took place more or less independently, they represent basically the same petroleum accumulation. Thus, they are known collectively as the Sespe oil fields. Ironically, the last field discovered, known as the Sections 23 and 26 area, is the only one now abandoned.

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Today, 340 active and shut-in oil wells in the Sespe fields produce from Tertiary reservoirs in the upper plate of the San Cayetano thrust, a Pliocene-to-recent fault that thrusts the Topatopa Mountains southward over the Santa Clara River Valley (Figure 3).

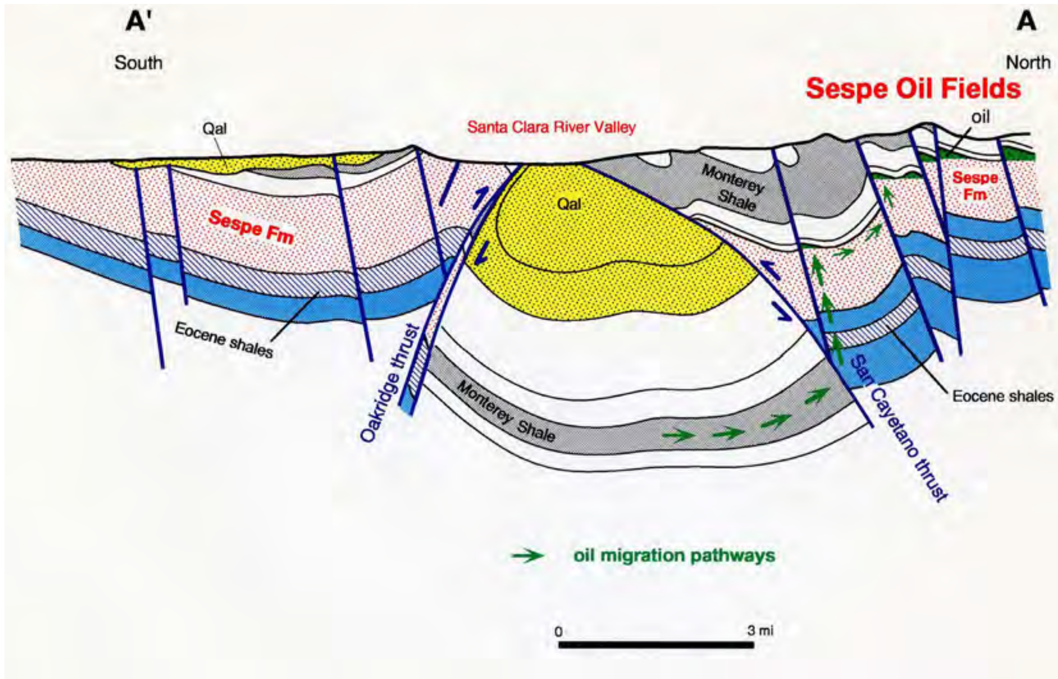

Figure 3: Oil in the Sespe fields derives from organic-rich source beds of the Monterey Formation that sit in the lower plate of the San Cayetano thrust. After generation, this oil migrates, upward through the thrust, to accumulate in overthrust reservoirs of the Sespe Formation.

Whereas subthrust Pliocene rocks produce oil at nearby Timber Canyon and Ojai fields, there is no subthrust production at the Sespe fields.

Recent, rapid uplift along the San Cayetano thrust results in an unusually steep terrain that complicates access to many of the wells. For example, the Frankel B lease, located on a ridge top at 4,296 feet above sea level, contains the highest producing oil wells in the state, and sits 3,000 feet above adjacent wells in Sespe Canyon. Both ridge top and canyon wells are reached only by dirt roads subject to washouts. Elsewhere in the field, there are wells that can no longer be driven to at all. In fact, landslides isolated the Sections 23 and 26 Field in Sespe Canyon the late 1960s—an event that eventually required a helicopter-supported operation by the California Division of Oil and Gas to plug long-abandoned wells that were leaking oil into Sespe Creek[1].

