As a young person I was a keen sailor and wanted to become an oceanographer, and so in graduate school took several courses in physical oceanography and marine geophysics. However, economic circumstances resulted in my first job, beginning in 1966, being with Zambian Anglo-American Corporation, exploring for copper on the Zambian Copperbelt. There I developed an interest in remote sensing techniques due to frustration with having to dig literally thousands of prospect pits in order to map the geology through thick soil cover. In 1973 I returned to the U.S., and in 1977 talked myself into a job with the Earth Satellite Corporation in Bethesda, Maryland, where I helped interpret Landsat and other images for structure and for tonal anomalies that could be related to the occurrence of mineralization or hydrocarbons. It was common knowledge in the company that the spill resulting from the blowout on 3 June 1979 of the Ixtoc 1 well in the Gulf of Campeche could be seen on some Landsat MSS images. There were also attempts to map spills in the Gulf of Suez using Landsat.

In 1986 I was working for Shell Mining Company when it was shut down and I was transferred to Shell’s Bellaire Research (Continued on Page 23)
The following report on national energy and state legislative news was prepared by Vice President of National Energy Barry Rava. The environmental report was prepared by Environmental Committee Chair John Kimberly. The views and opinions expressed are those of the authors. Some of the information presented is in the public domain and is available from a variety of sources; other references were selected by the authors and are noted in their reports.

**NATIONAL ENERGY & STATE LEGISLATIVE NEWS**

This is a summary of data gathered from the following main sources: the *Wall Street Journal*, IPAA-Energy in Depth (EID), *Oil and Gas Journal*, *Reuters*, *Geoscience Policy Monthly Review* (GPMR), *World Oil, Oil and Gas Finance Journal*, and Baker-Donaldson.

**U.S. Sells Oil in the Middle East**

Leadoff with a bit of seemingly absurd news: in an odd turn of events, the U.S. is selling oil in the Middle East! Sheela Tobben and Wael Mahdi of Bloomberg reported in February that a cargo said to be condensate is headed out to Abu Dhabi and that the U.S. also exported about 700,000 Bbls to the U.A.E!

The end of a ban on U.S. exports in 2015, coupled with the explosive growth of shale production, has changed the flow of petroleum around the world. Shipments from U.S. ports have increased from a little more than 100,000 barrels per day in 2013 to 1.53 million in November, traveling as far as China and the U.K.

With rising exports and already booming overseas sales of refined petroleum products such as gasoline, the U.S. net oil imports have plunged to below 3 million barrels a day, the lowest since data has been available starting 45 years ago, compared with more than 12 million barrels per day in 2006. The U.S. could become a net petroleum exporter by 2029, the EIA said. (See graph on page 3.)

Interesting to note here is that Corpus Christi is set to become a major export hub as shale drilling surges. *The Houston Chronicle* stated that energy research firm Wood Mackenzie believes U.S. oil producers will pump more than 11 million barrels of oil a day by 2023, lifting production by more than 4 million barrels a day over 2016 levels. The firm forecasts that by 2023, Corpus Christi oil exports should more than double to 2 million barrels a day, significantly surpassing overseas shipments out of Houston. “We see a big export surge ahead for Corpus Christi,” said John Coleman, senior analyst of North American crude oil markets at Wood Mackenzie in Houston. “There's going to be a lot of investments to go alongside that.”

**Leasing Activities**

**ANWR**: Sen. Lisa Murkowski (R-Alaska) said that the Interior Department is moving quickly to offer an oil and gas lease sale in the Arctic National Wildlife Refuge within the next three years, before President Trump’s first term ends. Deputy Secretary of the Interior David Bernhardt is planning to meet with residents of Kaktovik, the only native village located within the coastal plain of the wildlife refuge. “The push right now within Interior is to [issue leases] before four years,” Murkowski said. “They are working fairly and aggressively to put in place, to lay the groundwork for what comes next ... because once you get those leases out into the hands of those who can then move forward, it's tougher to throw the roadblocks in place.”

**Gulf of Mexico Lease Sale 250; 3-21-2018**

(Combined sources) Perusing various publications, this sale has been variously referred to as “weak,” “slow to improve,” “no turning point for offshore drilling,” and “encouraging;” all depending on one’s perspective! But just the facts show that there is still an interest in the deep waters. This sale was the largest acreage offering ever, and even though only about 1% (148/14,474) of the available tracts drew bids, the number of bids and total dollars exposed is up from last year.

There were 159 total bids with over $139 million exposed. The 148 winning bids totaled over $124.8 million and
averaged $153.00/acre—a lot cheaper than acreage in the Permian Basin!

Interesting Statistics are:

<table>
<thead>
<tr>
<th>Company</th>
<th>Bids/Rounded Value in $MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>27 / 20</td>
</tr>
<tr>
<td>Chevron</td>
<td>24 / 29</td>
</tr>
<tr>
<td>Shell</td>
<td>16 / 23</td>
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<tr>
<td>Total</td>
<td>9 / 15</td>
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<tr>
<td>Hess</td>
<td>7 / 5</td>
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<tr>
<td>Byron</td>
<td>7 / 3</td>
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<td>Arena</td>
<td>7 / 3</td>
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<tr>
<td>SDB Offshore</td>
<td>7 / 1</td>
</tr>
<tr>
<td>W&amp;T Offshore</td>
<td>7 / 1</td>
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<tr>
<td>EnVen Energy</td>
<td>5 / 5</td>
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<td>BHP Billinton</td>
<td>3 / 5</td>
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<td>LLOG Expl. Of.</td>
<td>2 / 5</td>
</tr>
<tr>
<td>Statoil GOM</td>
<td>5 / 4</td>
</tr>
</tbody>
</table>

**Florida Waters**

(EID 3-22-18 and News Service of Florida) Florida’s nearshore waters would be off limits to future oil and gas drilling under a measure that moved closer to appearing before voters in November. The state Constitution Revision Commission voted 32-1 to advance a proposal (Proposal 91) that seeks to prohibit oil and gas drilling within about three miles of the East Coast and nine miles of the Gulf of Mexico coast. “These things (oil rigs) are not what we want along our shorelines,” said Commissioner Jacqui Thurlow-Lippisch, a former mayor of Sewall’s Point who sponsored the proposal. “We want to protect our natural resources and our scenic beauty.”

Commissioners still will have to take a final vote on the proposed constitutional amendment before it could go on the November ballot. The commission meets every twenty years to propose constitutional amendments.

**...On the Other Hand**

States vow to fight offshore drilling by any means at their disposal (EID 3-13-18 and Politico). The Trump administration may have the power to control what happens in federal waters, but state leaders are vowing to make it as difficult as possible for the White House to advance its offshore drilling plan. The move has drawn opposition from both Democratic and Republican leaders in nearly every affected state, and mobilized the environmental community. From California to New York, lawmakers are considering ways to block the proposal, which would open vast new stretches of federal waters in the Atlantic and Pacific oceans, as well as in the Arctic and eastern Gulf of Mexico, to oil and gas exploration and extraction. New York Governor Andrew Cuomo has been particularly vocal. "Offshore drilling is a really, really dumb idea," Cuomo said at an event Friday, standing alongside former Vice President Al Gore. "That's my professional comment." Cuomo and his counterparts in other states are looking to prevent offshore drilling by any means at their disposal.

New West Virginia law seen to help operators boost production (EID 3-13-18 and Platts). Natural gas producers in West Virginia hope that a new law passed by the state legislature and signed by the governor will help spur production in the state, which in recent years has seen a dramatic ramp-up in gas output from the Marcellus Shale play. Governor Jim Justice signed the co-tenancy bill, which would allow drilling to take place on a tract of land if 75% of royalty owners agreed. The legislation amends current state law, which had allowed owners of a small minority stake in a given tract to block development of that land. The legislation gathered the support of producer groups in West Virginia. Charlie Burd, executive director of the Independent Oil and Gas Association of West Virginia, said the bill would make it easier for operators to acquire more individual tracts of land and to be able to accumulate those contiguous tracts in a way that would allow them to drill longer laterals, which are rapidly becoming the industry norm in the Appalachian Basin. "IOGA West Virginia is very excited to see that bill finally pass," Burd said in an interview. Burd said the legislature forged a compromise bill that would protect the rights of operators and the majority of royalty owners on a given tract of land, while protecting the rights of minority royalty owners and other stakeholders.

**Potential Oil and Gas Tax Increase**

The Oklahoma Supreme Court (PennEnergy & AP) said an initiative petition seeking a public vote on whether to increase the oil and gas production tax to help fund education can move forward. The court ruled that the petition is "legally sufficient" to be submitted to a vote of the people. Supporters will now have a 90-day window to gather about 124,000 signatures.

