Pacific Petroleum Geology
NEWSLETTER
Pacific Section • American Association of Petroleum Geologists
January & February 2019

California Oil Boom, 2019 Annual Convention Preview, PSAAPG Constitution & By-Laws, and Remembering A Member

www.psaapg.org

2018-2019 Officers

Staff

4 **President's Message** *Richard Behl*

5 **In Memoriam** *Dr. John A. Minch*

6 **2019 Annual Convention Call for Papers**

7-21 **Member Article & Bio** *Stephen M. Testa*

24 **New Membership Classification Proposed**

25 **Constitution & By-Laws**

34 **Member Society News**

COVER PHOTO: Partial view of vintage postcard displaying oil wells in Los Angeles City. Full postard seen in Member Article, p. 10.

PSAAPG Newsletter has now gone DIGITAL!

In an effort to reduce overhead and provide meaningful programs to our membership and the community, PSAAPG has decided to go DIGITAL!

For those members still wanting hard copies of the newsletter, please email **editor@psaapg.org** or write to us at:

Pacific Section AAPG
P.O. Box 1072
Bakersfield, CA, 93302

- 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.

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Societies Free Advertising:

Convention: Unlimited Space in PSAAPG Newsletter
Societies: 1/4 Page in AAPG Explorer

Dear Pacific Section AAPG Members,

Happy New Year to you all! I wish you health, wealth, love, happiness, and fulfillment in your professional and personal lives. One way that we become eternally refreshed and enriched is through our community activities and by our intellectual growth. We are fortunate that these opportunities exist in our chosen careers.

Some of the most important community and professional development activities in our profession are our annual meetings. The 2019 Pacific Section AAPG Conference will be held April 1-3 in the Pointe Conference Center in the Walter Pyramid of Cal State Long Beach (Go 49ers!). The theme of the meeting is "West Coast Creativity in Exploration and Production". In line with this theme, and thinking "outside of the box", we are delighted to present a new format and focus that we hope will stimulate your own creativity and success. This will be a field-based conference with a focused theme for one main technical session, as well as parallel oral and poster sessions for other technical aspects of petroleum-related and sedimentary geology. Two stimulating field trips and the All-Conference Awards dinner will be included with registration.

As we discussed in previous newsletters, new insights come from being exposed to new ideas and embracing new perspectives. Field studies or organized field trips are one of the best places that we are forced to expand our minds and challenge our preconceptions when we come face-to-face with real-world relationships and features that we need to understand and explain. This experience is what makes the value of field trips priceless. The two field trips integrated into this year's conference will visit opposite ends of the Los Angeles Basin – The Malibu Coast in the north and the San Clemente-Dana Point area in the south. The first will take you to an only recently studied section of the Monterey/Modelo that will let you examine the mixed siliciclastic and biosiliceous deposits that make up an intercalated conventional and unconventional reservoir at the fringe of a submarine fan. The second will take you to classic deep-water sandstone exposures, that have been reinterpreted in the light of new research on the control of synsedimentary tectonics on accomodation space, stacking patterns and reservoir connectivity.

In between the two field trips, we will have a day of oral and poster technical presentations. A special theme session on "Creativity and Opportunities In West Coast Energy" with many invited speakers will focus on creative solutions for finding and producing more hydrocarbons, improving the environment impact of hydrocarbon production, on turning waste into resource, and applying petroleum geology skillsets and approaches to aid in other aspects of the evolving world economy.

We are also trying to be creative by offering two new kinds of oral sessions that we hope will be helpful to the PS-AAPG membership. One session would be to invite government agencies (e.g., DOGGR, BOEM, BLM, USGS, Water Resources, State Lands, etc.) to share information about new programs, policies and initiatives, let us know how best to work together and to answer our questions for them. The other new session would be for Exhibitors/Vendors/Service Companies to tell us about their latest tools and services and how they can help us be successful in our jobs.

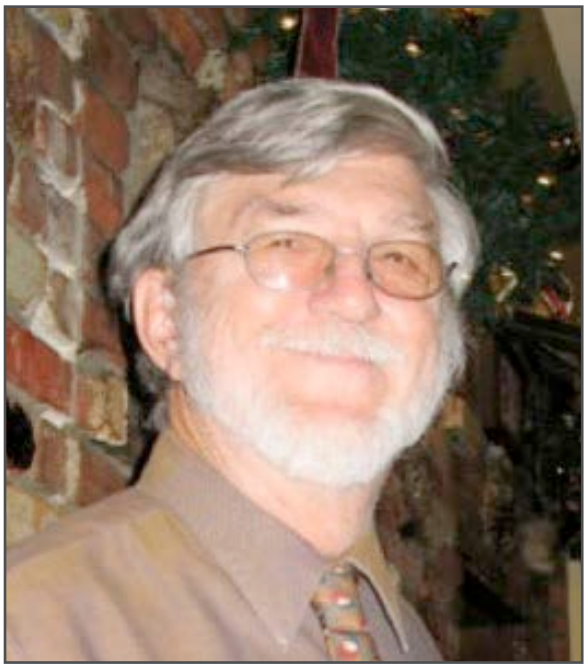
Last year's conference in Bakersfield was fantastic, but we are excited about trying this new convention format that we hope will stimulate new ideas and connections for all the Pacific Section members. Look for the Call for Papers and come join us in Long Beach and in the field for the 2019 Annual Convention.

Richard (Rick) Behl

PSAAPG President, 2018-2019

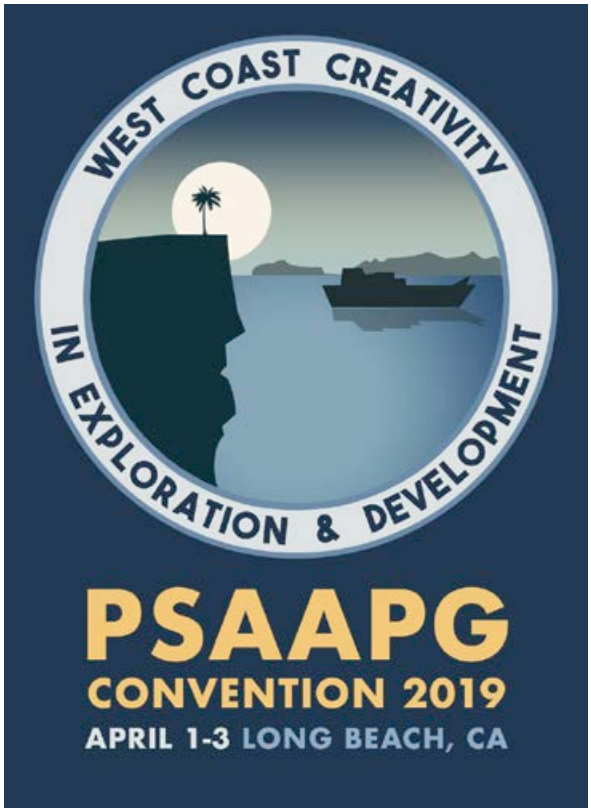
Dr. John A. Minch

October 24, 1939 - November 21, 2018



With sadness we convey the passing of Dr. John A. Minch on Wednesday, November 21st, 2018 following a long and valiant fight with prostate cancer. John's spirit and enthusiasm for geology and paleontology will most assuredly live on in his many thousands of former students, both in the U.S., and in his beloved Baja California, his colleagues, prolific publication of hundreds of papers, books, and volumes; and particularly by his proud editing and publishing of the entire Dibblee Geologic Map Series of California. John was unique in his innate ability to have excelled both in academia and teaching which spanned more than six decades, and in business where his eldest son now proudly carries on with the success of John Minch & Associates. His deep commitment to the geologic community was felt from national AAPG committees and conventions to local society chapters and private foundations in California. John's passion for geology was evident in his broad expertise across so many specialties of the profession, ranging from paleontology, geology, and engineering geology, to mineralogy and mining, to coastal and marine geology, faulting and tectonics of the California Continental Borderland. His latest geologic guidebook completed a near lifetime study of the geology and active faulting along California's international border with Baja California, an area he began studying as an undergraduate and later, a graduate student of Edwin Alisson and Gordon Gastil with whom he shared his passion for Baja and its unique geology. Most recently, John's publication of the San Diego Association of Geologist's guidebook to the Geology and Geologic Hazards of Northwestern Baja California: The Gold Coast & Agua Blanca Fault contained much of his and other's groundbreaking work in northwestern Baja, and significantly focused on the cross-border active faulting and tectonics which is so important to the safety of millions of residents on both sides. John is survived by his wife Carol, three children Edwin, Jennifer, and Jason, and 7 grandchildren. Private funeral services was held on December 5th, 2018. A celebration of life event is planned for early 2019. If you would like more information on this event, please e-mail generationgraphics@cox.net. In lieu of flowers or gifts, please donate to your favorite charity or local geological society to help the next generation of passionate geoscientists.

West Coast Creativity in Exploration and Development



2019 Annual Pacific Section
AAPG Convention

April 1-3

at the Walter Pyramid,
California State University, Long Beach

Call for Papers

Abstracts due
February 15, 2019

Visit the website for more details:
2019.psaapgconvention.org

All-Included Combined Field Trips and Technical Sessions!

Monday, April 1: Malibu Coast Monterey/Modelo field trip led by Wanjiru Njuguna & Rick Behl, followed by an Opening Session, Exhibits and Icebreaker at CSULB.

Tuesday, April 2: "Creativity and Opportunities In West Coast Energy" special session with invited speakers. SEPM and General oral + poster sessions. Two new kinds of oral sessions (either this day or the next morning): Exhibitors/Vendors presentations and Government Agency presentations (e.g., DOGGR, BOEM, BLM, USGS, Water Resources, State Lands, etc.). All-Conference Awards Dinner.

Wednesday, April 3: Southern Los Angeles Basin Deep-water Clastic Reservoirs field trip led by Dan Schwartz and Don Clarke. Possibly with the vendors or agency session first 2 hours in the morning before the field trip departs.

Thursday and Friday, April 4-5: Short courses

The Los Angeles City Oil Field – California's First Oil Boom During the Revitalization Period (1875-1900)

"I had found gold and I had found silver and I had found lead, but this ugly-looking substance…was the key to something more valuable than any or all of these metals"

Stephen M. Testa
President
Testa Environmental Corporation
19736 Jesus Maria Road, Mokelumne Hill, CA 95245
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PRECUSOR TO THE DISCOVERY

It is sometimes hard to imagine that the City of Angels, Los Angeles, the current day home to over 3.9 million people living in a very dense urban environment (7,873 persons per square mile) and encompassing 469.3 square miles, has been built over oil fields. Of historical significance is the Los Angeles City oil field located in the north-central part of the Los Angeles Basin, about one mile north of the Los Angeles Civic Center (Figure 1). What makes a historically significant oil field is what this article attempts to address and an expanded version previously published (Testa, 2005).