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Braided fluvial to alluvial, conglomeratic redbeds of the upper Eocene to Oligocene Sespe Formation are the most prolific of several reservoirs that produce oil from the fields. In fact, these redbeds account for over 90% of the more than 44 million barrels of oil produced here since 1887. Spectacular exposures of Sespe redbeds characterize the rim of Sespe Canyon and crop out in the oil fields (Photo 2). Other producing reservoirs that crop out nearby include the Miocene Rincon and Vaqueros Formations, and the Eocene Coldwater and Matilija Formations.

The Sespe district gained notoriety in 1874 when Joe Dye, a local gunfighter and former Mother Lode miner, claimed discovery of some spectacular oil seeps at Tar Creek, a steep-walled tributary of Sespe Canyon. The *Ventura Signal* of August 8, 1874 reports that "one-hundred oil springs" (later reduced to twenty) were found on a branch of Sespe Creek. Although Dye is not mentioned, he was probably the discoverer[2]. On May 15, 1875, the same newspaper, quoting the *Bakersfield Southern Californian*, reports that "somewhere in the Alamo Mountains [another name for the Topatopa Mountains] Mr. Joe Dye has discovered a flow of fine petroleum . . . said to be one of the best ever found in the state." These oils were of such high quality that when burned in lamps, straight from the seeps with no refining, they produced little smoke or soot—a plus to a society that depended solely on lamplight once the sun had set.

Drilling of the first truly commercial oil well in California at nearby Pico Canyon in 1876 drew public attention to Dye's discovery. As prospectors swarmed into the Sespe hills to stake claims on other seeps, disputes arose. To the ire of some locals, one group of entrepreneurs formed the Los Angeles Oil Company and began that same year to build an expensive road to exploit seeps along Little Sespe Creek. A successful well that the company drilled a year or two later, near a particularly spectacular seep (Photo 3), probably ruffled more feathers[3].

Photo 3: Abundant tar seeps in the Sespe foothills originate from oil leaking updip out of reservoirs in the nearby oil fields. This seep on Little Sespe Creek is near the site of the Los Angeles No. 1 well which in 1878 brought in the first oil production from the Sespe area.

To avoid disagreements, prospectors organized the Little Sespe Petroleum Mining District in 1878 to regulate their claims[4].

Initially, crude oil from the Los Angeles well was hauled in wooden barrels by horse-drawn wagon to a small refinery at the mouth of Sespe Canyon – a perilous journey down the Little Sespe Road (Photo 1). Limited to a daily capacity of only about twenty barrels, this refinery produced lubricating flux (asphalt), and a small percentage of lamp oil (kerosene) that sold locally. Later, a pipeline transported Little Sespe crude directly to the refining still[5].

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The Los Angeles well was rumored to produce some thirty to forty barrels of oil a day until 1882 when someone maliciously plugged the well and ruined it[6]. Attempts to reestablish production were unsuccessful, and the flow of oil down the canyon stopped. Even though Joe Dye, self-proclaimed discoverer of the Sespe seeps, was at one time a security guard on the Los Angeles Oil Company payroll, it appears likely that he had a hand in the plugging[7].

Continuous production from the Sespe did not begin until 1887 when Thomas Bard, a future United States senator, teamed up with two seasoned veterans of the Pennsylvania oil fields, Lyman Stewart and Wallace Hardison, to drill a well in the highlands above the old Los Angeles lease[8]. Their well, the Tar Creek No. 1 (Photo 4), discovered the Tar Creek oil field and was soon followed by discoveries of the Topatopa (1889), Little Sespe Creek (1891), and Foot-of-the-Hills (1891) areas (Figure 2). With only a few wells on pump, these pools produced 90,000 barrels of oil in 1892[9], almost one-fourth the entire output of oil from California for that year[10].