The Oklahoma Independent Petroleum Association argued that the proposal created an unconstitutional retroactive tax and violated the single-subject (Continued)
Oil & Federal Government: A New Partnership?

Zinke says Interior should be a partner with oil companies (EID and AP). Interior Secretary Ryan Zinke says his agency should be a partner with oil and gas companies that seek to drill on public land, and that long regulatory reviews with an uncertain outcome are “un-American.” Speaking Tuesday to a major energy-industry conference, Zinke described the Trump Administration’s efforts to increase offshore drilling, reduce regulations, and streamline inspections of oil and gas operators. "Interior should not be in the business of being an adversary. We should be in the business of being a partner," Zinke said to a receptive audience that included leaders of energy companies and oil-producing countries. Zinke said the government should shorten the permitting process for energy infrastructure—it shouldn’t take longer than two years. "If you ask an investor to continuously put money on a project that is uncertain because the permit process has too much uncertainty, ambiguity, (it) is quite frankly un-American," he said.

Lawsuits

Louisiana lawsuits try to put oil industry on trial for following the law 80 years ago (EID and Inside Sources). Twenty coastal parishes (out of a total of sixty in the state) are filing lawsuits against oil companies who either are operating or did operate in the area. The lawsuit is surprising in its breadth. Each company is being sued individually and the list of names includes both major companies like Chevron, Shell, BP, and ExxonMobil, as well as smaller companies that no longer operate in the area. In part, the lawsuit looks back to the 1930s, when development in the area began. The case is not the first one to go after the industry for coastal erosion. One of the first cases filed against oil companies seeking damages for coastal erosion was filed in 2013. That case sought to force the oil companies to pay to fill in canals and restore wetlands. The lawsuit was soon joined by others, but the entire process became bogged down in the courts.

New York Mayor Bill De Blasio plans big oil lawsuit, calls on NYC pension funds to divest (EID and Politico). Mayor Bill de Blasio will sue the city’s five biggest oil companies alleging climate change and global warming led to Hurricane Sandy and its catastrophic fallout, and the companies should pay for the city’s resiliency upgrades. The city will sue for reparations and force the companies to pay for the city’s resiliency efforts, which have taken years to complete since 2012, when the storm devastated the city, killing 53 people across the state, costing more than $19 billion. The mayor would like the city’s pension funds to divest from oil companies, two sources with knowledge of the announcement confirmed to Politico. The divestment announcement comes after State Comptroller Tom DiNapoli reasserted his long-held position that the state pension fund should remain vested in fossil fuel holdings so as to have a say in company policy and reap some of their profits.

Indians vs. Men in Black

(EID 3-13-18 and E&E News) An American Indian tribe in Utah is taking the federal government to court for $500 million, claiming U.S. officials have systematically withheld payments and revenue from oil and gas drilling and other development on tribal lands. The Ute Indian Tribe of the Uintah and Ouray Reservation filed suit in the U.S. Court of Federal Claims. They say the government has profited for more than 100 years off lands that rightfully belong to the tribe. At issue is the Uncompahgre Reservation, an area of northeast Utah set aside for a band of the Ute Tribe in 1882. Fifteen years later, the area was opened up to allotment. The Utes say various laws and treaties governing allotment entitle them to payment for any unallotted lands. According to the lawsuit, the tribe never received...
payment, and the Bureau of Land Management has since raked in money from leasing the land for grazing, oil and gas drilling, and other mineral development.

Discoveries at an All-Time Low
(Combined Sources) As reported in the Oil and Gas Journal (and other publications), exploration activities added a record-low 7 billion BOE in 2017, not seen since the 1940s, said Mlada Passos, senior analyst at Rystad Energy. This amounts to replacing only 11% of what was produced. “Low resources per discovered field can influence its commerciality,” Passos said. Rystad’s report estimated that more than 1 billion BOE discovered resources in 2017 may never be developed under the current base-case price scenario.

Passos said low discovered volumes globally “represent a serious threat to the supply levels some ten years down the road.” Since 2014, exploration expenditures have fallen more than 60%, Passos said. A turnaround is necessary to avoid a future supply deficit.

Capital expenditures (and personal sales experiences) do not indicate that this trend will easily turn around. While shale wells are creating a glut now, without more investment in bigger, conventional supply, the world may see output deficits as soon as 2019, according to Canadian producer Suncor Energy Inc. “Tight rock is not going to solve the global supply-demand issue,” said Adam Waterous, chief executive officer at the Calgary-based Waterous Energy Fund.

ENVIRONMENTAL REPORT

After three years serving as the environment director on the SIPES National Board, it is time to move on. Writing the Quarterly report has been a satisfying experience. Each month I reviewed about twenty articles on the subject of environment, trying to find relevant information to share with you. Since the beginning article presented in August 2015, I have emphasized scientific information, avoiding political science (pun intended) and outright propaganda.

Based on my studies of the forces that affect climate, I consider, in order of importance, solar radiation, Milankovitch cycles, circulation of the oceans and atmosphere, and makeup of the gases of the atmosphere to be most significant. Notice that mankind’s activities have no influence on the first two forcings, no measurable influence on the third, and an insignificant effect on the last. The atmospheric gases consist mostly of molecular nitrogen, oxygen and the inert gas argon, which together constitute 99.97% of dry air. For real air including H2O, the water constitutes about 1% at sea level and overall about 0.4% of total atmospheric gases. Other trace gases are carbon dioxide, neon, helium, methane, krypton, and hydrogen.

For this final article I am presenting my findings on the atmospheric gas carbon dioxide (CO2). This gas, way down on the list of forcings of climate change in my opinion, has unfortunately
become predominant in most people’s minds as a result of political influence and media attention. I have always stressed scientific facts over populist beliefs in my articles, so let’s take a look at facts about CO₂.

CO₂

CO₂ is indeed an extremely important gas in our atmosphere, despite its low concentration, because of its role in plant growth. Without it, plants cannot survive, and with more of it plant life prospers. A paper by S. B. Idso et al. (May 2007) reported that in experiments whereby atmospheric CO₂ was increased by 300 parts per million (ppm), the following average growth enhancements occur:

- C3 cereals 49%
- C4 cereals 20%
- Fruits and melons 24%
- Legumes 44%
- Roots and tubers 48%
- Vegetables 37%

My article in the November 2016 SIPES Quarterly on “A Greener Planet” reported that “overall in thirty years there had been a roughly 14% increase in green vegetation on planet Earth.” The increase in CO₂ during this thirty-year period is approximately 62 ppm.

It is important to understand how necessary CO₂ is to our survival. Apparently we need more CO₂ in our atmosphere to feed our human population, not less as is being propagated by a very active and impassioned segment of our society.

Present day CO₂ levels in our atmosphere are about 400 ppm. Figure 1, adapted from R. Brener, shows the CO₂ concentration in geologic perspective through Phanerozoic time. Other than the glacial period in late Paleozoic time and our current glacial period, Earth has not had such low atmospheric CO₂ levels. We are truly in a CO₂-starved period compared with Earth’s history. This historic perspective is important to remember when we hear or read media sources warning of the dangers of high CO₂ levels. In my opinion, the CO₂ level in the atmosphere is not a concern and if it increased by 300 ppm, it would be very helpful in feeding humanity and raising living standards.

In 1896 Svante Arrhenius published “On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground.” At the time, CO₂ was called carbonic acid. This paper is frequently (Continued)
cited to advance the theory that CO₂ is a driver of global warming. It is true that CO₂ does affect warming as Arrhenius proposed, but it should also be brought out that the warming effect decreases as the CO₂ content increases. This feature is graphically presented in figure 2, which shows how small the influence of CO₂ is when added to an atmosphere already containing concentrations of 250 ppm or more.

To further emphasize that CO₂ has been falsely blamed for global warming, I would like to direct your attention to the use of models to predict future temperature. In the February 2016 Quarterly I showed graphically how wrong these models were; all 102 models used in the Intergovernmental Panel on Climate Change (IPCC) CMIP-5 predicted higher temperatures than were actually recorded. The empirical evidence showing that models using CO₂ as a primary agent for warming the atmosphere fail to predict true temperatures is proof that CO₂ is not the culprit causing global warming. It is time to look for other reasons Earth has experienced gradual warming since the Little Ice Age, which ended in the early 1700s.