Figure 1. Location of know oil fields in the vicinity of Los Angeles County as of 1910 (Barlow and Hill 1910). Note absence of major oil fields yet to be discovered along the coastal plain to the west of the Los Angeles City oil field.

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During the latter part of the 19th Century, Los Angeles was not much more than a small sleepy town situated among east-west oriented, gently rolling hills, which grade to a flat coastal plain toward the west. Oil seeps have historically been noted by Native Americans and Spanish explorers in the vicinity of Los Angeles since about 1543. William Phipps Blake (1826-1910), was the first professional geologist to remark about the oil potential in the Los Angeles area and elsewhere throughout southern California while serving as geologist and mineralogist for the Pacific Railroad Survey (Testa 2001), and his geological report for this region provided the first printed view of the village (Figure 2).

Figure 2. The village of Los Angeles as drawn by William Phipps Blake (1858).

When revisiting the early history of oil in California, this rich history can be traced to the latter half of the 19th Century, and divided into four major periods: the Early Reconnaissances (1849-1864), California's First Oil Boom (1865-1866), The Doldrums (1865-1875) and the Revitalization Period (1875 to 1900; Pemberton 1943 and Testa 2001). In 1865, only six years following the monumental discovery of oil by Edwin Drake in Pennsylvania, and following Benjamin Silliman, Jr's 1864 prospectus for oil in California, California's first productive well was drilled by the Union Matolle Company east of San Francisco. This area would become the focus of much of the early drilling activity in the latter half of the 1800s. Although the wells drilled in this portion of the Central Valley of California were not considered major discoveries, they did provide oil for the nearby market of San Francisco, which during this period was the largest population center in California during the post-gold rush era.

California's first oil boom during the years of 1865 and 1866 was followed by a period of decline referred to as The Doldrums (1865-1875). Following 1875, the oil industry in California would start to show signs of revival, although most of the work done up to this time was performed blindly and relied heavily on known occurrences of surface seepages. Ten years following California's first oil boom, the Revitalization Period would run from 1875 to 1900. Surface seepages would continue to play a significant role during the Revitalization Period; however, other important factors included the recognition for scientific guidance, the completion of the Southern Pacific Railroad from San Francisco to Los Angeles in 1876, changes in drilling techniques, and the use of steam machinery in 1877.

In 1890, the sleepy seaside village of Los Angeles would boast a population of about 50,395 people. After a decade of what could be termed a relatively small and static oil industry, the discovery, situated in what is now

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Echo Park, and being in close proximity to downtown Los Angeles, would not only re-ignite the oil industry but also spark the first major land boom in the fledgling city. Twenty-five years following California's first oil boom, this discovery by 1900 would double and transform the village to a population of 102,479, and by 1910 triple to 319,198, present itself as one of the major fields of the State, and stimulate interest in the oil potential of the Los Angeles Basin.

THE DISCOVERY

The first oil well within the city of Los Angeles was dug by hand in 1857 a short distance west of Coronado Street and south of Third Street (Crowder 1961), although Watts (1897) shows this well as being in the vicinity of the 200 block of Coronado Street South (immediately north of Third Street). Known as the Dryden well, depth and production is unknown, but it is known that the well produced a considerable amount of heavy oil for several years. In fact, for the next 30 to 35 years, minor amounts of brea and tar was sold to the city of Los Angeles for two dollars a ton to oil the streets. Other minor attempts were made, most noteworthy was in 1865 when Mr. A. Polhemus dug a well at the corner of Temple and Boylston Streets to a depth of 390 feet before encountering sulphurous gases and tar fumes (Goodyear 1888). This well yielded water and some gas. Goodyear (1888) also notes another well being drilled near the Southern Pacific Railroad station, in the bed of the Los Angeles River, and terminated at 80 feet when asphaltum with some gas was encountered.

Serious attempts to develop oil resources within the city limits began around 1890 (Preston 1890). The Maltman Oil Company drilled nine wells in the Maltman Tract situated in the northwest portion of the field, and another 12 wells would be dug in the Ruhland Tract, about one-half mile south of the Maltman wells (Crowder 1961). Within the Maltman Tract, producing depths would vary from 140 to 285 feet. It was reported that these two groups of wells would produce about two barrels of 21-degree gravity oil a day per well. Other prospect wells were drilled at various times, without appreciable success, and production from the Maltman and Ruhland wells was not significant enough to generate much interest.

Credit for the first well to yield appreciable oil in Southern California and ignite an oil boom is given to Edward L. Doheny, an unsuccessful gold and silver prospector, and Charles A. Canfield, his old mining partner (Figure 4). For many years, a small deposit of brea was known to exist on West State Street near Douglas Street in the city of Los Angeles (Watts 1897). In 1892, Doheny arrived in Los Angeles from Wisconsin almost broke. While in the downtown area of Los Angeles, he observed a cart whose wheels were coated in tar and hauling a substance called "brea", the Spanish word for pitch, to be used at a nearby ice factory as fuel in place of coal (Davis 1998). Inquiring as to the source of the tarry substance, Doheny was directed to an area a short distance to the northeast at Westlake Park where the material was unearthed. Doheny would later recall (Forbes 1923, p. 108) "I had found gold and I had found silver and I had found lead, but this ugly-looking substance…was the key to something more valuable than any or all of these metals."

Figure 3. Portraits of Edward L. Doheny (a) and Charles A. Canfield (b) (from Davis, 1998).

(Continued on next page)

Being a miner, Canfield was skeptical, but Doheny convinced him and pooling their resources in 1892, that being $400. They leased a three-parcel lot at the corner of Patton and State Streets. Interest in their endeavor was shared by a mining acquaintance of Canfield, H. B. Ailman, and a local banker named Sam Cannon, even before they sunk their first well (Davis 1998). Their first well was situated in downtown Los Angeles along Glendale Boulevard between Beverly Boulevard and Colton Avenue, although Watts (1897) shows Doheny's well to be located between Second Street Park and the Dryden Well in the vicinity of the 100 block of Coronado Street South (Figure 3). Oil seeped from the sides of the shaft at seven feet below the ground surface, and despite the presence of gas, they continued digging. Initially, they began digging a 4 by 6 foot miner's shaft. Working from dawn to dusk, they hit oil-soaked shale at about 60 feet. They would give up at a depth of 155 feet, being nearly overcome by fumes, and without a gusher (Rintoul 1976). They then made a crude drill utilizing a sharpened end of a 60-foot long eucalyptus tree, and drilling an 18-inch hole, this well would yield about 7 barrels a day for several weeks; by July 1894, yields would decrease to about 2 barrels a day.

The crew became dangerously ill from the fumes, and Doheny could not entice Canfield to stay. Doheny was able to get some additional financial support from Cannon, and with his new partner, moved across Colton Street to what was then known as Second Street Park (Prutzman 1913). They erected a twenty-foot high oil derrick out of four-by-fours, with the actual drill being a cross-shaped bit attached to a three-inch iron rod, and assembled a horse-driven pump. At about 200 feet, they broke through a hard material and plunged through soft strata. Curious, they pulled the drill upward to find it soaked with oil. The well extended to a depth of about 460 feet, where on the fortieth day, gas burst out of the hole, and oil bubbled upward into the shaft. This well at State and Colton Streets, would become the first free-flowing oil well ever drilled in the city of Los Angeles. With their success in November, 1892, other wells were sunk on adjacent lots, and the field grew quickly.

This area immediately became known as the Second Street Park oil field due to its close proximity to the Second Street Park (Figure 5). Second Street Park was situated on what was then called Crown Hill. Now cradled in the arms of the Hollywood and Harbor Freeways, Crown Hill was one of several hills that ringed the original City of Angels, and once termed a "howling wilderness", was at the time of the discovery by Doheny and Canfield, an elite area occupied by elegant Victorian mansions (Rasmussen 1999). Nestled in its center and bordered by a white picket fence, including a playground and lagoon for boating, was Second Street Park. This name would last for several years before becoming known as the Los Angeles oil field, then The Old Field, and now formally designated as the Central Area of the Los Angeles City oil field. The original field has long-since disappeared, but in its heyday and being a land with few trees, Los Angeles had the appearance of a forest (Figure 4). The area now occupied by Dodger Stadium and portions of the Santa Ana and Hollywood freeways, was notably named City Field (Rintoul 1976).

Figure 4. Postcards from the mid-1900s showing oil wells in downtown Los Angeles. The inscription on the postcard to the left reads "Do these look natural to you? They are doing away with many of these now – Los Angeles, California, February 14, 1906."

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Within two years, 80 wells were producing oil from the area bounded by Figueroa, First, Union and Temple Streets. By June of 1894, the "Second Street" men were producing about 115 barrels per day, and five months later Los Angeles producers were developing more oil than all of the other oil fields in California combined (White, 1962). By 1895, more than 300 wells existed within an area of less than 4,000 square feet. Thirty-one wells would be abandoned in 1895 due to water for the most part, although significant amounts of gas and sulphur water were encountered in some wells situated west of downtown (i.e., in the vicinity of Rancho La Brea). Crowder (1961) reported that between the period of 1892 and 1895, over 500 wells were completed by 105 oil companies. It would be stated that "wells were as thick as the holes in a pepperbox." (White 1962, p. 153)

Location rather than quality gave Los Angeles oil its greater importance. The best of its crude was not more than 20 gravity, considerably heavier than other producing fields. Thus, although it was considered too heavy to refine, it made good fuel (White 1962). When refined, the heavy oil from the Los Angeles City oil field (and that from the Kern River oil field) was largely used for stove distillate (household heating oil), fuel oil and some lubricant (White 1962). According to Watts (1896), oil was largely used for fuel on the Southern California Railroad, a portion of the Santa Fe railroad system between Barstow and San Diego. By 1896, more than half of their locomotives were adapted to the use of oil as fuel.

Due to a lack of cooperation among producers, and lack of facilities for storage and handling, the price of oil dropped to "ruinously low rates". The average price for 1895 was about 60 cents a barrel, and as low as 25 cents a barrel. The price per barrel would recover in 1896 reaching $1 per barrel by July, reflecting diminishing supply, organization of the producers, and increased number of facilities for storage and handling. The two primary pipelines were operated by Pacific Oil Refinery and Supply Company, and the Union Oil Company (Watts 1897). Pacific Oil Refinery and Supply Company constructed a pipeline from Second Street Park oil field to its tanks on Santa Fe Avenue. The line consisted of one-mile of 6-inch pipe, 4 miles of 4-inch pipe, and ½-mile of 3.5-inch pipe, with tankage storage capacity of 75,000 barrels. The Union Oil Company also had a line that extended from the Second Street Park oil field to Palmetto Street, on the Southern California Railway. This line consisted of 5 miles of 4-inch pipe, with a tankage capacity of 32,000 barrels. With a daily yield of more than 2,000 barrels, production would decline to 1,400 barrels in the early part of 1896. At least eight companies were providing tankage as of May 1896. By 1910, eight-inch lines would become the norm (Wolbert, 1979).