Photo 4: The Tar Creek No. 1 well (above) that Hardison, Stewart and Bard drilled in 1887, is often described as the discovery well of the Sespe oil fields. Actually, the first production came nine years earlier from the Los Angeles Oil Company well No. 1, which was drilled at Little Sespe Creek near the seep in Photo 3.

These early wells produced primarily from the Vaqueros and uppermost Sespe Formations, near-surface reservoirs with strong meteoric water drives that responded to heavy rains with increased oil production. Although these wells typically came in strong with high flow rates when first completed, many were producing at marginal rates of less than ten barrels of oil a day, and lots of water, just a few years later (Eldridge and Arnold, 1907; Kew, 1924).

By 1900, the oil fields were in decline. Despite the 1905 discovery of the Sections 23 and 26 area in the main Sespe canyon, production plummeted—reaching a low in 1913 of only 15,722 bbls/year[9]. A devastating brush fire in 1917 made matters even worse by burning houses, tanks, and twenty wooden derricks[11]. Although these facilities were quickly rebuilt, and field productivity restored to 40,000 bbls/year, few new wells were drilled—leading to predictions that future production "will never be increased to any great extent[12]".

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The 1934 discovery of oil in the X zone of the lower Sespe Formation revived interest in the fields. As old wells were deepened and new ones drilled, production rose dramatically to 97,600 bbls/year, the highest level since 1892. Interest in this new zone was so great that some operators even placed wells precariously straddling narrow ridge tops in a quest to fully exploit the reservoir (Photo 5).

Photo 5: Despite rugged topography, the X zone of the basal Sespe Formation was such a prolific oil producer in the 1930s that some operators in the Foot-of-the-Hills area placed their wells on exposed ridges to better exploit the reservoir. Note the 40° rail tram that leads to this precariously placed wooden pumping jack.

Development of yet another new zone in 1963, the prolific Z conglomerate in the basal Sespe Formation, resulted in another dramatic production jump, this time to 225,000 bbls/year. As innovative drilling and completion techniques were applied to the Z interval, production reached an all-time high in 1970 of 2,500,000 bbls/year. Even though the field output, most of it from the basal conglomerate, has since declined to less than 550,000/yr, the Sespe remains the fifth largest oil field in the Ventura basin and will undoubtedly produce oil for many years to come.

When prospectors first began looking for oil on the margins of the Ventura basin in the 1860s and 1870s, they drilled shallow wells next to tar seeps to produce a thick, smelly oil (low-gravity and high-sulfur) that flowed only a few barrels per day. Wallace Hardison and Lyman Stewart theorized that these heavy, viscous crudes originated from light oils at depth and changed to heavy oils as they migrated updip to surface seepages[13]. Thus, Hardison and Stewart tried to get closer to the oil sources by locating their wells at Tar Creek, higher in the mountains and away from the seeps (Photo 6).

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Photo 6: Although these early Tar Creek wells are sited on the giant Topatopa anticline, it was tar seeps, not structure, which first led prospectors to this rugged area. By locating their wells uphill and downdip from the seep in Photo 3, Wallace Hardison and Lyman Stewart were able to get closer to the subsurface oil sources and produce a higher-quality crude oil than their predecessors.

Although these uphill wells required deeper drilling, they penetrated the producing formations structurally downdip from the seeps and found a lighter, sweeter crude that flowed at higher rates.

Geologists pointed out that the Tar Creek wells sat on the crest of the Topatopa anticline, a giant structure trending through the fields, and they attributed the oil there to I. C. White's (1885) "anticlinal theory" which proposed that oil and gas accumulate as high as possible in reservoirs. Hotly debated at the time (Howell, 1934), this theory was accepted, for the most part, in the Sespe fields, and subsequent wells were preferentially located on structural highs. Nonetheless, continued drilling on the field margins found oil in the structural lows as well. In fact, Little Sespe Creek field produces oil from the axis of the Pine Canyon syncline—an indication that there was oil to be found almost anywhere one chose to drill in the Sespe.