Analysis of ice cores use the 40 Argon isotope contained in bubbles within the ice as a proxy for temperature and compare it to CO₂ levels in the same bubbles. Cores taken from glaciers in Greenland and Antarctica have provided scientific evidence that CO₂ levels follow, rather than lead, temperature change. Gerhard and Thomasson reported that there are at least eleven papers that have demonstrated this same effect. If this is true, it follows that the geologic record demonstrates that an increase in CO₂ in Earth’s atmosphere is a result of, rather than a cause of global warming.

The scientific evidence against CO₂ being a significant cause of global warming is very convincing. If there is significant evidence to the contrary, why isn’t it being presented? Additionally, higher CO₂ levels have been shown to benefit our planet’s vegetation. Why is this essential gas upon which we are so dependant classified as a pollutant? The answer to that question gets into politics, not a subject I want to cover in this column.

The graphic illustrations I have used in this article are all taken from a paper entitled “The True and False of Climate Change” by Dr. M. Ray Thomasson and Dr. Lee C. Gerhard. The paper has not been published yet, but they kindly allowed me to use their graphs. When their paper is published, I highly recommend that you read it.

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HERE ARE JUST A FEW OF THE HIGHLIGHTS FROM THE SIPES 2018 CONVENTION IN SANTA FE ◆ NEW MEXICO!

The Icebreaker

The Awards Banquet

Outgoing President Patrick Nye and President Elect Carol Shiels
The field trip was a tremendous success despite the dry weather. New Mexico is currently experiencing extremely dry conditions and many of the planned stops were not possible because of park closures. But, despite the weather, Dr. Kirt Kempter led a tremendous trip. We started by departing Santa Fe for the Jemez Caldera; a relatively young volcanic feature with eruptions at 1.6 and 1.25 million years ago. The Jemez Volcanic Field has developed in the past 15 million years at the junction between the Rio Grande Rift and the Jemez Lineament. These two tears in the basement crust of New Mexico are related to the development of the San Andreas Fault and widespread extensional tectonics across western North America. The rift has allowed magma from the mantle to move upward into the thinning crust of the rift. On our way to and from the caldera, we observed both recent volcanic sediments, but also older Paleozoic and Mesozoic rocks from the Colorado Plateau. Dr. Kempter said that during the physical growth of the mountain range, the focus and composition of magmatism varied, ranging from a dense basaltic material to a lighter high-silica rhyolite, with corresponding diverse eruption styles and deposits. He said that the light rhyolitic magma was derived from the older crustal material and was more viscous than the deeper derived basaltic magma which was more fluid. Our lunch stop was within the caldera with a special park permit thanks to Dr. Kempter. Many of the ashy and tuffaceous materials in outcrop were deposited in a matter of hours or days rather than a more traditional lengthy period. Our last stop was at White Rock, New Mexico, where we observed the Upper Bandelier Tuff on top of Cerros del Rio Basalt. Dr. Kempter explained that this tuff is comprised of light, porous rock formed by the consolidation of volcanic ashes and was erupted during the collapse of the Valles Caldera over one million years ago. The eruption began by shooting pumice far into the sky, forming a layer of what is known as Tsankawi Pumice. This pumice contains abundant quartz and sanidine crystals.

We returned to Santa Fe at approximately 4:30 p.m. with a tired but grateful crew of participants. Many kudos and thanks to Dr. Kempter.

Top right and bottom photos are courtesy of Jory A. Pacht, #3054. See http://www.flickr.com/geofiz for more photos.
Many thanks to the members listed below for their continued support of our society

Promoter – $2,500
Thomas A. Smith — Austin, TX

Oil Finder – $1,200
Michael N. Austin — Westminster, CO
William C. Burkett — Midland, TX
Stewart Chuber — Schenckburg, TX
Ralph J. Daigle — Houston, TX
David A. Eyler — Midland, TX
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Daniel L. Smith — Houston, TX
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William B. Harbor — Midland, TX

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and Fort Worth chapters did a marvelous job putting together the event along with SIPES National, where over 160 registrants participated. The La Fonda on the Plaza was the host hotel. Without doubt, the best way to enjoy the convention was to have been there! Here are a few of the highlights:

**SIPES Foundation Seminar** — Dr. Eric Blinman, Dr. Hilario Romero, and Joy Poole, three local historians, gave a comprehensive and exciting history of Santa Fe from pre-colonization through establishing of the Santa Fe Trail.

**Icebreaker** — If you were fortunate enough to hear about Santa Fe’s history, the icebreaker, overlooking ol’ Santa Fe located on the “La Terraza” (terrace) punctuated the history along with excellent food fare and weather.

**Astronomy Adventure Tour** — “WOW!” is all I can say about the incredible clear sky filled with the Milky Way and constellations. Enthusiastic leaders utilizing two telescopes spotted Neptune, Saturn plus their moons, star clusters, and galaxies. Satellites and falling stars interrupted the sky as the leaders told stories and factoids about various astronomical subjects. THIS WAS JUST THE FIRST DAY!!

**DAY #2 — Technical Sessions & Tours** — Technical talks kicked off the morning session with the resources and oil of New Mexico followed by exploration tools for the independent. Excellent talks provided Q&A and broadened the horizons for each participant. Tours included the Canyon Road Walking tour and Restaurant Walking tour, both well received.

**All-Convention Luncheon** — An appreciative crowd welcomed in the new SIPES President, Carol Shiels, officers, and board of directors. The SIPES Past Presidents issued a motion as follows:

> “Whereas the prior year had been challenging for the current SIPES Board with a lot of difficult decisions. With that in mind, in our Past Presidents meeting yesterday, we came to a unanimous decision that we would like to make a motion to be entered in to the official minutes of the annual meeting.”

Our motion is: “That the current SIPES Board of Directors be commended for: a) their willingness to make difficult decisions under extremely challenging circumstances, b) for their efforts above and beyond to facilitate a smooth administration transition, and c) for their commitment in positioning SIPES for future success.”

ALL APPROVED BY ACCLAMATION!

**SIPES Awards Banquet** — Local author Hampton Sides entertained the audience with his historic biography of Kit Carson – a hero, villain and legend of the southwest. Autographed books provided by Bob and Pam Leibrock were distributed after the event and treasured by all. Thank you, Bob and Pam!

**DAY #3 — More Technical Sessions & Tours** — A morning technical session centered on field histories and followed by the field trip guide Kirt Kempter pre-empting his discussions of the Jemez Mountains. Tours included the Botanical Garden and Historic Downtown tours of Santa Fe. Many folks also enjoyed short hikes to the famous Loretta Chapel and numerous shops and restaurants in the area.

**Discovery Room & Ethics Talk** — In its second year, the Discovery Room is growing in participation both on the buyers and sellers sides. This is a tremendous added value that aligns SIPES investors and prospectors to exchange ideas, show their latest discovery, or buy and/or sell prospects to SIPES Members at the convention. A big thank you to David Shiels and Randy Bissell who stepped up to the task of presenting the Ethics Talk since the speaker was unable to attend. Thanks guys!

**SIPES Cornerstone Group Reception** — The brain child of Carol Shiels, the reception, in my opinion was one of the best in the history of SIPES. Kevin Hill entertained the packed crowd at the Santa Fe School of Cooking with his wide range of knowledge, lore, and comedian-like delivery of the Calcareous wines of California. Wine tasting occurred before, between, and during the five-course dinner! I must say THIS was a GREAT EVENT!! Thanks Carol and to ALL of the SIPES Cornerstone supporters!!!

**SIPES Headquarters & Rebuilding Efforts Update**

I am extremely happy to report that the SIPES National Board of Directors has stemmed the tide and turned around what was a scary future into a solid path forward. All of the directors are real heroes that have spent an enormous amount of time and effort to set SIPES National on solid footing. Key components of the success began with Katie and Phyllis, taking on the additional workload to run headquarters, keep up with dues, contributions, member and Cornerstone lists, the website, and of course—compiling the Quarterly and convention books. THANK YOU! I would also like to thank ALL of the directors and officers who have gone above and beyond, especially Carol Shiels, who has given many, many hours at headquarters while in her spare time spearheading the 2018 Convention committee. All I can say is WOW & THANKS!!
committee relies on your support to grow the capital base so that scholarship funding will continue well into the future. A big thank you goes the SIPES Foundation Board and the investment committee for their diligent efforts this year!

**SIPES Cornerstone Update**

SIPES National greatly appreciates the Cornerstone members who have generously given to our organization this year. Please see the summary of the 24th Annual Cornerstone Reception above. Any Cornerstone contribution, large or small is greatly appreciated!

**Final Comment**

This has been an immensely rewarding year for me serving as SIPES President. Challenging—yes, fun—yes! Great BOD (Board of Directors)—YES!! My best wishes to everyone this year and thank you for your continued support for SIPES. If you haven’t noticed, there is an exceptional group of directors that have shouldered this critical transition. There are no words to convey my heartfelt thanks to them and the staff at SIPES HQ.