The second year of production (1895) following discovery by Doheny and Canfield, the Los Angeles City oil field produced 729,695 barrels of oil (Watts 1897) pushing California's output past one-million barrels for the first time, and accounting for three out of every five barrels of the state's 1,209,000 barrels of oil by 1895 (Rintoul 1990). The deepest well extended to a depth of 1,140 feet, being drilled by Frank McCabe, but hitting the first oil sand at 700 feet. The Doheny-Canfield Oil Company, one of 67 operators that reported well information to the state, drilled 28 wells alone, producing 100,000 barrels in 1895. By 1897, the number of wells increased to 500. Within a few years, there were over 200 oil companies and 2500 wells within the city limits.

Doheny borrowed money to buy 1000 acres of land in what is now the Echo Park area. His efforts would put Doheny on the road to becoming one of the wealthiest men in America, and later be in a position to challenge for the Democratic nomination for Vice-President of the United States (Davis 1998). Doheny would also become a central figure in the Teapot Dome Scandal of the 1920s, which would bring disgrace to the presidency of Warren G. Harding. Doheny would eventually be cleared of any wrong-doing, the scandal, not surprisingly, centered on oil.

PROMOTION

Following discovery of what would be the Central area, large numbers of oil companies were formed and the Los Angeles Stock Exchange was overwhelmed with oil stocks. So much confusion existed that more money was made in the promotion of stock than in the production of oil. Being close to downtown Los Angeles offered

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a likely market. Another major factor which launched the greatest oil boom in California yet to be seen had to do with real estate. The area where oil was found had already been subdivided into residential lots during a land promotion five years prior (Rintoul 1990), and the entire area was available for sale. Anyone who could scrape up or promote enough money to drill a 1,000-foot well, $1,000 to $1,500 and frequently less (Watts 1897), could compete for the parcels.

Of course this had devastating effects. Operators with relative small townlot parcels would drill at least one well per lot. Operators with larger parcels or tracts of land would situate their wells in a systematic orderly pattern spaced to maximize overall production. Many would locate wells along property or lease lines in order "to capture" oil before it flowed to an adjoining lease, or produce oil from an adjacent lease. Such frenzy would lead to a townlot drilling boom not only within the city's limits, but elsewhere throughout the Los Angeles Basin in the years to come. Over drilling due largely to closely-spaced wells resulted in rapid reduction of reservoir pressure, and declining production. The Spacing Act which would be enacted in 1931, would come too late for the City of Los Angeles, and regardless, did not apply to fields discovered prior to 1931, or in new areas of older fields.

FIELD DESCRIPTION

The earliest geological sketch map of Los Angeles and vicinity was prepared by W. L. Watts under the State Mineralogist J. J. Crawford (Watts 1897). This map was prepared to show description of rock types, surface orientation of certain structural elements (i.e., direction and degree of dip), location of bituminous shale and sandstone, surface seeps, surficial faulting, and well locations (Figure 5). Early structural elements were also developed by Watts, and illustrated in cross section (Figure 6). Early photographs of many of the oil fields throughout California for the period from 1865 thru 1940, including the Los Angeles City oil field, is presented by Franks and Lambert (1985).

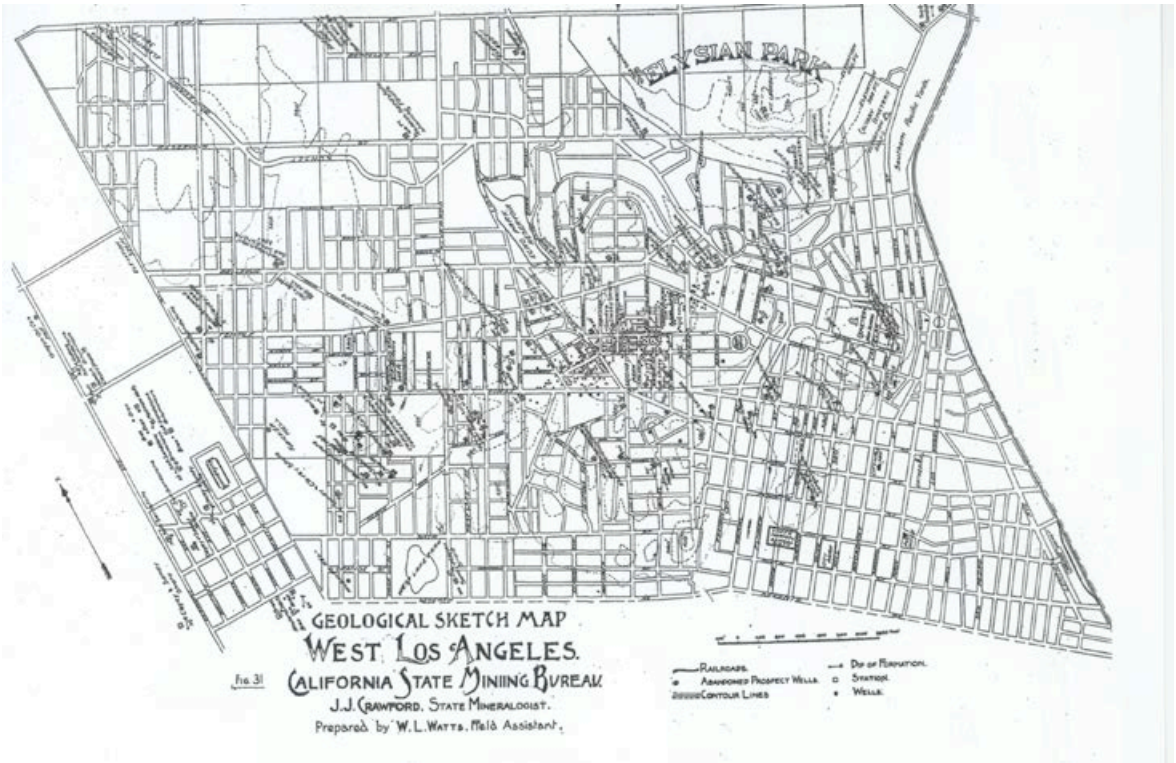

Figure 5. Earliest geologic map showing oil potential in the vicinity of downtown Los Angeles (Watts, 1897).

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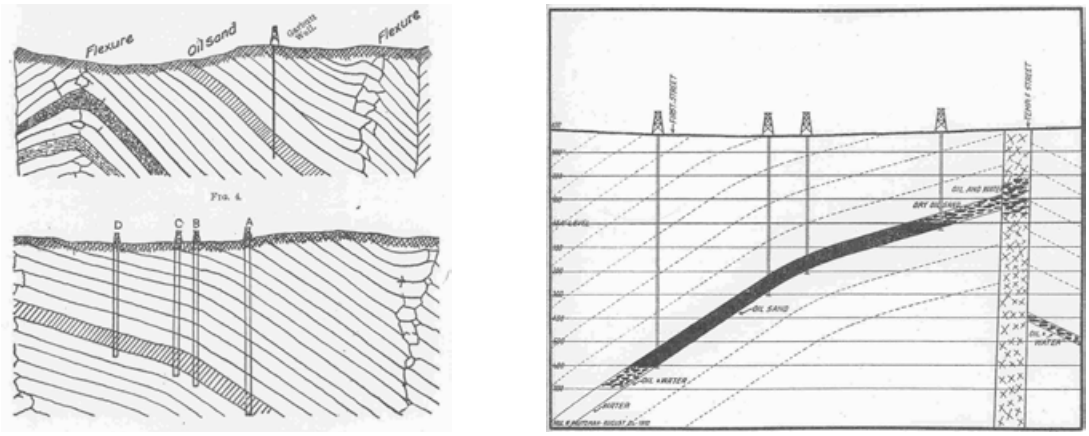

Figure 6a and 6b. Early geologic cross-sections depicting the Los Angeles City oil field prepared by the California State Mining Bureau 1897 (a) and Prutzman 1913 (b).

Comprehensive discussion of the geology of the field is presented by Kew (1924), Eldridge and Arnold (1907), Soper (1943) and Crowder (1961). The Los Angeles City oil field lies in the region between West Lake Park and Elysian Park. Structurally, the field is located along the south side of a narrow zone of minor faulting and sharp folding (Figure 7, Soper 1943), which occurs as one of several secondary structural features on the south limb of the Elysian Park Anticline. The east end of the field shows surface evidence of normal faulting. The area is also part of the Elysian Park blind thrust system. This system generally has an east-west trend, and in part, accounts for the uplift and tilting of petroliferous strata as shown in Figure 8.

It was noted early on that although the majority of the wells extend down to the Fernando formation, most wells draw their production from the Puente Figure 8; (Leck 1921). The field is divided into three separate fields with a total of 416 operating wells as of 1913: Western, Central and Eastern fields Figure 9). As of 1913, the field was about 4 miles in length, and a third of a mile in maximum width. The productive portion of the field was confined to wells east of Coronado Street, with exception to a block bounded by Commonwealth Avenue and Fourth Street, where there were 21 operating wells. The Eastern field extended from Buena Vista Street to Sunset Boulevard. As of 1913, the Eastern field had 221 operating wells. The Central field extended from Sunset Boulevard to Coronado Street. The Central field as of 1913 had 174 operating wells. The Western field as of 1913 was essentially abandoned.

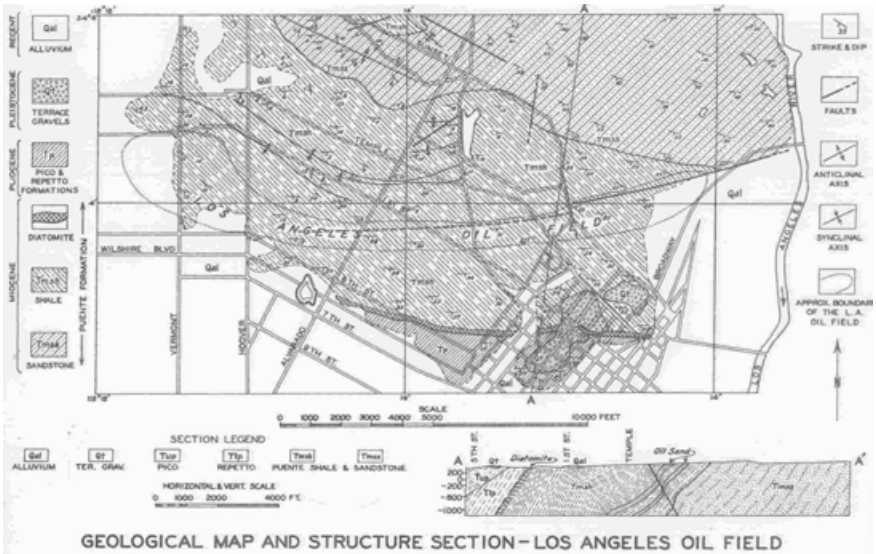

Figure 7. Geologic map of the Los Angeles City oil field and vicinity (Soper, 1943).