Although some geologists found the idea of synclinal oil pools hard to accept (e.g., Eldridge and Arnold, 1907, p. 57), these anomalies demonstrated that structure was not the only factor controlling where the oil accumulates. Consequently, E. H. McCollough in 1934, using examples drawn from several California oil fields, introduced the concept of the petroleum "trap". He proposed that oil accumulates not only in structural highs, but is also trapped in fractures, local zones of high porosity, in stratigraphic pinchouts, and beneath erosional truncations and tar seals.

Realizing that "no clear geological picture of the [oil] pool and its reason for being can be presented", geologists theorized that "fracture conditions control the accumulation" of oil in the fields (Kaplow, 1949). Ultimately, the Sespe reservoir was characterized as a "dual-permeability system" that initially produces from high-permeability fractures. As these fractures rapidly deplete, production then shifts to the low-permeability (<4 md), low-porosity (<11%) sandstone matrix.

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One consequence of this dual-permeability model was the introduction in the 1960s of innovative drilling and completion techniques to more efficiently exploit the fractured Sespe reservoir. Some wells were drilled deviated, at angles of several degrees from vertical, to intersect regional joint sets in the reservoir at high angles—thereby maximizing the number of fractures penetrated by the wellbore. Other wells were drilled with air to avoid contact of drilling fluids with the tight sandstone matrix—thereby avoiding permeability reductions due to migration of clay particles (illites and kaolinites) into narrow pore throats, and due to expansion of swelling clays (smectites) lining the framework grains.

Field operators also began high-pressure injections of sand-fluid slurries into production zones, operations called "frac jobs", to increase oil production by stimulating fracturing of the reservoir rock (Dosch, 1967). Typically, a frac job enhances the initial production of a well and results in flow rates of 100 to 500 barrels per day. However, these rates rapidly decline to just a few barrels per day as the fracture systems deplete and production then shifts to the low-permeability sandstone matrix (Ritzius, 1966; Annual Reports, 1976, v. 61, p. 24-25; Nulty, 1982).

Historically, the Sespe oils were assumed to derive from organic-rich shales of the Eocene Juncal and Cozy Dell Formations contained in the upper plate of the San Cayetano thrust (Kew, 1924; Taliaferro et al., 1924; Bailey, 1947). Typically, these shales contain 1 to 2 % total organic carbon (TOC)—an adequate, but by no means rich, organic content. However, recent biomarker and carbon isotope analyses indicate correlation of the Sespe oils to even richer shales (3 to 5 % TOC) of the Miocene Monterey Formation which are located in the lower plate (Lillis and Clark, 1991; Clark et al., 1994). If so, primary oil migration (expulsion) is required from subthrust source rocks, followed by secondary migration (reservoir filling) of these oils through the San Cayetano thrust to overthrust reservoirs (Figure 3).

Tertiary oil migration (leakage) is also evident. Geochemical studies indicate that the Sespe Canyon tar seeps result from oil leaking updip out of subsurface reservoirs in the fields (Lillis and Clark, 1991). Also, tar seeps along the San Cayetano thrust at the Timber Canyon and Ferndale fields are sourced by oil that is either leaking updip out of subthrust traps and accumulations, or oil that is currently being generated and expulsed by subthrust source rocks.

Essentially no seal exists between the subthrust oil sources and the surface tar seeps—the only migration barriers being fractured, calcite-cemented sandstones and slow oozing tar mats (Figure 4).