Thank you and blessings to all!

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**WELCOME NEW MEMBERS**

In accordance with the SIPES Constitution, By-Laws & Code of Ethics, the following announcement of new members unanimously approved by the SIPES Membership Committee during the last quarter is printed below.

Any member in possession of information which might possibly disqualify an applicant is asked to submit this information to the secretary of the society (John H. Newberry) within thirty days of this publication. To be considered, this information should be in writing and bear the writer's name. If this information is received within thirty days after the publication of the applicant's name, the SIPES Board of Directors must reconsider its previous approval of the applicant. The board's action, after consideration of such new information, shall be final.

*Carol M. Shiels, National Membership Committee*

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<tr>
<td>3075</td>
<td>Chuck H. Hadley</td>
<td>Houston</td>
<td>C.G. Tyner, W. Mark, B. Bippus</td>
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AUSTIN
The Austin Chapter’s regular lunch meeting is held the first Thursday of the month at the County Line on the Hill Restaurant from October through May.

At our January meeting, Ursula Hammes, of Hammes Energy Consultants and Texas A&M, was our speaker. Her talk was about the mudrocks of the Curiaco Basin in Venezuela. The Curiaco Basin is an anoxic basin where mudrocks are currently being deposited. The Curiaco Basin mudrocks provide a good analog to the Eagle Ford and Haynesville formations of the Gulf Coast. The Curiaco Basin and the Gulf Coast shales all have alternating layers of organic-rich, laminated marls and planktonic-rich limestones. The alternating layers are likely the result of sea level changes, upwelling, and variations in sediment supply.

In February, our speaker was David Koger with David Koger Remote Sensing. He provided an interesting overview of recent advances in remote sensing, including the rapidly developing drone technologies. The increasing availability of satellite data is allowing for better and more cost-effective ways to evaluate prospect and field information.

At our March meeting, Dallas Dunlap, senior research scientist at the Bureau of Economic Geology, discussed his research on the northwest shelf of Australia. Using high-resolution seismic data, he was able to map and describe ancient carbonate channel-levée systems. Siliciclastic channel systems have been extensively studied, but carbonate channel-levée deposits have only recently been explored. The channels, having widths of 200 to 300 m, extend for more than 70 km. Stratigraphic patterns in the carbonate channels are similar to siliciclastic stratigraphic patterns suggesting similar depositional processes.

Ward Davenport
Chairman

CORPUS CHRISTI
Allen Gilmer, co-founder of Drillinginfo, former CEO and current executive chairman of Drilling Info, Inc., was our January speaker. His presentation asked: How Big is the Prize?

Allen presented many figures and graphs explaining rig counts by basin and by operator. After an overview of the different plays and basins in Texas and New Mexico, he then compared the economically recoverable reserves of these unconventional resources (1,080 BBOE to 2,160 BBOE) to Saudi Arabia’s 268 BBOE and Venezuela 297 BBOE. Needless to say, Texas and New Mexico are world leaders.

In February, Scott Pollard, an independent scout and consulting geologist, gave us a current report of Texas Railroad Districts 1-6. Closest to home, the Eagle Ford rig count is up to 70 rigs, from a low of 30 in mid-2016. While this is over a two-fold increase, it is still low from the high of over 230 rigs in mid-2013.

No leasing is happening in these districts outside of the Eagle Ford and Chalk plays.

Scott talked about different activities of CO2 injection projects, drilling the Midway Sands, various fracing strategies in the Eagle Ford, low perm Frio/Vicksburg sands, and horizontal drilling in sand reservoirs.

Tom Fett was our March speaker. Tom is a dipmeter/imaging specialist and petrophysicist, retired from Schlumberger. His talk was titled “The Joys of Geological Field Trips.” Tom is based outside of San Antonio. He leads many field trips from San Antonio, which is centrally located and home to many excellent outcrops. On a field trip you learn geology – appreciating the size and scale, the setting and orientation, and the variability of the rocks you observe.

There are many excellent resources as field trip guides and field trip tools. Local geological societies, the Gulf Coast Association of Geological Societies, the United States Geological Survey, and the Bureau of Economic Geology are good starting places. This is a list of just a few of the publications:

- Geologic Wonders of West Texas by Don McGookey
- Landscapes, Water, and Man by Tom Ewing
- Texas Fossils by the Bureau of Economic Geology
- Texas in Time by Tom Ewing
- Fracture Bulletin from February 2014 by the South Texas Geological Society.

Dawn Bissell
Secretary
CHAPTER NEWS CONTINUED

DALLAS

The Dallas SIPES Chapter welcomed Russell Davies as its first 2018 speaker at the Prestonwood Country Club in January. Dr. Davies is consulting services manager, structural geology with Schlumberger, having over twenty-six years experience in the oil and gas industry at Schlumberger, Shell E&P, ARCO and Rock Deformation Research. His expertise is structural geology, trap and seal analysis with focus on the flow characterization of faults and fractures, fracture modeling and other. Dr. Davies can be reached at rdavies4@slb.com.

Richard Fritz, CEO of Council Oak Resources, a new EnCap private equity start-up shared insights into the “many faces/facies” of the Osage STACK Play in Oklahoma with the Dallas Chapter in February. The STACK play of Oklahoma is one of the leading new unconventional plays having excellent recoveries and well economics. Five different play types have been interpreted creating multiple exploration and development opportunities within the “Osage” chert/carbonate lithostratigraphic horizon.

Jon Herber, petrophysicist/consultant and Dallas SIPES member completed the first quarter of technical luncheon presentations in March discussing best practices of integrating conventional core data with petrophysical interpretation to take the mystery from the results of a CO₂ EOR program. Jon demonstrated several simple and economical observations to analyze and accurately map high permeability zones within a wave dominated deltaic environment having multiple facies.

The presentation was well received. Jon can be reached at: jonherber@sbcglobal.net.

Richard Fritz, Council Oak Resources explaining the Oklahoma STACK play.

Jon Herber, March speaker, noting the relationship of channel facies to conventional core metrics / properties in Dallas.

The Dallas SIPES Chapter enjoyed having National SIPES Board members attend the March luncheon meeting. John Stephens has joined the National SIPES Board as treasurer and Dallas representative.

Robert Webster (left) shares a view with new Dallas SIPES member, Ron Stillwell (right).

Bill Guffy (left) congratulates John Stephens on joining the SIPES National Board as treasurer and Dallas representative.

New Dallas SIPES members Ron Stillwell (left) and Sybil Callaway (right) at the March luncheon accepting SIPES certificates. Sybil Callaway is an experienced petroleum engineer with degrees in engineering and geology. Ron Stillwell is an accomplished geologist with over 30 years experience. Both are currently associated with Mercury Operating LLC, Irving, TX. Ron is Exploration Manager and Sybil a consulting Sr. Reservoir Engineer.

SIPES President Patrick Nye (left) with National Director Jeff Allen (right) of Houston.

(Continued)
DENVER

The Denver Chapter of SIPES opened 2018 its first meeting in January with a presentation by SIPES member Steve Cumella, his talk titled “What Do Resistivity Reversals Tell Us About the DJ Basin Niobrara Petroleum System (?).” Resistivity of the Niobrara intervals has been a principal mapping parameter since the idea was first published in an RMAG paper in 1984 by Smagala, Brown, and Nydegger. They concluded that an increase in resistivity corresponds to an increase in thermal maturity. Duhailan and Cumella (2014) recognized resistivity reversals of the Niobrara in the DJ, Piceance, and Sand Wash basins. These reversals however are noted in the most productive and thermally mature areas of the DJ Basin particularly in the prolific Wattenberg Field. The causes of the reversals are poorly understood. Steve presented a plausible mechanism for these reversals which involves changes in wettability. In the oil generation window, source rocks generate both non-polar hydrocarbon liquids (saturates and aromatics) and polar organic compounds (e.g., resins, asphaltenes). The non-polar hydrocarbons displace water from the center of the pore spaces which leads to an increase in electrical resistivity. As the polar organic compounds begin to compete with water to coat carbonate and siliciclastic grain surfaces, the wettability of the rock begins to change. Eventually this leads to a disruption of the conductive, continuous water phase, and a significant jump in electrical resistivity results. Maturation continues with thermal cracking affecting the already generated hydrocarbons and kerogen. Cannibalization of resins and asphaltenes occurs along with a reversal of the oil-wetting behavior and grain surfaces are rewetted by connate water causing a drop in resistivity.