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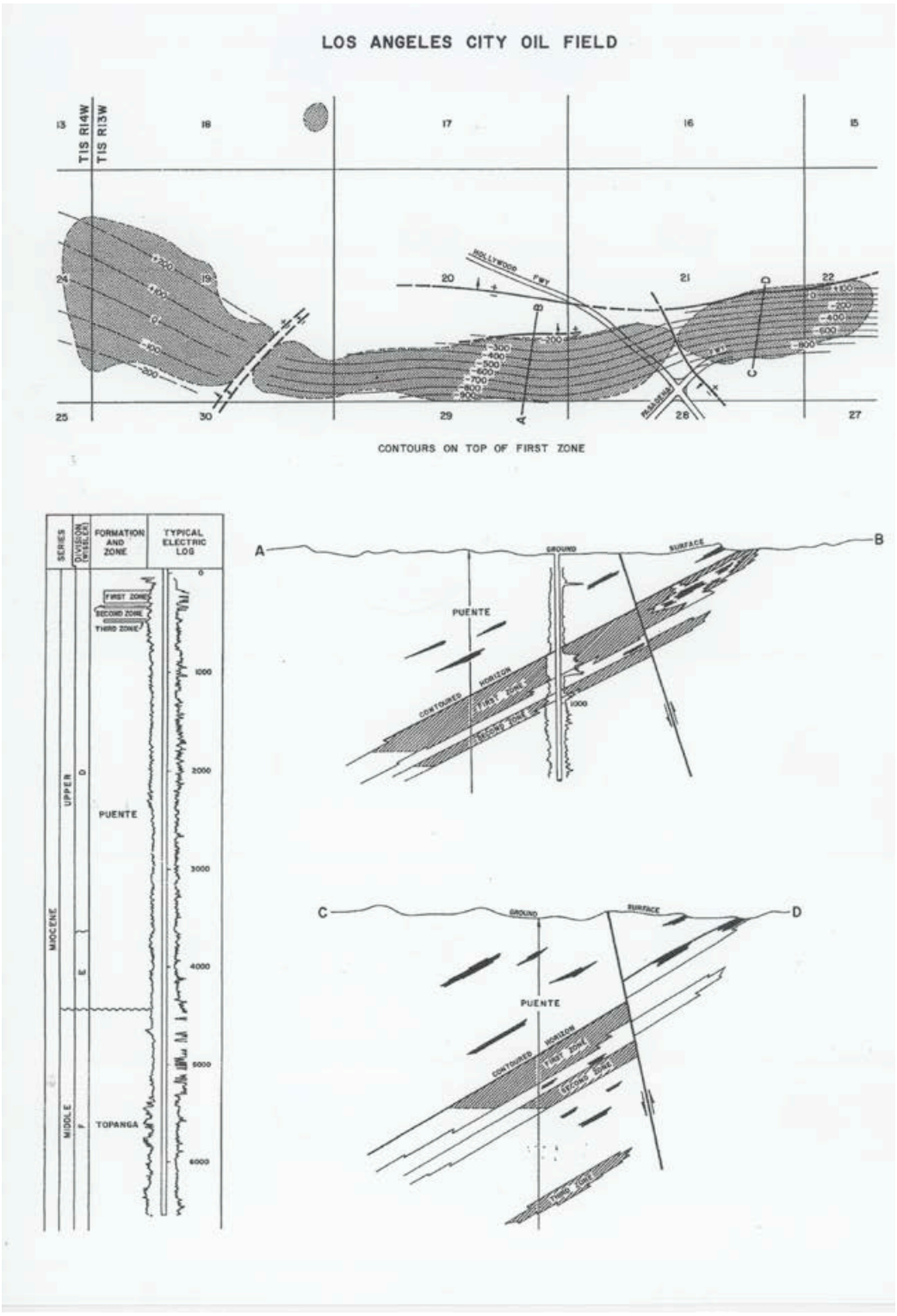

Figure 8. Plan view and cross-sections of the Los Angeles City oil field (California Division of Oil, Gas and Geothermal Resources, 1992)

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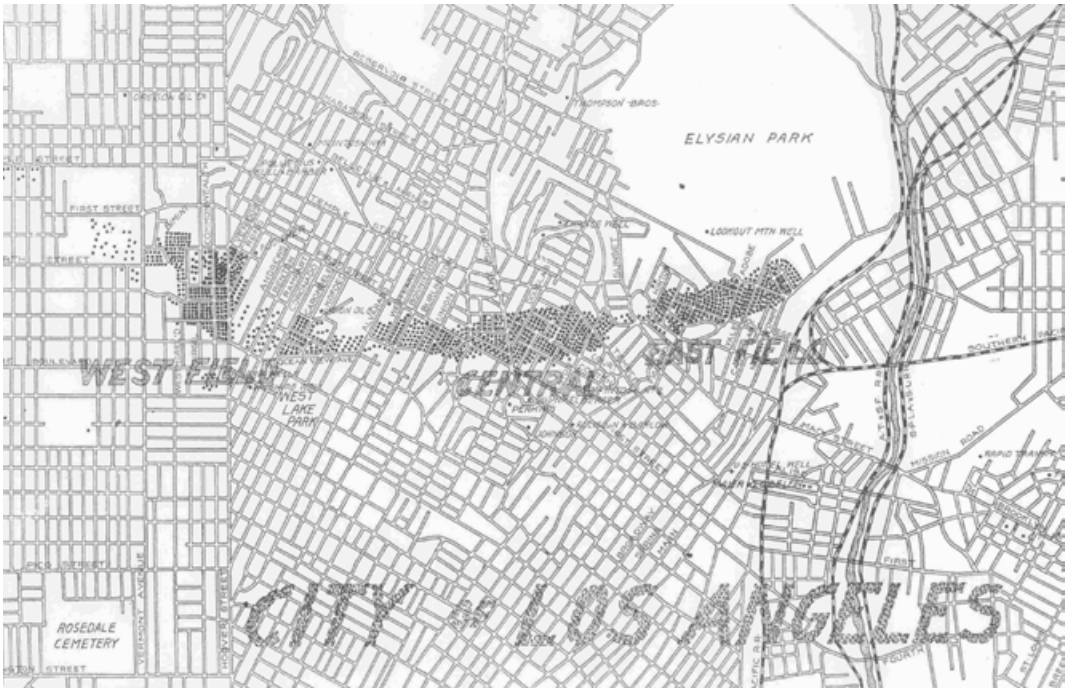

Figure 9. Illustration showing the Western, Central and Eastern fields, and well locations as of 1912 (Prutzman, 1913).

Three producing zones have been identified: first, second and third, and averaging 900, 1,100 and 1,500 feet in depth, respectively (Figure 8; California Division of Oil, Gas and Geothermal Resources 1992). Overall average net thickness for the three zones is 125, 30 and 30 feet, respectively. Porosity of at least the first and second zones is 34 percent. The oil varies from 11o to 18o Baume in gravity, averaging 14o (Leck, 1921). API gravity for the three pools has been reported at 18-20, 12-16 and 14, respectively; salinity has ranges from 1,000, 3,300 and 3,400, respectively (California Division of Oil, Gas and Geothermal Resources 1992).

It was noted by 1914 that the Central and Western fields are situated along the south flank of an anticline in the Puente formation (Figure 7). The anticline is faulted from Sunset Boulevard eastward, and oil has accumulated within the sandstones and interbedded fractured Puente Shale on the south side of the fault (McLaughlin and Waring 1914). Surface seepages are along the fault.

PRODUCTION HISTORY

The field was at its peak in 1901, with 1,150 producing wells with as many as 200 companies operating (Figures 10a and 10b). The high density of wells would eventually have reduced what little reservoir pressure there was, and daily production would experience a sharp decline. A review of the overall production history of the field is presented by McLaughlin and Waring (1914) and Crowder (1961). The field has always been characterized by shallow wells and small production. Following the initial discovery in 1892, more than 300 wells existed by the end of 1895, with a cumulative production of 729,695 barrels (6 or 7 barrels per well per day, 2,000 barrels of oil per day), 60 percent of the State's total oil production of 1,245,339 barrels. Peak production was in 1901, with the field producing 830,000 barrels (Figure 20; California Division of Oil, Gas and Geothermal Resources 1992).

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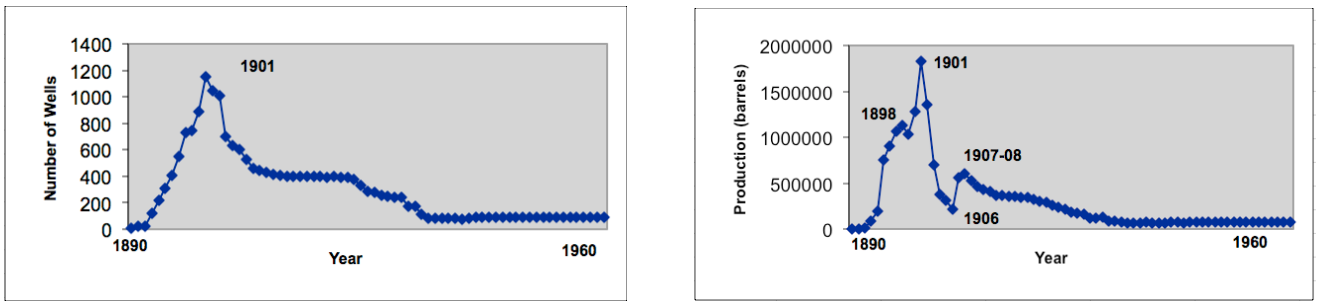

Figure 10a and 10b. Graph showing number of wells drilled upon discovery in 1892 (a) and overall oil production with time (b).

Following the boom, extensive drilling would continue to about 1907. The impact of Los Angeles County in 1898 on overall oil production in the State, with the notable contribution being from the Los Angeles City field, is illustrated in Figure 11 (Testa, 2001).