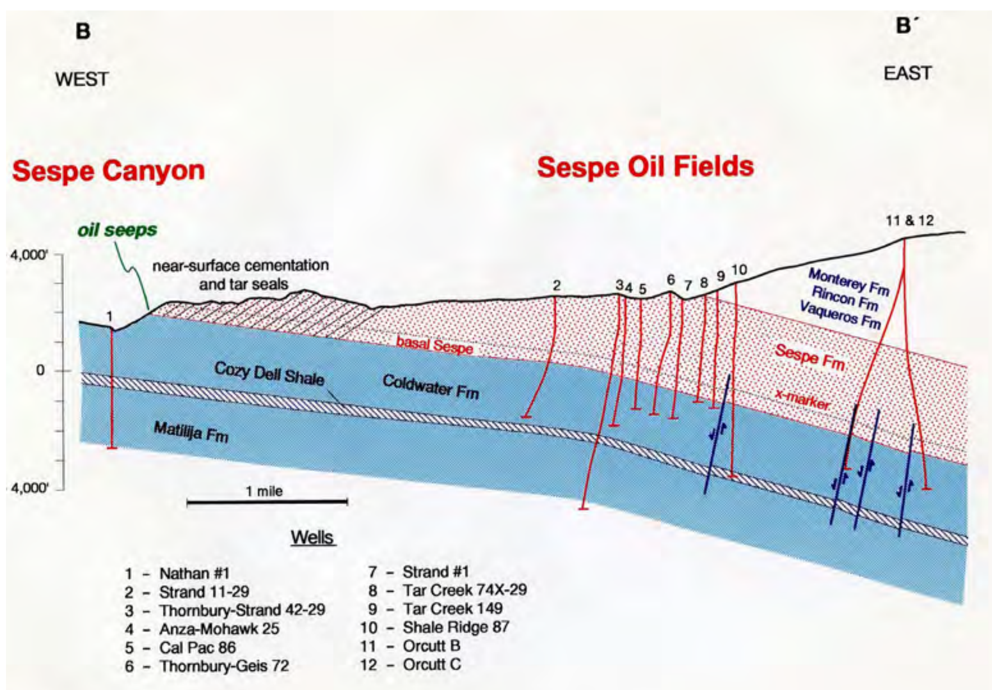

Figure 4: Essentially no trap exists between producing reservoirs in the oil fields and abundant tar seeps that are located just west of the field complex. This indicates that the oil pools may actually be kinetic accumulations that result when oil migrates into the reservoirs faster than it leaks out.

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Because these barriers leak, they are not true seals at all and serve only to slow the oil down on its upward journey to the surface. This indicates that the field may actually be a "kinetic accumulation" in which subthrust sources supply oil to overthrust reservoirs faster than oil leaks out of the reservoirs to surface seeps (Clark et al., 1994). Because bottlenecks are created, oil backs up behind these to form pools. Thus, oil is continually replenished as it produced, *albeit very slowly,* by new supplies migrating in from below. Oil not produced migrates to the surface where it is lost through evaporation, oxidation, and bacterial biodegradation.

Although there are several ramifications to this model, one especially hearkens the explorationist. Because the oils are in a current state of migration, kinetic accumulations are possible anywhere along the migration path. Thus, undiscovered accumulations may exist between the present field and surface seeps at the end of the migration path.

In essence, exploration and development strategies in the Sespe oil fields have moved a full circle since the early days when prospectors drilled tar seeps looking for a few barrels of heavy crude. Although these entrepreneurs moved away from seepages to the tops of anticlines in search of more oil, geologists may one-day move the search back to the drill sites of their predecessors, looking for kinetic accumulations between the oil fields of today and the tar seeps where it all began.

ACKNOWLEDGEMENTS

Many thanks to Glen Gregory, Tom Hopps, Paul Lillis, and Steve Mulqueen for keeping me well supplied with data and advice over the years; and to Doug Waples who first suggested that the Sespe fields may be a kinetic accumulation.

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5. Hanks, 1884, p. 303; Youle, 1926, p. 49; White, 1962, p. 45, 47-48.