Steve is presently a consulting geologist in Denver, having earned bachelor’s and master’s degrees in geology at the University of Texas at Austin. He was awarded the Rocky Mountain Association of Geologists’ Outstanding Scientist Award in 2005 and AAPG’s Robert H. Dott, Sr. Memorial Award for Best Special Publication in 2010. He was an AAPG Distinguished Lecturer in 2011. He is past executive editor of the RMAG “Mountain Geologist” and Past-President of the Grand Junction Geological Society in 1991.

The February luncheon featured a presentation by Debra Higley with a talk titled: “Controls on Gas and Liquids Production in the Devonian Marcellus Shale Gas Giant, Appalachian Basin, U.S.A.” With a cumulative production of more than 29.2 trillion cubic feet of gas, 51.4 million barrels of natural gas liquids, and 142 million barrels of water from about 12,000 wells, the Middle Devonian Marcellus Shale is a “Gas Giant.” The areas of best production and potential are characterized by 40 ft and greater thickness of quartz-rich fissile, brittle and organic-rich shale. This source rock has an average total organic carbon greater than 2% by weight, and measured vitrinite reflectance 1% and higher. The regional structure is marked (Continued)
CHAPTER NEWS CONTINUED

by subtle and complex, mostly north-west-trending folds and faults caused by the Alleghanian Orogeny and movement of the underlying Silurian aged Salina Salt. True vertical depths to the reservoir are generally around 4,500 ft with long horizontal laterals oriented perpendicular to structural features. The Marcellus Shale is normal to overpressured. Exploration and production is concentrated in northeastern and southwestern Pennsylvania, and northwestern West Virginia which is the area of the basin with the greatest production and potential for natural gas liquids.

Debra is a Research Geologist with the Central Energy Resources Science Center of the U.S. Geological Survey in Denver. Her research combines conventional and unconventional oil and gas resource assessment with petroleum system modeling for basins in North and South America. She earned an M.S. in geochemistry and Ph.D. in geology from the Colorado School of Mines, and a B.S. in geology from Colorado Mesa University.

The first quarter of 2018 concluded with a presentation by Michael Holmes on “Peak Production through Optimal Completion Strategy Petrophysics to Define Relative Permeability and Fluid Flow Rates.” Disposal of produced water is a critical issue in oil and gas operations and consequently, well completions needs to minimize the possibility of perforating intervals with mobile water. Relative and effective permeability to hydrocarbons and water can be calculated from the triple-combo wireline log, and by applying appropriate fluid viscosities, the expected hydrocarbon/water ratio can be estimated. Net potential recoverable hydrocarbon reserves, together with associated water volume can be determined in intervals of interest and initial daily rates of hydrocarbons and water can be estimated.

FORT WORTH

The Fort Worth Chapter kicked off the 2018 new year at the Fort Worth Petroleum Club on January 3rd. Bob Leibrock (SIPES Fort Worth Treasurer) announced our upcoming National SIPES convention with his co-chair Don Muth (SIPES Dallas 2018 President).

Our speaker, Bill Fairhurst, with the Bureau of Economic Geology at the University of Texas presented: “Real-Time Data Analytics Success Stories and Tight Oil Resource Assessment (TORA).”

The TORA program is an industry consortium created in 2016 to fund a multidisciplinary study of tight-oil-producing horizons in the Midland and Delaware basins shale and tight sand plays. Unlike previous governmental analysis that utilized statisticians and non-earth scientists, TORA uses geostatistical analysis incorporating porosity, permeability, original oil in place, and many other geological variables to give hydrocarbon production potential within the study area. The TORA project leverages both State and operator funding to conduct the resource assessment. Industry memberships ($50,000) in TORA gives geologic, petrophysical, engineering, statistical, and economic analysis provided by the multidisciplinary research team. The final product gives a basin wide 3D facies architecture framework used to calculate resource-in-place analysis. Members will see “Sweet Spots” within the plays of various horizons along with the best completion techniques used in that area. Memberships are currently being solicited.

The SIPES February meeting started with our Chairman Dan Earl Duggan announcing Temple Energy, an Austin Operator, is actively seeking Gulf Coast prospects. This is a good sign that our industry may be turning a corner with renewed interest and activity.

The February program was presented by William DeMis, President of Rochelle Court, LLC, a geoscience consultancy. He presented “By-Passed Plays: Considering net income from hydrocarbon production and water disposal costs, estimates of initial daily net income can be determined. By adjusting the assumed completion interval, it is possible to predict the maximum economic advantage when completing the well. Examples were presented from the Bakken, Niobrara, the Midland Basin, and the Delaware Basin for both oil and gas wells, showing excellent correlation with produced fluids.

In 1998, Michael combined consulting activities with software development, to form Digital Formation, Inc. in Denver. From 1998 to the present, most of his work has been petrophysical analysis and reservoir characterization in reservoirs world-wide. More recently, Digital Formation has developed extensive petrophysical algorithms including rock physics, capillary pressure, and the analysis of unconventional reservoirs. Michael has a Ph.D. in Geology from the University of London and the M.Sc. in Petroleum Engineering from Colorado School of Mines.

Jerry Cuzella
Secretary

(Continued)
Understanding False-Negatives and Log-Normal Distributions to Capture New Opportunities."

In the late 1970s, famed explorer Robert Sneider showed that the average (conventional) reservoir had 2.7 “dry holes” drilled through it before the reservoir was “discovered.” Unconventional plays of today have had hundreds of dry holes drilled through them.

Conventional fields are by-passed if subtle shows are not tested—but dismissed as “uneconomic”—thereby resulting in plugged, oil-productive wells (a “false-negative”).

Conventional fields can also be condemned as uneconomic if early wells show low-rate IPs or low estimated ultimate recovery. The data are not correctly interpreted as part of a continuous log-normal distribution; but misinterpreting as field averages.

Examples:
1. Wells that “Looked Wet” on the logs and not tested with a twined well IP of 4 MMCFPD + 100 BWPD.
2. Three feet of pay was “Too Thin,” then twinned by 2nd company with an IP of 1000 BOPD discovery of the Hilight Field with a reserve of 83 MMBO.
3. Six dry holes with noncommercial DST recovering drilling mud with a small amount of oil. The excessive mud cake masked the true production characteristic and the twin produced 300 BOPD + 81 BWPD.
4. Tilted oil / water contact prevented first company from drilling down dip. Second company found more than 1/2 the field down dip from the original field.

More oil is found in field extensions than the original discovery. A great place to look for oil is around old fields.

Confident professionals working for large companies often do not take chances nor go outside the box of standard operating procedure for fear of upsetting the boss. As Independents we should seize those opportunities and profit from them.”

The SIPES Fort Worth March 7th Meeting was kicked off by the co-chair of our annual SIPES Convention, Bob Leibrock, announcing the opportunities to be found at the convention in Santa Fe this year. Great venue, speakers, and times to be had this year.

We were honored to have Dr. Richard Denne of TCU to share some of his research on the Woodbine-Eagle Ford. He is Professor of Professional Practice and the Hunter Enis Chair in the Department of Geology at TCU. His talk is titled “Implications of Woodbine-Eagle Ford depositional episodes on unconventional production, South Texas and Brazos basins.”

A regional study of the Eagle Ford/ Woodbine system in outcrops, cores, and logs from south and east Texas identified 9 regional depositional episodes that affect unconventional production. These episodes were related to transgressive/regressive cycles, erosion of the adjacent Sabine and Ouachita uplifts, and bottom-water oxygen levels.

The Eagle Ford oil production is a function of good source rock, the Marl, alternating thin limestone units to aid in frac propagation, and a low clay content. Detailed stratigraphic mapping of each of the 9 episodes can predict better production rates in the trend. He and his masters research students can provide operators with such detailed knowledge to aid with their Woodbine-Eagle Ford projects.

The Fort Worth Chapter meets September through May on the first Wednesday of each month at the Fort Worth Petroleum Club.

Monte Meers
Secretary

LAFAYETTE

We started out the new year with Thomas Gentiz from Core Laboratories giving an excellent presentation at our January meeting. His talk was about geochemical screening of conventional source rocks and reservoirs and how important it is to select the appropriate analytical program to obtain the best results. The Rock-Eval pyrolysis analytical equipment and its classical Basic/Bulk-Rock method have been developed mainly to characterize potential source-rock intervals in petroleum systems.

However, with the increasing interest in unconventional plays, it has been shown recently that the use of modified pyrolysis-temperature regimes improves the quantification of hydrocarbons still present in oil-impregnated reservoir samples. Dr. Gentiz showed us examples from the Wolfcamp & Spraberry, the Niobrara and the Bakken using three known different pyrolysis methods and how these methods yielded different oil in place estimates.