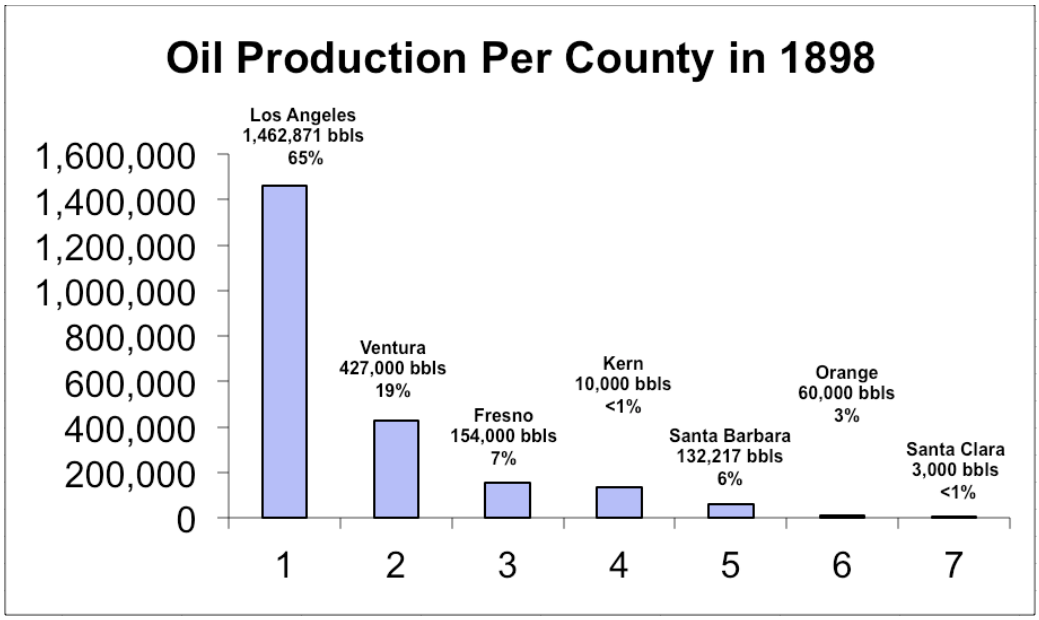

Figure 11. Graph showing impact of the Los Angeles City oil field on overall production in California in 1898 (data from Pemberton 1943).

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The production decline curve as shown in Figure 20 illustrates the rapid abandonment of wells. Only 416 producers existed as of 1910, whereas, in 1904 there were about 1,150 producers. The primary cause for the rapid decline was the uneconomic development of closely spaced wells on city lots. No new work was allowed in the city, and it was predicted by McLaughlin and Waring (1914, p. 313) that "the field is probably thoroughly prospected and developed". Mclaughlin and Waring (1914, p. 315) would go on and state "Altogether the figures illustrate conditions in a field that is nearly exhausted and slowly approaching abandonment." This prediction was reiterated by Leck (1921, p. 135) noting "it is probable that the next few years will see the abandonment of the remaining producing wells." Since 1907, little development work continued. This decline in activity reflected mainly exhaustion of the oil sands, and restrictions placed upon the drilling of new wells within the city limits (Leck 1921). Between 1910 and 1914, the number of wells remained nearly constant at a little over 400, with monthly production declining from about 60,000 to 30,000 barrels between 1907 and 1913 (McLaughlin and Waring 1914). Total production at the end of 1913 was 16,700,000 barrels, or 40,170 barrels per acre, exceeding all other major fields in southern California and rivaling the McKittrick Field which was discovered in 1898 (Table 2). The rate per well at this time was fairly constant at four to two barrels, but pumped only occasionally. About 400 of the old wells were in fact still pumping in 1921, with a total average production on the order of 1000 barrels per day. As of the latter half of 1957, the Los Angeles City oil field had 90 wells producing 38,901 barrels for the six month period, totaling 20,902,934 barrels to date (Musser 1957). As late as 1980, the Los Angeles City oil field still had almost 40 producing wells, with a cumulative production of about 50,000 barrels annually.

ENVIRONMENTAL LEGACY

The discovery and operation of a major oil field in an urban environment was a first for the burgeoning petroleum industry, and generated unique issues the citizens of Los Angeles had to contend with. The drilling and operation of wells in an urban environment did not exist without having some adverse impact on the environment. Between the noise, traffic, odors, waste storage and handling, and spillage, operators, and citizens and home owners, had to improvise. In some cases, if a homeowner had a rig in their backyard but no place for a sump for storage and handling of waste water and mud, they may have used their basements.

The City of Los Angeles would lead in the establishment of strategies to combat the environmental concerns. With the dramatic increase in population, noise abatement became an issue, and by the 1930s and 1940s, downtown wells were soundproofed. This would be initially accomplished using vinyl-coated glass cloth, with one-inch sheet fiberglass filling to abate the noise. With the burgeoning population, aesthetics also became an issue, and camouflage strategies would first be used in the country. This strategy would eventually be extended to off- shore fields as well.

CONCLUDING REMARKS

The Los Angeles City oil field initiated the first oil boom during the Revitalization Period, the first great land boom in Los Angeles, and marked the first significant oil boom leading into the 20th Century. Colorful as the oil boom was, its notoriety was not marked by any great gusher. Its importance was due to location, and more importantly, the effect it had on the industry as a whole, engaging a large number of persons directly involved in oil production. The field would reach its peak in 1901, with as many as 200 companies operating 1,150 producing wells. The impact on the economy of southern California was significant since it created a market for fuel oil in lieu of coal, in which California was in short supply. Like many other booms, this one did not last, but a lasting impression was made. Other individuals and operators were drilling wells in the Los Angeles Basin and throughout California, and many factors contributed to the oil and land boom that followed Doheny and Canfield's venture in 1892. Certain individuals, notably Doheny, showed others how to make money, and would invest their monetary gains into exploration, opening other fields. By 1894, Following Doheny and Canfield's initial success in the Second Street Park area, they would drill three more wells in the City of Los Angeles, then drill wells in the nearby cities of Puente and Newhall. Obtaining a map of all known oil seeps from W. A. Goodma with the State Mining Bureau, Doheny invested time and money in Kern County with success. Canfield

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would do the same in Coalinga, where along with Joseph A. Chanslor, formed the Coalinga Oil Company. Both men would later come together again along with others to form the Mexico Petroleum Corporation, initiating their operations in the Tampico region of Mexico.

Even more importantly, Doheny with help from Canfield established a significant long-term market for oil. In search of a larger market base, Doheny pursued Atchison, Topeka, and Santa Fe Railway (A.T. & S.F.), the most important and largest passenger carrier in the West. A significant stockholder of the A.T. & S.F, Doheny urged railroad officials to substitute oil for coal in their locomotive engines (Davis, 1998). The railway owned oil-rich land in Orange and Kern Counties. By the winter of 1899, Canfield's Coalinga wells were the most prolific oil producers in all of California. Despite several setbacks, by 1899, Doheny's continued persistence with officials of A.T. & S.F. railway, and with developmental assistance by Canfield with the installation of a force-fed burner and steam jet designed to facilitate oil uptake, all of A.T. & S.F. and Southern Pacific railway locomotive engines were being converted from coal-to oil-burning. This event was the harbinger of a new era of petroleum-fueled transportation.

By 1910, three major fields were discovered: Los Angeles City (1892), and the Whittier and Fullerton fields (1897; Figure 1). The discovery of the Los Angeles City oil field would soon lead to other fields being discovered throughout the Los Angeles Basin during the early 20th Century, including the proving of seven giant fields (Brea-Olinda, Beverly Hills, West Coyote, East Coyote, Montebello, Richmond and Santa Fe Springs), with the Los Angeles Basin area becoming one of the major oil-producing areas in the world.

By 1961, the surface area of the Los Angeles City Oil Field had been completely developed for industrial and residential use, and most of the productive area placed under the auspices of the Urban Renewal Association (Crowder 1961). Plans to abandon most of the existing wells and redevelop the area for residential usage were also in play by 1961. By 1961, the Eastern and Central areas remained industrial, with 93 wells operated by 22 companies. Later deep tests and drilled holes were abandoned without completion to the shallower sands.

The historic Los Angeles City oil field itself remains active today. The city limits also encompasses a portion of several others such as the El Segundo, Potrero, Torrance and Wilmington oil fields. The most recent oil field to be discovered within the city limits was in 1964, and is known as the Los Angeles Downtown oil field (Hesson and Santiago, 1994). But it was the Los Angeles City oil field that started it all. Prior to the discovery of oil within the city limits, Angelenos have seen cattle die from drought; banks fail during flood events, and real estate boom collapse. An Old Angeleno, Mr. William Andrew Spalding, reminiscing about the city at the turn-of-the-Century would state:

"Then an oil belt was developed within the city boundaries which seemed to bring as much destruction of values as it produced – when there was no system, no order – when oil went to waste and the gas escaped – when there was no market for the product, and the price fell to ten cents a barrel – then the people addressed themselves to solving the strange problem, this embarrassment of riches."

They constructed storage tanks, and devised means of transportation; they invented burners, and learned how to use crude oil for steam generation and brick-making; they learned how to utilize crude oil in road-making; they acquired the art and devised the apparatus for refining; they discovered a way for saving and utilizing the gas that had been escaping from their wells; they prospected with 'wild-cat' boring until they had extended the territory miles outside the originally developed area. In short, they established one of the greatest petroleum fields in the world. With such a record of courage, persistence and achievement, it is no wonder that Los Angeles began the new century with a stout heart and a confident air." (Weaver 1973, p. 56)

The Los Angeles City Field was the largest producer in California in the late 19th Century, and although other fields yet to be discovered would prove to be larger, the Los Angeles City oil field was the most historically influential producing field in California's oil history.

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Biographical Brief of Stephen M. Testa

President
Testa Environmental Corporation

Stephen M. Testa is an engineering and environmental geologist, and since 1994 President of Testa Environmental Corporation. From 1976 until 1994, he served as an engineering and environmental consultant for a variety of firms including Bechtel, Inc.; Dames and Moore; Converse Consultants; Engineering Enterprises, Inc.; and Applied Environmental Services which was taken public in 1993. In 1994, Testa founded Testa Environmental Corporation. From 2005 to 2015, Testa also served as Executive Officer of the California State Mining and Geology Board. Testa is the author of numerous books and publications, including Geological Aspects of Hazardous Waste Management; The Reuse and Recycling of Contaminated Soils; Restoration of Contaminated Aquifers: Petroleum Hydrocarbons and Organic Compounds; Oil Spills and Gas Leaks: Environmental Response, Prevention, and Cost Recovery; and One Man's Planet – Earth in Today's Political Culture. He has served as an instructor at USC and CSU Fullerton, and has provided numerous workshops and technical presentations. Testa is the Past-President of the American Geological Institute (AGI) and the American Institute of Professional Geologists (AIPG), American Association of Petroleum Geologists-Energy Mineral Division and Division of Environmental Geoscienes, and the Los Angeles Basin Geological Society. Testa is past Editor-in-Chief of American Association of Petroleum Geologists – Division of Environmental Geosciences' (AAPG-DEG's) peer review journal "Environmental Geosciences", and the recipient of the AIPG's Martin Van Couvering Award, Honorary Membership and Parker Medal, AAPG-DEG's Research and Public Service Award, and the Roy Shlemon Geology Mentor Honorarium for excellence in application of applied earth science. Testa received his BS and MS in Geology from CSU Northridge, California. His most recent book, Environmental Considerations Associated with Hydraulic Fracturing Operations – Adjusting to the Shale Revolution in a Green World, is being published by Wiley Publishers and due out in early 2019.