6. Goodyear, 1887, p. 104; Hutchinson, 1965, v. II, p. 5; v. II; White, 1962, p. 82.

7. Although never implicated, Joe Dye was well known for similar acts of treachery. His demise came after he tried to cheat the California Oil Company out of their Razzle-Dazzle No. 1 well, the discovery well of the Foot-of-the-Hills field. When Mason Bradfield, a former protégé, refused to go along with Dye's scheme, the two came close to blows. Bradfield later ambushed Dye in Los Angeles in 1891 and gunned him down with a shotgun. Few mourned Dye's passing (Sheridan, 1926, p. v. I, p. 333-336; Hutchinson, 1965, v. I, p. 20-21; Outland, 1984, p. 27-28; Los Angeles Times, May 14, 1891).

8. Welty and Taylor, 1966, p. 86-87 & 338. Bard was a veteran of the oil fields as well, having been in 1866 the first person in California to successfully drill a producing oil well with a steam-powered drill rig. Though stormy, his partnership with Hardison and Stewart, successfully paired Bard's financial resources with Stewart's "nose for oil". Bolstered by successes at Tar Creek and elsewhere, the partners incorporated their holdings in 1890 to form the Union Oil Company of California, a global enterprise known today as the Unocal Corporation.

9. Production statistics for the Sespe fields from 1892 to 1967 are listed in Table 1 of Dosch (1967). Statistics for 1968 to 1994 are given in the Annual Reports, v. 54-80.

10. According to annual records of the California State Mineralogist, the state produced 385,049 barrels of oil in 1892.

11. Dosch, 1967, p. 41.

12. Kew, 1924, p. 126-127.

13. Youle, 1926, p. 49-53; Welty and Taylor, 1966, p. 81.

PSAAPG's 2018 Imperial Barrel Award (IBA) Competition

This year Pacific Section held its Imperial Barrel Award (IBA) competition on March 23 in Bakersfield (Thanks to the generous sponsors, Aera, Black Fox , CRC, and PSAAPG).
We had three teams compete for the opportunity to go on to the AAPG Annual convention in Salt Lake City, and compete against schools from all over the world.

The three PSAAPG teams that competed were: University of Alaska Anchorage -first time competing; California State Long Beach-Stanford- combined team; San Diego State University compete every year.

The teams all had the same Australian data set to explore and present their findings to a panel of judges. We did have our first virtual competitors this year- the University of Alaska Anchorage requested to compete virtually. Virtual competitions may be the new norm but as long as we have sponsorship we will continue to host the competition in person. I want to thank our sponsors Aera, CRC, Pacific Section, and Black Fox!! We also had a team of five industry judges and numerous volunteers.
Thank you!

All the teams worked extremely hard, had great presentations, and I hope learned how a petroleum geologist defines a play and uses all the supporting data to formulate a plan and then how to present their finding to management or business partners.

The Winning Team - San Diego State.

The winning team from left to right:
Madison Burvant, Kip Hering, Michael Levenson, Bonnie Bloeser,
Jack Brown, Mark Nahabedian, Bennet Spevack, and Abbey Warner.

San Diego State won the Pacific sections competition, and went on to Salt Lake City to compete against 12 teams from around the world and from the US.

(Continued on next page)

I am very excited to announce the San Diego State IBA Team not only represented the PSAAPG, they won second place in the global competition, the Selley Cup, and $10,000 for their University!! Although since 2007 we have been very well represented at IBA competitions, this is the first time a PSAAPG team has made it to the top three in the global competition!

The winning team from left to right:
Michael Levenson, Abbey Warner, Madison Burvant,
Mark Nahabedian, Jack Brown, and Kip Hering (Advisor).