(Continued)
Our February meeting had an interesting presentation from Alyssa Dausman. Dr. Dausman is the Vice President for Science at the Water Institute of the Gulf in Baton Rouge. She was kind enough to tell us about The Water Institute of the Gulf. It is a not-for-profit, independent research and technical services resource with a mission to support resilient coasts and sustainable water systems worldwide. The Institute connects academic, public, and private research providers and conducts applied research to serve communities and industry. Today, the Institute is at work conducting applied research that will help coastal communities and economies become more resilient to land subsidence, storms, rising sea levels, and other coastal threats. Key initiatives include development of numerical modeling and decision support tools, real-time forecasting, and comprehensive integrated risk assessment modeling to establish scientific benchmarks and provide guidance that will better inform policy makers, communities, and businesses.

In March we had Jon Rotzien speak to us about addressing the 21st century siliciclastic reservoir quality challenges. He is a visiting professor at the University of Louisiana at Lafayette. He spoke about exploration wells drilled in turbidite-dominated depositional systems along the Gulf Coast continue to face key geologic risks including reservoir presence and reservoir quality. In particular, the Paleogene Wilcox Group shows a broad spectrum of lithofacies, depositional architecture, and reservoir quality over a stratigraphic interval exceeding 6,000 feet in the thickest parts of the trend. One of the methods to better understand geologic uncertainty in Gulf of Mexico petroleum reservoirs is via the study of global outcrop analogs. This presentation features data from four classic deep-water outcrop locales in the Western Irish Namurian, Alpine Foreland of France, Taranaki, and Ventura basins to highlight the architectural complexities and similarities of each system to the Wilcox Group.

King Munson
Chairman

OKLAHOMA CITY

Our first speaker for the year was Neil Suneson of the Oklahoma Geological Survey. His presentation was titled “Rocks, Castles, and Whiskey: A Tour of the Geologic Delights of Scotland.” Neil regaled us with stories and pictures of his three-week adventure in Scotland in which he visited many of the famous geologic locations from whence modern geologic thought was born. Of course, one of the most important thoughts he brought back was the Scottish saying, “Today’s rain is tomorrow’s whiskey.” It was also our pleasure to be joined by the SIPES Foundation Scholarship Award winner, Abram Barker from the University of Arkansas.

Our February speaker was Muizz Matemilola, graduate student at the University of Oklahoma. His presentation was entitled “Identification of Mechanical Stratigraphic Controls IP30 Hydrocarbon Production Volumes in the Merge Area, Anadarko Basin, Grady County, Oklahoma.” It was an extremely interesting talk about the use of vertical transverse isotropy to pinpoint landing zones within the Woodford Shale to optimize liquids production.

Ray Sorenson, noted Mid-Continent geologist and co-editor of Oil-Industry History was our March speaker, and gave us a presentation entitled, “Mid-Continent Leftovers.” He shared with us the idea that even though horizontal drilling seems to be the mainstay of Mid-Continent drilling, there still remain reserves to be found that may not fit the “standard” geologic models. As exploration geologists, there is still plenty of oil and gas to be found if we break the paradigm, and look for the reserves that still may be hiding in old drilled up areas due to geological, geophysical or geographical anomalies.

Greg Riepl
Chairman

SUMMER NAPE
15 – 16 AUG 2018 | Houston, Texas
George R. Brown Convention Center
**CONGRATULATIONS TO THE WINNERS OF THE SIPES FOUNDATION 2018 NO HASSLE RAFFLE**

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<td><strong>SECOND PRIZE — $250</strong></td>
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<td>Richard W. Thompson, Jr.</td>
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**EXTRA ONSITE DRAWING WINNER — $100**

Lanny O. Butner  
*Wichita, Kansas*

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## SIPES Chapter Meeting Information

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<td>TBA</td>
<td>Michael Adams</td>
<td>Tom Zadick</td>
<td>Barry Rava</td>
<td>Julia Battle</td>
<td>Earl Sebring</td>
<td>Cliff Williams</td>
<td>Michael Bone</td>
<td>Lee Billingsley &amp; Bill Layton</td>
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<td>Treasurer:</td>
<td>Dwight Cassell</td>
<td>Neil Barman</td>
<td>Monte Meers</td>
<td>Allan Kean</td>
<td>King Munson</td>
<td>George Friesen</td>
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<td>Meets:</td>
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<td>Time and Location TBD</td>
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**JUNE 2018**
MIDLAND

In January, our speaker was George Veni. His talk was titled “Sinkhole Collapses and New Findings to Minimize their Occurrence.” Karst and related pseudokarst terrains cover 25% of the U.S. Many of these areas are prone to sinkhole collapse. Recent studies by the U.S. Geological Survey have determined that sinkholes cause a minimum average of $300 million per year in damages across the country. The true cost is likely far higher. Most collapses occur as cover-collapse sinkholes, which have three primary modes of origin. Research by the National Cave and Karst Research and one of its partners, has determined that induced recharge due to urban infrastructure results in collapse at a rate more than fourteen times greater than the other causes combined in a Florida study area. Consequently, engineering practices are proposed for building codes and ordinances to reduce induced sinkhole development in areas prone to cover-collapse. Analytics are the buzz word and fastest growing process not only in the oil and gas industry, but in most industries and society in general. Analytic programs are sprouting across the academic world at breakneck speeds. The main tools, Multivariate Statistical Analyses, are tools and processes you can do, and which you need to be involved in or potentially risk being left behind. The solutions from basic analytics are powerful, insightful, technical, financial and business answers for issues we all address professionally and in our daily lives.

In February we had the Annual Chapter Dinner. The dinner was held on Thursday, February 22, at Midland Country Club. There were 67 in attendance. The guest speaker was Margret Wade of Midland College. Her topic was “Lessons from Rapa Nui (Easter Island).”

At our March meeting, the speaker was Lewis Matthews, with Crown Quest Oil and Gas Company. His talk was titled “The Second Shale Revolution.” Just over a decade after the first shale revolution, the Permian Basin sits on the verge of another revolution. Laboratory results are suggesting that recovery factors could increase from roughly 12% to >50% with EOR. The implications of this value creating revolution are huge and stand to further tip U.S. energy production in America’s favor. However, the Permian Basin is still wrestling with trying to find the optimum spacing and completion method that maximizes value. Optimal well spacing to maximize value at the granular level is a unique solution for each well and is dependent upon geology, geophysics, geomechanics, well bore geometry, proximity to other well bores, drilling engineering, and completion engineering, price of oil, and cost of inputs. Within these typical datasets there are literally thousands of variables yielding unwieldy sized solution spaces with sparse datasets. Many companies are turning to non-parametric modeling to make predictions in data where parametric models have failed. These non-parametric methods are very quickly hitting the limits of the data which are thousands of variables with only hundreds of samples. This ill-posed problem results in poorly constrained endpoints that increase the probability of having failed to realize maximum value. This talk is about solving these problems together and what that framework is starting to look like.

George Friesen
Secretary

NEW ORLEANS

In January, Jack M. Thorson, #2326, a geologist, founder of Northcoast Oil Company in Covington, Louisiana, and a member of the New Orleans SIPES Chapter, discussed the “Future Climate Change and Hydrocarbon Demand.” Jack has been researching this topic for several years and is not intending to take on the global warming crowd, but rather uses the available science to show that there are a multitude of factors contributing to the Earth’s cycling climate changes. Jack concluded that in the near future, the Earth may begin returning to a much cooler climate which could result in high demand for oil and especially natural gas.

Jack reviewed the Earth’s climate history for the past 65 million years and related ice ages through geologic periods. A graph showed that the overall temperature dropped during this period. Jack explained the long-term effect by the Milky Way Galaxy and the short-term effect by our solar system on the Earth’s climate. He then focused on the last third of the current Pleistocene ice age. Jack showed us the cyclical nature of warming and cooling trends and provided a method to predict when the cooling trend may continue.
zation for both onshore and offshore dropped significantly as the product price dropped during the recent downturn. However, as the oil price exceeds $52/BO, both deepwater and North American shale come into play. Professor Smith compared the investment parameters between U.S. shale and offshore ultra deepwater. The lower investment threshold, shorter project life and great flexibility of shale vs. deepwater offshore are a driving force behind growth in shale vs. offshore. Buildup from deepwater will be required to help meet demand.

Professor Smith believes deepwater development in the U.S. Gulf will continue because at current prices, investments are still economically viable and recent discoveries demonstrate there are remaining reserves to be discovered. For the moment, lower capex subsea tie backs are dominating offshore development.