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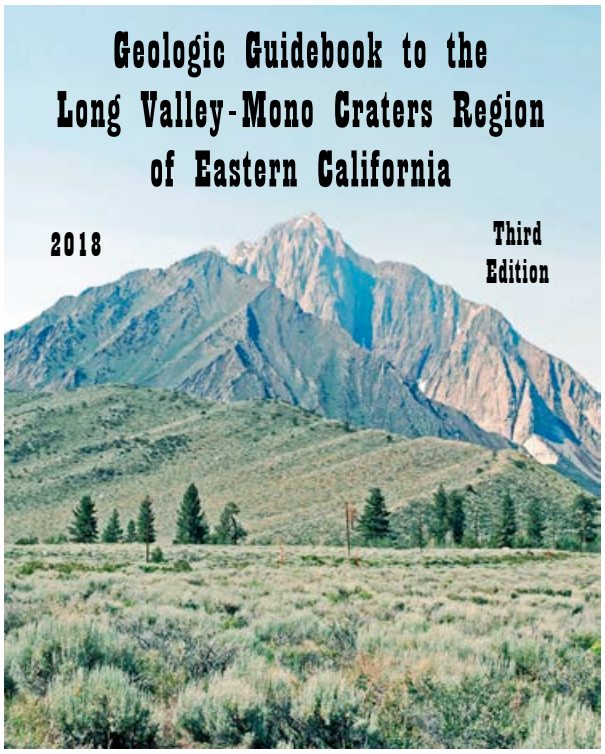


PSAAPG Membership Directory

The PSAAPG website will have a members-only password-protected membership directory available as of March 1, 2018

Please email SKChehal2@aeraenergy.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.

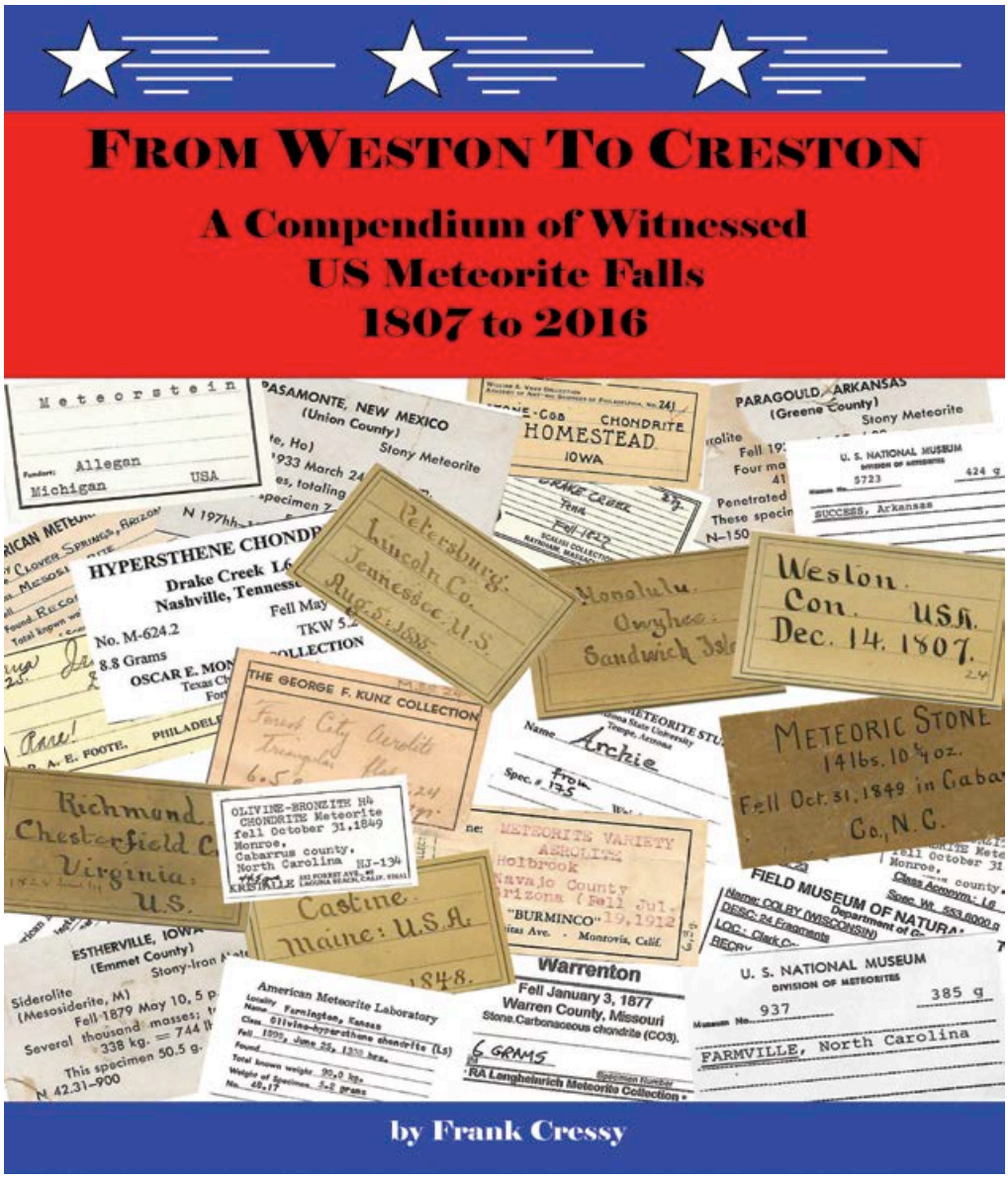
New Publication

"FROM WESTON TO CRESTON – A Compendium of Witnessed US Meteorite Falls – 1807 to 2016"

by **Frank Cressy**

The violent display of blazing light and explosive sounds ending with meteorites crashing to the ground is an unforgettable event to those who witness it firsthand. This book summarizes the fall histories of nearly 170 witnessed meteorite falls that have occurred in the United States since the first documented fall at Weston, Connecticut in 1807. It is written not only for the collector of these rare objects, but also for those interested in the history and the growth of the branch of science known as Meteoritics. The accounts of the fall phenomena and recoveries associated with these extraordinary events are the focus of the book. However, the book is more. The reader will learn about those individuals responsible for the growth of the science and their contributions, together with interesting facts and coincidences about these visitors from space; 257 pages with over 300 color photos plus maps, figures and illustrations.

Soft Cover books $36.00; for ordering, contact: fcressy@prodigy.net



New Membership Classification Proposed for the Pacific Section

Active Members of the Pacific Section will be asked to approve changes to the Constitution and By-Laws (C&BLs). The most significant change is to the membership classifications. Under the proposed changes, Non-member Subscribers will be deleted and Associate Members added. The Non-member Subscribers class was intended for those who wanted to receive the PS Newsletter, primarily libraries. With the proposed new class of Associate Members, all those interested in the activities of the Pacific Section, but do not meet the Active Members criteria, are welcome to join. Associate Members will not be able to vote or hold office, but may participate in all other activities of the Section, including holding leadership positions in committees.

Another proposed change concerns committees. The Pacific Section will no longer publish a membership directory, and the Committee on Directories will be deleted from the C&BLs. In recognition of the technology that helped make the Pacific Section Directory obsolete, a new Committee on Communication and Technology is proposed. The role of this committee will be to develop new ways of communication with Members, and to provide guidance for operation of the Pacific Section website.

One last change is to require the President and President-Elect to be Active Members of AAPG. Under the current version of the Constitution, AAPG membership is not required of Pacific Section officers or members. However, the President and President-Elect are entitled to participate in AAPG committees, and Pacific Section presence is vital in maintaining our visibility in the national organization. The recommended changes to the C&BLs will require the President and President-Elect to be Active Members of AAPG.

Voting instructions will be emailed soon to Active Members along with the location on the PSAAPG website where the proposed changes may be reviewed. If you prefer to vote by paper ballot, please request one from the Membership Chair/Treasurer-Elect Simmie Chehal by email to: treasurer2@psaapg.org or by mail to:
Pacific Section AAPG, P.O. Box 1072, Bakersfield, CA 93302

The Pacific Section Executive Committee recommends a YES vote for the proposed changes.

Tony Reid
C&BLs Chair

Constitution & By-Laws

Pacific Section of the American Association of Petroleum Geologists

Adopted: September, 1924
Proposed Updates: January, 2018

CONSTITUTION

ARTICLE I. NAME

This organization, whose area of interest comprises the Pacific Coastal Region, shall be known as "Pacific Section of the American Association of Petroleum Geologists" and is hereinafter referred to as "PSAAPG."

ARTICLE II. PURPOSE

SECTION 1.
The purpose of PSAAPG shall be to provide for discussion of subjects and problems coming within the scope of the profession and to advance the science of geology and the professional well-being of our members. PSAAPG, by such intercourse, will promote the advancement and aims of the American Association of Petroleum Geologists (hereafter referred to as "AAPG") as set forth in its Constitution, By-laws and Code of Ethics.

SECTION 2.

PSAAPG is a non-profit [501(c)(6)] corporation, and no portion of the financial assets inures to the benefit of any private individual or member.

SECTION 3.

PSAAPG may affiliate with any other geological organization in order to further its purposes and to cooperate in activities including but not limited to the annual convention, newsletter, directory, and publication sales.

ARTICLE III. MEMBERSHIP

SECTION 1.

The members of PSAAPG shall consist of persons concerned with or furthering the professional applications of the geological sciences.

SECTION 2.

Various classifications of memberships and the qualifications thereof shall be established by the By-laws of PSAAPG.

ARTICLE IV. OFFICERS

SECTION 1.

The elected officers of PSAAPG shall be a President, a Vice-President, a President-Elect, the

(Continued on next page)

immediate Past-President, a Secretary, a Treasurer, a Treasurer-Elect, and an Editor-in-Chief. The officers shall assume their duties at the beginning of the membership year next following their election as hereinafter provided. The duties of the officers are defined in the By-laws. During the absence of the President, the President-Elect shall assume the duties. In the event of the death or resignation of the President, the President-Elect shall succeed to the office and title of President. Should the President-Elect be unable to serve in this capacity, the duties and title of President shall be assumed by (first) the Vice-President, or (second) the Secretary. In the event of a vacancy of any office, other than the President and immediate Past-President, the Executive Committee shall appoint an active member to fill the vacancy. In making such an appointment, the Executive Committee shall give due consideration to appointing a member from the nominees at the last previous election.