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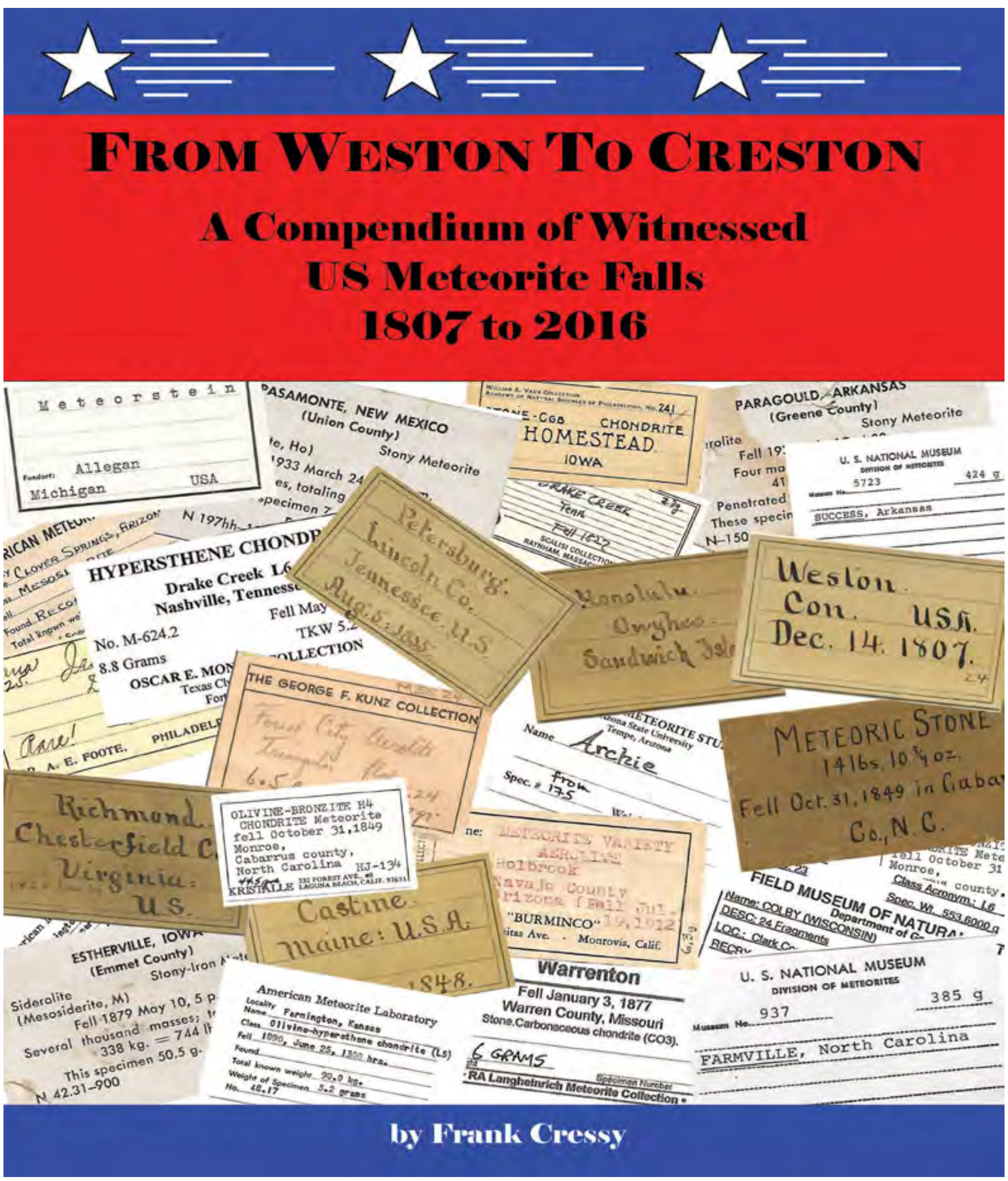

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Alaska Geological Society

Summer break. Talks to resume in September, 2018.

Coast Geological Society

Summer break. Talks to resume in September, 2018.

September 18th, 2018.
Speaker: Roger Putman, Moorpark CC.
Talk: Title to be provided. Talk will be about El Capitan.