In March, Kevin J. McMichael, #3002, provided an update on an onshore, ultra-deep exploration prospect in Louisiana in a presentation titled “Highlander—New Frontier?” Kevin founded the New Orleans Land and Exploration Company, LLC (NOLEX) in November 2013 to generate south Louisiana drilling prospects and provide technical evaluations of producing properties and project development.

The Highlander prospect is an inboard test of the Lower Tertiary-Cretaceous trend, drilled to a TD of 29,400' in Q1 2014. The well found 150' of net pay, initially tested 43.5 MMCFGD on a 22/64" choke at 11,880 FTP, and has produced over 30 bcfg through Q3 2017 at a relatively constant production rate.

Kevin reviewed the regional geologic setting, integrated deep water data, and identified the potential risks that had to be addressed—high temperature, potential for low porosity and permeability, gas quality—H₂S & CO₂, deliverability, and high capital cost.

Kevin highlighted challenges to further development including recent collapse of natural gas prices and capital constraints. He concluded that Highlander’s success demonstrates major gas reserves are present in south Louisiana, which are long lived and should be repeatable. This well was drilled and produced economically at unit costs that are lower and safer than comparable deepwater wells to comparable targets.

Cliff Williams
Vice Chair

SAN ANTONIO

Richard Ball and Sean Kimiagar, geologists with Detring Energy Advisors, were the speakers at the San Antonio Chapter luncheon in January. Detring Energy Advisors has partnered with Drillinginfo to provide basin-level technical reports on every major and active U.S. basin. The first two reports in their series cover two sub-basins of the Greater Permian Basin, the Midland, and Delaware. The goal was to provide an in-depth, multi-disciplinary analysis of the basins, aimed at both the technical and investment communities.

The Greater Permian Basin covers an impressive 115,000 square miles (approximately), and contains the Midland, Delaware, Val Verde, and Marfa sub-basins. During the past six years, increase in activity has drastically accelerated during the “Shale Gale,” as horizontal drilling and hydraulic fracturing techniques have become more efficient and cost-effective. The Midland and Delaware basins were primarily filled by sediments from the surrounding highlands. Midland Basin wells show a higher gamma ray and lower resistivity response toward the basin center and away from the Central Basin and Eastern Shelf platform-supported margin. This is indicative of materials becoming finer grained away from the stable margins. In the Delaware, the basin becomes gradually shallower to the south, while the 3rd Bone Spring Carbonate thickens into the basin. This thickening corresponds to some of the best returns noted in our Type Curve Analysis. After splitting the Midland and Delaware basins into 45/70+ type curve sub areas (respectively), they viewed the Midland Basin break-even threshold at $38 and the Delaware is $30 per barrel oil for a 10% return.

(Continued)
Sean Kimiagar is a geologist with experience working both conventional and unconventional reservoirs domestically in the U.S., and internationally, including projects in offshore Brazil, Australia, Utica, Marcellus, and Gulf of Mexico. Before joining Detring Energy Advisors, Sean worked for BHP Billiton Petroleum, Halliburton, and C&C Reservoirs, where he held a number of technical and business development positions. Sean received his master’s degree in petroleum geology from the University of Texas at Arlington and is an active member of AAPG and the Houston Geological Society.

Richard Ball is a certified petroleum geologist who worked both conventional and unconventional reservoirs with Chevron USA over the past ten years, including onshore U.S., Gulf of Mexico Shelf/Deep Water, and West Africa Shelf. Richard served the AAPG as general chair for the 100th Anniversary Annual Convention, and is currently a DPA Councillor and candidate for treasurer. Mr. Ball is a graduate of Stephen F. Austin State University and the University of Louisiana at Lafayette, where he earned his B.S. (2005) and M.S. (2007), respectively.

In February, the San Antonio Chapter hosted its annual Valentine’s Day event. The event was well attended and provided a Valentine’s Day spirit to the holiday. Italian food, candy, flowers, balloons, and open bar provided zest to the party.

In March, Dwayne C. Purvis, #3470, talked on “Myths and Misunderstandings of Reservoir Engineering” which takes aim at some of the most common and intransigent fallacies, even among reservoir engineers. The wide-ranging discussion addressed concepts like drainage area maps, the concepts of depletion and interference, and tilted oil-water contacts as well as applications like the choice of a constant b-factor, the use of daily production data, and how those relate to reserves categories.

Mr. Purvis has spent over two decades in reservoir engineering and executive leadership as a consultant and operator. He has led or participated in hundreds of field studies and reserve analyses over dozens of basins in the U.S. and abroad, and he has participated in the sale or acquisition of projects valued from tens of thousands to billions of dollars. Mr. Purvis started his own consulting practice in 2015. Mr. Purvis has published on issues of reserves, risk analysis and shale reservoirs. He is a registered professional engineer in the state of Texas, member of SPEE, AAPG, SEG, and a 25-year member of SPE.

Doug McGookey
Secretary

IN MEMORIAM
We regret to note the passing of the following members:

Charles R. Burnette, #760, of Corpus Christi, Texas, who passed away on December 24, 2017

Stanley L. Cunningham, #3251, of Oklahoma City, Oklahoma, who passed away on November 29, 2017

Louis H. DuBois, Jr., #2511, of Arlington, Texas, who passed away on April 7, 2018

Jacob D. Eisel, #3152 of Boulder, Colorado, who passed away on November 2, 2017

J. Frank Fuller, #2094 of Dallas, Texas, who passed away on March 4, 2018

Paul M. Strunk, #1869, of Corpus Christi, Texas, who passed away on June 17, 2018

John C. Worley, #1168, of Oviedo, Florida, who passed away on January 5, 2018

Tom Fett (center left) and John Patterson were masters of ceremony for the Valentine’s Day SIPES party.
Center to set up a remote sensing effort. The company was unwilling to spend much money on remote sensing, but they did approve purchase of the ERDAS™ image-processing software, which I loaded, with a lot of help from Ed Biegert, onto a Sun 2 workstation and began to learn to use. Landsat-TM data at the time were very expensive, so I therefore began looking for low-cost imagery that I could scan for geologically significant phenomena. The entire dataset from the SIR-A Radar mission, flown on the second Shuttle flight, Nov. 12-15, 1981, was available free, on long rolls of 6-inches wide film, from NASA, so I ordered it and began to examine it in January 1989. One track passed through the Gulf of Campeche, and I could clearly see the bright dots of reflections from the oil rigs, but I could also see that the sea surface was abnormally dark in this area. Another parallel track passed south of the Mississippi Delta, where there was another large dark patch in the ocean (Figure 1).

A couple of days later I happened to see Dan Worrall, who was at Bellaire for a technical conference, and told him that I had seen what I thought was a large oil slick off the Mississippi, similar to one in the Ixtoc area. He shot back, “Can you get me the coordinates by tomorrow afternoon?” It took some effort, because the SIR-A data was not annotated with a grid of any sort. But by locating on a good map of Louisiana features that I could see in the image I could position that part of the track, and then extrapolate to the position of the dark patch in the Gulf. I left a message for Dan with the coordinates, and he immediately got back to me with some excitement in his voice: “Can you get any other imagery over the area, preferably much more detailed, and soon?” This posed a problem: there were no other radar data over the Gulf. There was plenty of Landsat-MSS data, but I knew that slicks, even known large slicks, were rarely visible on these images. Landsats 4 and 5 had been launched in July 1982 and March 1984, respectively, and both carried the new, higher resolution Thematic Mapper instrument. However, the Government had given control over data distribution to a for-profit company, EOSAT, and they had raised the price to $4000. I called Dan, “Is this OK?” “Sure, go ahead!” In those days there were relatively little Landsat TM data offshore, but EOSAT’s catalog showed a couple of images with less than 50% cloud cover over the area. I ordered one. By the time it arrived my transfer to Pecten, the international arm of Shell Oil, had become effective and I was working at Woodcreek, about 11 miles from the Bellaire Lab. The data came on four large reels of nine-track tape. I went down to the lab after work at Pecten and loaded it to examine on-screen. It was frighteningly densely covered by clouds. But here and there, between the clouds, there were groups of dark streaks on the sea surface. On the workstation I stitched the tapes together into two half-images (north and south), because otherwise the printed scale would have been very small, and geographically rectified them and labeled them with a Lat/Long grid. This took several hours and then the printing took some more hours. About one in the morning I went home, thankfully only a 10 block walk, and to bed. This became my life for the next several months, because when Dan heard where those slicks were, he demanded that I look at the whole Deepwater Gulf of Mexico, because the deadline for the 1989 lease sale was only a few months away. I was now working two full-time jobs, at least until the lease sale. It took 14 images to cover the Gulf, and we used three coverages, for a total of 40 images. Each coverage took two evenings to process and print out.