SECTION 2.

There shall be an Executive Committee consisting of the President, President-Elect, Past President, Vice-President, Secretary, Treasurer, Treasurer-Elect, Editor-in-Chief, and one representative selected from each affiliated geological society approved by their existing Executive Committee.

SECTION 3.

The President, Vice-President, Secretary, Treasurer, and Editor-in-Chief of PSAAPG can not hold elected office concurrently in AAPG or affiliated societies of AAPG, with the exception of the AAPG House of Delegates. If the President, Vice-President, Secretary, Treasurer, or Editor-in-Chief chooses to serve as an officer in AAPG or an affiliated society, then the Executive Committee will appoint a replacement.

SECTION 4.

President-Elect and President shall be Active Members of AAPG and will facilitate communication between PSAAPG and AAPG through membership on AAPG committees and other activities. Other officers are encouraged but not required to be Active Members of AAPG.

ARTICLE V. PROPERTY

SECTION 1.

Property of PSAAPG includes logo, letterhead, newsletter, website, publications (copyright and inventory), contracts, funds held in banks and any other asset of PSAAPG.

SECTION 2.

The Executive Committee of PSAAPG is responsible for the management of PSAAPG's property.

SECTION 3.

In the event of the dissolution of PSAAPG, PSAAPG shall distribute any assets remaining after the discharge of all liabilities, for charitable, scientific, or educational purposes. Under these circumstances, no member of PSAAPG shall have any right to or interest in the property or assets of PSAAPG.

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ARTICLE VI. FUNDS

SECTION 1.

The Executive Committee shall establish the fiscal year, review the financial position of PSAAPG, and have a current financial statement available at each annual business meeting. Annual dues of PSAAPG shall be payable in advance in an amount established by the membership at the annual business meeting. The Executive Committee shall not have authority to levy assessments against the membership and shall not have the authority to increase annual dues.

SECTION 2.

The funds of PSAAPG shall be deposited to the credit of Pacific Section of the American Association of Petroleum Geologists in any federally insured depository selected by the Treasurer or Treasurer-Elect but not to exceed the limit insured by the Federal Deposit Insurance Corporation. Whenever necessary, the President shall certify to the authority of the Treasurer and Treasurer-Elect in administering PSAAPG's accounts by providing the depository bank with a notice of the Treasurer's and Treasurer-Elect's selection and with a true copy of this Constitution. The Treasurer and Treasurer-Elect shall have authority to issue checks against the bank account so established, on the Treasurer's or Treasurer-Elect's sole signature, but in the event of the Treasurer's or Treasurer-Elect's absence, withdrawals or payments by check may be made on the signature of the President. The identity and authority of the President and the circumstances relating to the absence of the Treasurer and Treasurer-Elect shall be certified to by the Executive Committee if so required by the depository bank.

ARTICLE VII. MEETINGS

SECTION 1.

The Pacific Section shall hold an annual convention meeting at a location approved by the Executive Committee. If the annual meeting of AAPG is held in the regional area of PSAAPG, the Pacific Section will not hold their annual convention meeting that year.

SECTION 2.

The Executive Committee shall conduct business meetings at the annual meeting and at such other times during the year and at such places as designated by the President or a majority of the Executive Committee. Robert's Rules of Order shall apply at all meetings. A quorum shall consist of eight (8) members.

SECTION 3.

At the annual convention meeting, the Executive Committee will hold a public meeting for the Pacific Section membership. The purpose of the meeting is to inform members of the activities of the Executive Committee and its committees, to encourage input from the membership, and to vote on adjustments to annual dues.

ARTICLE VIII. ELECTIONS

SECTION 1.

The Past-President of the Pacific Section of the American Association of Petroleum Geologists, with the approval of the Executive Committee, shall appoint a nominating committee at least three (3) months prior to the beginning of the next membership year of the Pacific Section,

(Continued on next page)

consisting of four (4) members, two (2) of whom shall be Past-Presidents of the Pacific Section. The nominating committee shall, each year, select two (2) candidates for each of the following offices: President-Elect, Vice-President, Treasurer-Elect, and Secretary, and every other year shall select two (2) candidates for the office of Editor-in-Chief. All candidates for positions as officers of PSAAPG shall be current members in good standing of the Pacific Section. The final slate of candidates shall be approved by the Executive Committee. The slate of the candidates shall be announced in the "Pacific Petroleum Geologist Newsletter" at least six (6) weeks prior to the election. Additional nominations may be made by written petition of twenty-five (25) or more members of the Pacific Section in good standing, received by the Secretary within two (2) weeks following the publication of the nominating committee slate of candidates. The Executive Committee shall have the authority to name an additional nominee in case of necessity, to assure two candidates for each office. Voting shall be by mailed ballot. The Secretary shall set a date for counting ballots and shall mail ballots to all members not less than six (6) weeks prior to this date. A candidate receiving a plurality of votes is the winner of the election. In the case of 3 or more candidates, elections will be held using procedures outlined in the AAPG Constitution and By-laws.

SECTION 2.

In matters pertaining solely to the business of PSAAPG, all Active and Honorary Members of PSAAPG may vote. In matters pertaining to the Advisory Council and other official business of The American Association of Petroleum Geologists, only Active and Honorary Members of that Association as assigned to PSAAPG shall be qualified to vote.

SECTION 3.

This Constitution and By-Laws may be amended by a mail ballot. Ballots concerning such amendments shall be mailed upon the authority of the Executive Committee or upon receipt by the Secretary of a Petition for Amendment signed by fifty (50) or more members in good standing. A two thirds majority of the ballots returned and received by PSAAPG by the closing date noted on the ballot shall be required to pass any amendment.

BY-LAWS

ARTICLE I. TERMS FOR OFFICERS

SECTION 1. PRESIDENT-ELECT

The President-Elect is elected annually and the term of office shall be for three (3) years. The President-Elect's term is served in three parts: during the first year as President-Elect, during the second year as President, and during the third year as Past-President. Presidential terms will overlap and are intended to help provide continuity as new officers are elected.

SECTION 2. VICE-PRESIDENT

The Vice-President is elected annually and the term of office shall be for one (1) year.

SECTION 3. TREASURER-ELECT

The Treasurer-Elect is elected annually and the term of office shall be for two (2) years. The Treasurer-Elect's term is served in two parts: during the first year as Treasurer-Elect, and

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during the second year as Treasurer. The Treasurer's terms are overlapping and are intended to help provide continuity as new officers are elected.

SECTION 4. SECRETARY

The Secretary is elected annually and the term of office shall be for one (1) year.

SECTION 5. EDITOR-IN-CHIEF

The Editor-in-Chief is elected biannually and the term of office shall be for two (2) years.

ARTICLE II. DUTIES OF OFFICERS

SECTION 1. PRESIDENT

Duties of the President are to (1) communicate activities of PSAAPG to the members at annual convention meetings and in the Newsletter, (2) be the voice of PSAAPG in dealings with government agencies, other geological societies, and the public, (3) liaise with AAPG on current and planned activities of PSAAPG, and provide written beginning-of-year business plan and end-of-year state-of-Section reports, (4) set meeting dates and agendas of Executive Committee meeting and chair meetings, (5) review standing and ad hoc committees and appoint committee chairs, (6) define the annual goals of this Society, the Executive Committee, and the standing and ad hoc committees, (7) provide direction and assign projects to the Vice-President and President-Elect, and (8) serve as an ex officio member of the Pacific Section AAPG Foundation.

SECTION 2. PRESIDENT-ELECT

Duties of the President-Elect are to (1) serve on the Executive Committee and at least one other committee, (2) perform ad hoc tasks assigned by the President or Executive Committee, (3) assist the President to develop goals of PSAAPG, and (4) succeed the President should the office become vacant.

SECTION 3. PAST-PRESIDENT

Duties of the Past-President are to (1) serve as chair of the Nomination Committee, and (2) act as mentor for the President and President-Elect.

SECTION 4. VICE-PRESIDENT

Duties of the Vice-President are to (1) represent PSAAPG as needed on behalf of the President, (2) serve on the Executive Committee and at least one other committee, (3) perform ad hoc tasks assigned by the President and Executive Committee.

SECTION 5. TREASURER

Duties of the Treasurer are to (1) keep the financial books of PSAAPG in order, supervise contracted bookkeepers and tax preparers, and interact with financial institutions, (2) pay invoices, expenses, and other debts of PSAAPG that are approved by the Executive Committee, (3) prepare and report financial statements for the Executive Committee, (4) serve on the Executive Committee and the Committee on Finance, (5) mentor the Treasurer-Elect, and (6) serve as an ex officio member of the Pacific Section AAPG Foundation.

(Continued on next page)

SECTION 6. TREASURER-ELECT

Duties of the Treasurer-Elect are to (1) serve on the Executive Committee and the Committee on Finance, and (2) prepare to assume the office of Treasure by performing activities at the direction of the Treasurer.

SECTION 7. SECRETARY

Duties of the Secretary are to (1) take and archive minutes of meetings of the Executive Committee, (2) prepare and distribute agendas prior to meetings, (3) serve on the Executive Committee, and (4) assist the President with meeting logistics, organization and execution.

SECTION 8. EDITOR-IN-CHIEF

Duties of the Editor-in-Chief are to (1) prepare and publish PSAAPG's Pacific Petroleum Geologist Newsletter, (2) supervise and edit information in PSAAPG's website, (3) serve on the Executive Committee, and (4) select a Webmaster, an Advertisement Coordinator, and an assistant Newsletter Editor.

ARTICLE III. MEMBERSHIP

SECTION 1. MEMBERSHIP

Membership in PSAAPG shall consist of the following classifications:
a) Active Members
b) Honorary Members
c) Associate Members

SECTION 2. ELECTION TO MEMBERSHIP

Every candidate for admission as a Member shall submit an application on an application form authorized by the Executive Committee. The Membership Chair shall review the application form and select the appropriate classification of membership. Any member, of whatever classification, who resigns, or who forfeits membership for nonpayment of dues, except for Honorary Members, ceases to have any rights in PSAAPG.

SECTION 3. DEFINITION OF TERM: "ACTIVE MEMBER"

A member in good standing who is engaged in the practice of geology, the teaching of geology, or holds a degree in a geological science from a college of acceptable academic standards.

SECTION 4. DEFINITION OF TERM: "HONORARY MEMBER"

The Executive Committee may honor each year the accomplishments and distinguished service to PSAAPG and profession by one or more Active Members by designating them as Honorary Members. The Active Member honored must be a member in good standing of PSAAPG. Honorary Members shall be exempt from all future dues of PSAAPG.

SECTION 5. DEFINITION OF TERM: "ASSOCIATE MEMBER"

Any person not qualified for active membership who is interested in the activities of the PSAAPG. Associate Members shall not have the right to vote or hold office, but may otherwise participate in the activities of PSAAPG.