L.A. Basin Geological Society

Summer break. Talks to resume in September, 2018.

Northern California Geological Society

Summer break. Talks to resume in September, 2018.

September 26th, 2018.
Speaker: Dr. Artie Rodgers, Lawrence Livermore National Laboratory.
Talk: "High-performance computing ground motion simulations of large, damaging Hayward Fault scenario and moderate earthquakes in the USGS 3D model of the San Francisco Bay Area".

Northwest Energy Association

Summer break. Talks to resume in September, 2018.

Sacramento Petroleum Association

Summer break. Talks to resume in September, 2018.

San Joaquin Geological Society

Summer break. Talks to resume in October, 2018.

SJGS AND SPE JOINT GOLF TOURNAMENT tentatively set for September 14th, 2018.
Keep an eye on your email for further info!!!

Alaska Geological Society

www.alaskageology.org

P. O . Box 101288
Anchorage, AK 99510

Contact: Dave Buthman
dbuthman@hilcorp.com

Geology meetings/talks 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 am to 1:00 pm. Open To The Public. No Charge to Attend.

President:	Larry Smith	ljsmith@gci.net
President-Elect:	Greg DuBois	
Vice-President:	Keith Torrance	keith.torrance@uicurniaq.com
Secretary:	David Buthman	dbuthman@hilcorp.com
Treasurer:	Carla Sanchez Phelps	carlasphelps@gmail.com
Past-President:	Chad Hults	chadcph@gmail.com

Coast Geological Society

www.coastgeologicalsociety.org

P. O. Box 3055
Ventura, CA 93006

Contact: Theresa Heirshberg
805-443-7641

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 Shelby Fredrickson (secretary@coastgeologicalsociety.org), and should be made by 4:00 p.m. on the Friday before the meeting.

President:	Theresa Heirshberg	president@coastgeologicalsociety.org
Past President:	Alastair Haddow	pastpresident@coastgeologicalsociety.org
Vice President:	Eric White	vicepresident@coastgeologicalsociety.org
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Treasurer:	Stacey Zeck-Boles	treasurer@coastgeologicalsociety.org
Membership chair:	Bonnie Walters	membership@coastgeologicalsociety.org
Webmaster/Tech Support:	John Rice	webmaster@coastgeologicalsociety.org

Los Angeles Basin Geological Society

www.labgs.org

Contact: Bert Vogler
949-585-3103

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 Maia Davis at 530-559-1404 or maiac.davis@gmail.com. Reservations are best made prior to Tuesday before the meeting.

President:	Bert Vogler	hvogler@kleinfelder.com
Vice President	Nate Busch	nbusch@eecenvironmental.com
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Scholarships:	Karla Tucker	ktkr2@aol.com
Webmaster	Ivan Aburto	Ivan.aburto@crc.com

Northern California Geological Society

www.ncgeolsoc.org

803 Orion #2
Hercules, CA 94547-1938

Contact: Barbara Matz
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)

NCGS Officers:

President:	Greg Bartow	gregbartow@yahoo.com
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Past President:	Will Schweller	willschweller@yahoo.com
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Scholarships:	Phil Garbutt	plgarbutt@comcast.net
Program chair:	John Karachewski	cageo@sbcglobal.net
Website Manager:	Mark Detterman	mdetter1@gmail.com

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	Laird Thompson	lbtfracs@gmail.com
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Sacramento Petroleum Association

P. O. Box 1844
Folsom, CA 95630

Contact: 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:	Scott Hector	Scott.Hector@gmail.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: Lindsey Thompson
lthompson@envirotechteam.com

We have dinner meetings on the second Tuesday of the month, October through June, 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:	Cameron Campbell	cameron.campbell@conservation.ca.gov
Past President:	Greg Gordon	gsgordon@aeraenergy.com
President-Elect:	Jonathan Goodell	Jonathan.Goodell@crc.com
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