Somehow, I managed to find time to do some research on why and how I was seeing these slicks, and why Landsat-TM worked and Landsat-MSS didn’t. Some of our first images were very dark and had no slicks; others were very bright and had no slicks. From the Manual of Remote Sensing I gleaned that ripples on the sea surface are initiated at a windspeed of about 1.2 knots (0.6 mi/s), so under calm conditions our images would be dark and there would be no visible slicks. From illustrations (Continued)
and descriptions of the Beaufort Scale, and from my own experience, I realized that at about 12 knots (6.2 mi/s) there are sufficient white caps to break up any thin oil slicks present. We began to request a wind hindcast for the day and time of overpass of each image we were considering buying.

I discovered the 1956 publication by C. Cox and Walter Munk of Scripps Institute on the “Slopes of the sea surface deduced from photographs of sun glitter.” The glitter pattern is the bright stripe seen across the sea surface when we look at the sun’s reflection: at its center is the point at which the sun’s reflection would appear if the sea surface was as flat as that of a mirror - the “specular point.” The sun’s image is broken up and spread out by scattering from all the little wave facets that are not horizontal: its visible width subtends about 30 degrees at the eye, because under light winds there are a significant number of slopes up to only about 15 degrees (see Figure 2a, where the glitter is visible out to about 20 degrees—each circle represents an angle of 5 degrees subtended at the eye). Cox and Munk took the lens out of a camera so as to average out the bright facets and dark spaces between and thus record the average brightness of the glitter pattern for every few square meters of the ocean (Figure 2b): this was equivalent to converting their photograph into a raster image with pixels that are large in relation to individual reflecting wave facets. The large pixel size of Landsat-TM mimics the lens-less camera – it measures an average reflectance value for each 812 m² TM pixel. As the wind increases, the waves increase in wavelength and slope and hence the glitter becomes more diffuse (a wider pattern, but less bright at the center). They found that the effect of an oil slick is to reduce the mean square slope by a factor of two to three. What this means is that, if you are looking at the outer region of the glitter pattern, as one always is with a satellite such as Landsat that looks vertically downwards (Figure 3), an oil slick will always appear dark (Figure 2c) against its background. However, if one looks straight at the reflection of the solar image, oil slicks will be blindingly bright, as the cone of scattering from them is much narrower and the glitter therefore brighter over the slick (Figures 2c and 3). In effect, the work of Cox and Munk (Continued)
Munk told us we needed to have a high enough solar elevation to have measurable glitter: in practice this turns out to mean that the background brightness of an 8-bit (256-grey-level) TM image must be a few grey levels above a threshold determined by the atmospheric backscatter in that band. Often, the slicks would only be one or two grey levels darker than the background, and since the human eye can only reliably distinguish 16 grey levels in a black-and-white image, that was the number of grey-levels we displayed. Landsat-MSS data, however, were acquired as a 6-bit image, hence only 64 grey levels, and so most slicks had insufficient contrast with the background to be detectable on an MSS image.

The local time of overpass for the first 3 Landsat satellites, carrying the MSS instrument, was around 8.30 in the morning. Landsat 4 and its successors, carrying the TM, transited an hour later, around 9.45 am, thus the sun is about 15 degrees higher in the sky than for MSS images, reaching an elevation of as much as 64 degrees in TM imagery of the tropics, so that the center of the image is only 26 degrees away from the sun’s reflection. The solar elevation for MSS images rarely goes above 50 degrees, which is insufficient for detecting slicks. The Landsat 4 User’s Guide conveniently included a nomogram (Figure 4) showing the relation between target latitude, time of year, and solar elevation at time of overpass, making it very efficient to search for images with solar elevations over 57 degrees, which we soon found was the minimum required for good imaging of slicks.

More Modern Satellites: ERS-1 and Radarsat

No SAR (Synthetic Aperture Radar) satellites were in orbit in 1987: ERS-1 (European Remote Sensing Satellite 1) was launched in 1991, and the Canadian Radarsat-1 in 1995. Most of the considerations above apply when ordering data from these satellites, but they have the huge advantages that cloud cover is not an obstacle, and nor is the lack of daylight. Wind must still be over 2 knots and less than 12 knots, and the Radar look angle must be steep enough to allow backscatter from unslicked waves to reach the satellite. Radarsat, for example, has some beam modes with such high incidence angles (i.e., shallow beams) that there is little to no return from the sea surface, and the Japanese JERS-1 (launched 1991) SAR imagery, acquired with a fixed angle of incidence near 35 degrees can only detect slicks in ideal conditions.

Meaning and Form of Slicks

Naturally-occurring oil slicks occur over seeps at the seafloor, which like seeps on land represent the endpoints of migration paths from a kitchen to the Earth’s surface (Figures 5a and 5b). The occurrence of slicks in the ocean over a frontier basin therefore indicates the presence of an active petroleum system in the basin (Figures 6a and 6b). Note that the shapes of slicks that occur in both of Figures 6a and 6b differ—they vary with wind and current.

In a more mature basin, with sonar and seismic data available, the location of the seeps at the seafloor can be determined. This allows sampling and the typing of the oil. With sufficient seismic data, the migration path to the seep can be determined, its relationship to any potential traps along the way, and the integrity of the traps can be determined. Partly on the basis of my work, Shell was able to acquire a dominant position in the Deepwater Gulf of Mexico at the 1989 lease sale. BP also acquired a lot of leases and I later found out that one of their remote sensing geologists had also discovered how to map slicks at the same time as I had.

Lessons to be drawn from this tale:
1. A prepared mind is essential:

   I gave some biographical details at the beginning of this story to show that no learning is ever wasted: it was my (Continued)
awareness that oil slicks had occasionally been seen as dark areas on Landsat-MSS data, especially at Ixtoc, that allowed me to jump to the conclusion that the dark patches I saw in the Gulf of Mexico were oil slicks, and it was my training as an oceanographer and as a small-boat sailor, hitherto useless in my career and thus, in one sense, a waste of time and money, that allowed me to quickly determine the conditions under which the slicks could be observed.

I think that Dan Worrall would say the same thing: he must have seen oil slicks in the Gulf of Mexico and he knew that traps could fill to spill, and that there were very large hydrocarbon columns in the Gulf, so when he heard that one could see and map oil slicks from space, it immediately suggested to him that they could be used as a low-cost exploration tool. In particular, they could answer the question “Is there charge in this minibasin?”

The moral for young geologists is to always pursue knowledge and never close your mind to new knowledge, as every experience, every piece of knowledge that you acquire in your life, may one day acquire great importance—no learning is ever wasted if you keep an open mind.

2. “Basic Research” may be more cost-effective than “Directed Research.”

Not long after I had completed mapping the slicks in the Gulf of Mexico (see Figure 5), Pete Lucas, then Manager of the Bellaire Research Center, asked me whether I had set out to study oil slicks or had I just happened on their significance during “undirected research.” When I confirmed that the latter was the case—that I had just been looking through a free dataset to see if there could be anything useful in it—he heaved a sigh of relief and thanked me profusely. He was on the way to a meeting at which he had to defend spending money on “basic” research against senior managers who only wanted to pursue solutions to identified problems. This approach, in my opinion, has since become a major problem throughout government and corporate research: huge bucks are thrown at an obvious problem, like finding a cure for cancer, when it is really quite probable that the solution will come from an observation made by a lone scientist who was working on some completely unrelated topic. The discovery of penicillin is a case in point, the harnessing of nuclear fusion, imminent for 65 years, its counterpoint.

3. Making your big idea practical may take a lot of hard work:

In this case, since I had already been transferred out of the laboratory, and was working on the tectonics of the Tarim Basin, when oil slicks became of interest I basically had to work two jobs for more than half a year. This is what it (Continued)
often takes, and it may be very disruptive of your family life, but it is worth it in the end.

4. Management support can be fickle and come from odd places: “networking” is all:

I had not persuaded management at the lab that there were avenues of research in remote sensing that showed enough promise to justify more than token investment. At Pecten management needed me to support an active exploration project with structural interpretations. Support for the slicks effort came from a chance remark to a manager I barely knew in an office I had never visited.

It took many years to convince some senior managers that there was any utility at all in mapping slicks and I have never managed to persuade many people that, under the right circumstances, slicks can be used to evaluate specific traps. If the editor agrees, I may try to persuade y’all of the value of natural oil slicks for exploration in another article.

References


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