(Continued on next page)

ARTICLE IV. COMMITTEES

SECTION 1. STANDING COMMITTEES

PSAAPG shall establish and maintain the following standing committees:
a) Committee on Finance
b) Committee on Membership
c) Committee on Publications
d) Committee on Communication and Technology
e) Committee on Honors and Awards
f) Committee on Conventions

SECTION 2. APPOINTMENTS AND TENURE

The President shall appoint all committee chairs and co-chairs and fill vacancies whenever they occur. The committee chairs and co-chairs shall appoint all vice-chairs and members for their respective committees. The Executive Committee may remove any committee chairs or co-chairs of the Standing Committees. The chair or co-chair may remove any vice-chair or member of their committees. The term of office of a member of a standing committee shall be one (1) year. Chairs may succeed themselves from year to year if reappointed by each succeeding President. The President may create at their discretion ad hoc committees and appoint chairs. Ad hoc committees have specific goals, are temporary, and expire at the end of the appointing President's term.

SECTION 3. COMMITTEE ON FINANCE

The primary function of the Committee on Finance shall be to prepare a fiscal budget for approval by the Executive Committee. The Treasurer and Treasurer-Elect shall serve as ex officio members and no other member of the Executive Committee shall serve as member of the Finance Committee.

SECTION 4. COMMITTEE ON MEMBERSHIP

The primary function of the Committee on Membership shall be to encourage applications for membership and to review and act upon such applications on behalf of, and with the approval of, the Executive Committee.

SECTION 5. COMMITTEE ON PUBLICATIONS

The primary function of the Committee on Publications shall be to advise the Executive Committee on proposed publications, estimate costs and pricing and potential sales, oversee editorial and printing processes, handle the storage and sale of the publications and maintain adequate records of costs, sales and inventory. The Chair may name a member of the committee as Managing Editor and, upon approval of the Executive Committee, the Chair may assign a number of the listed Committee functions to the Managing Editor.

SECTION 6. COMMITTEE ON COMMUNICATION AND TECHNOLOGY

The primary function of the Committee on Communication and Technology shall be to develop new ways to communicate with Members using latest technologies. Management of the PSAAPG website and similar communication platforms shall be guided by the Committee with the oversite of the Executive Committee.

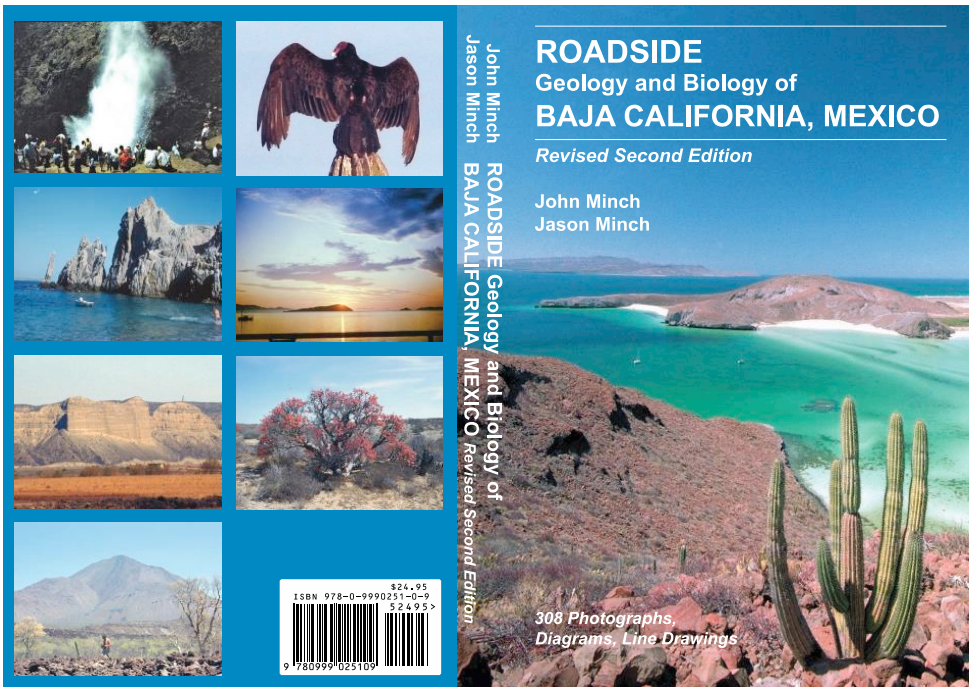
(Continued on next page)

SECTION 7. COMMITTEE ON HONORS AND AWARDS

The primary function of the Committee on Honors and Awards shall be to recommend to the Executive Committee recipients for all honors and awards. All recommendations for these honors and awards by Section members or other Section Committees shall first be considered by this Committee before being presented to the Executive Committee for approval. Following Executive Committee approval, the awards will be presented at the Annual Convention of PSAAPG, or the Annual Convention of AAPG if held in California.

SECTION 8. COMMITTEE ON CONVENTIONS

The primary function of the Committee on Conventions shall be to initiate planning for the Section's Annual Convention, advise the Executive Committee on site selection and convention budgeting, and assist each year's Annual Convention's General Chair, as requested. The Committee will also assure that appropriate accounting standards and procedures are maintained. It will compile and maintain Convention records, statistics and guidelines for use by future Annual Convention General Chairs. The members of the Committee will include the Past-President, President-Elect, General Chair of the current Annual Convention; the General Chairs, when appointed, for the following three Annual Conventions and the President of the host Society of the current Convention.



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Alaska Geological Society

February 21st - AGS/AMA

Speaker: Rick Van Nieuwenhuyse (President and CEO of Trilogy Metals Inc)
Talk: Arctic and Bornite Exploration Projects

March 14th - AGS

Speaker: Rob Witter, USGS
Talk: Ground Failures Induced by Seismic Shaking During the 2018 Anchorage, Alaska M7 Earthquake

April 23rd - AGS/GSA/SPE

Speaker: Joint presentation, Shuvajit Bhattacharya (UAA Geophysics), Machine Learning Using Alaskan
Talk: Geophysical Data

Northern California Geological Society

January 30th

Speaker: Dr. Jonathan Lilien — Chevron
Talk: Environmental Aspects of Oil & Gas Production in California

February 27th

Speaker: Dr. Paul Renne — Berkeley Geochronology Center

March 27th

Speaker: Dr. Sara Kelly Mcbride — United States Geological Survey
Talk: Science to Emergency Management Response: Kaikoura New Zealand Earthquakes 2016

April 24th

Speaker: Dr. Owen Anfinson (tentative) — Sonoma State University
Talk: Using detrital zircon to reconstruct the origin of Salinian Block

Northwest Energy Association

January 24th

Speaker: Allison Pyrch, Hart Crowser
Talk: Earthquake Resilience

February 28th

Speaker: Paul Loikith
Talk: Climate Change in the PNW

PSAAPG Needs a Webmaster

If you have interest in communications, social media and outreach, please contact us. This is an excellent way to provide an important professional service to your Society.

Current Webmaster, Taylor Carrasco, and Vice President, Mike Clark, will provide guidance, but having previous website construction experience is a tremendous plus!

For questions or to volunteer, please contact PSAAPG Executive Committee Officers:

President, Rick Behl - President@psaapg.org
VP, Mike Clark - vicePresident@psaapg.org

Alaska Geological Society

www.alaskageology.org

P. O . Box 101288
Anchorage, AK 99510

Contact: Keith Torrance
ktorrance@gci.net

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:	Art Banet	banetak@gci.net
President-Elect:	Steve Carhart	steve_carhart@hotmail.com
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Secretary:	Keith Torrance	ktorrance@gci.net
Treasurer:	Holly Fair	holly.fair@alaska.gov
Past-President:	Larry Smith	Ljsmithak@gmail.com

Coast Geological Society

www.coastgeologicalsociety.org

P. O. Box 3055
Ventura, CA 93006

Contact: Eric White
805-628-2312

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:	Eric White	president@coastgeologicalsociety.org
Past President:	Theresa Heirshberg	pastpresident@coastgeologicalsociety.org
Vice President:	Shelby Fredrickson	vicepresident@coastgeologicalsociety.org
Secretary:	Renee Richards	secretary@coastgeologicalsociety.org
Treasurer:	John Abeid	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
Treasurer:	Nicky White	nwhite@geomechanicstech.com
Secretary:	Wanjiru Njuguna	wanjiru.njuguna@gmail.com
Scholarships:	Karla Tucker	ktkr2@aol.com
Webmaster	Wanjiru Njuguna	wanjiru.njuguna@gmail.com

Northern California Geological Society

www.ncgeolsoc.org

803 Orion #2
Hercules, CA 94547-1938

Contact: Barbara Matz
barbara.matz@aptim.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
	President-elect:	Tom MacKinnon	tom.mackinnon@comcast.net
	Past President:	Will Schweller	willschweller@yahoo.com
	Treasurer:	Barbara Matz	barbara.matz@aptim.com
	Recording Secretary:	Crystal Replogle	ctreplogle@gmail.com
	Membership Chair:	Tom Barry	tomasbarry@aol.com
	Outreach Chair:	Mark Petrofsky	mpetrof@hotmail.com
	Newsletter Editor:	Mark Sorensen	msorensen@gilbaneco.com
	Field Trip Coordinator:	Will Schweller	willschweller@yahoo.com
	K-12 Program Co-Chairs:	Paul Henshaw	drphenshaw@comcast.net
	K-12 Program Co-Chairs:	Pamela Polite Fisco	pampolite@gmail.com
	Scholarships:	Phil Garbutt	plgarbutt@comcast.net
	Program Director:	John Karachewski	geoscapes1@gmail.com
	Website Editor:	Jonathan Partsch	jon.partsch@gmail.com

Northwest Energy Association
www.nwenergy.us

P. O. Box 6679
Portland, OR 97228

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
Vice-President	Chris May	c.law.may@gmail.com
Treasurer	Barb Portwood	bbportwood@gmail.com
Co-Treasurer	Jim Jackson	jackson.js@comcast.net
Secretary	Clark Niewendorp	clark.niewendorp@state.or.us

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 start 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 American Legion Hall (Post 26) at 2020 H Street, Bakersfield, CA 93301. 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:	Jonathan Goodell	Jonathan.Goodell@crc.com
Past President:	Cameron Campbell	cameron.campbell@conservation.ca.gov
President-Elect:	Jeff Kimber	Jeff.Kimber@conservation.ca.gov
Vice-President:	Kristy Whitaker	KWhitaker@bry.com
Secretary:	Lindsey Thompson	lthompson@envirotechteam.com
Treasurer:	Jennifer Prosser	jprosser@envirotechteam.com
Webmaster:	Ivan Aburto	Ivan.Aburto@crc.com

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