PTTC at 20
PTTC Partners with EFD, managed by HARC

This week marks the 20th anniversary of Petroleum Technology Transfer Council’s (PTTC) hiring of its first employee, and first Executive Director, Deborah Rowell. With its office located in the basement of the Independent Petroleum Association of America’s building in Washington, DC, PTTC began its work without ceilings overhead, as the unused office space was renovated around the newly created organization. PTTC has come a long way. True to its collaborative beginning—working with IPAA, GTI, DOE, RPSEA to name a few—PTTC continues to leverage partnerships to expand impact within the oil and gas industry.

PTTC and the Environmentally Friendly Drilling (EFD) program, managed by the Houston Advanced Research Center (HARC), have recently joined together to develop and implement a research effort to address gas flaring and stranded gas. The ultimate plan is to utilize novel technologies to monetize gas at the wellhead. Reminiscent of its first workshops in 1994, PTTC will begin by organizing and running problem identification workshops in at least three locations around the country, with the first scheduled for September 2014. After results from those workshops have been assessed and analyzed, PTTC will move into technology transfer and training. EFD will manage the program, participating at the workshops along the way.

The overall objective of this Flaring Issues, Solutions and Technologies (FIST) project is to develop and demonstrate technologies to monetize stranded gas and to reduce or eliminate gas flaring and/or methane emissions associated with gas production in a manner that results in monetization of the valuable gases.

The FIST project team is currently developing a budget, program schedule & sponsor participation fee structure. The plan will be structured into four phases:

- Phase 1 will develop a web based prototype screening tool and begin the screening of technologies.
- Phase 2 consists of performing an initial evaluation of various technologies and refining the screening tool.
- Phase 3 will include detailed engineering and design for field demonstrations as selected by the sponsors.
- And Phase 4 will include field trials, documentation and the continuation of the program to maintain the web site, additional field testing, and provide training.

If you are interested in learning more, the following link will get you there: http://efdsystems.org/index.php/flaring-issues-solutions-and-technologies-fist and look for more information about the Problem Identification workshops that will take place in September and October 2014 on PTTC’s calendar and in future PTTC Tech Alerts.

As PTTC reaches this 20 year milestone, we reflect on the great outcomes of working together within industry to enhance production, reap cost savings, and bring knowledge to far-reaching audiences. Gratitude is extended to all of those groups and people who have worked with PTTC to this end. Read on for further industry-wide environmental updates and see the calendar of events and regional sections to find out what is going on in your part of the country.
Modern drilling and production practices are all geared towards conducting activities that are safe, low impact, and as fast as possible.

Onshore operations that can implement multi-pad wells are faster, more economical and reduce the area of impact. Wells that are drilled and completed without leakage, spills or waste contamination either subsurface or on the surface are more economical. Onshore the environmental hazards range from potential contamination of water resources, air pollution from compressors and fuel use, road damage, impact on wildlife and agricultural areas, sounds, smells and visual disturbances to people in urban and rural areas.

Safety and environmental protection is even more critical for offshore operations, because the natural risks associated are much higher. The marine environment has unique problems because any spill or leak of petroleum fluids or chemicals spreads so rapidly and working on offshore platforms and vessels servicing drilling and production operations in thousands of feet of water includes an array of dangers. Cleanup and preventing the spread of fluids to reduce contamination of the ocean is a highly complex environmental process.

PTTC recent and current lineup of workshops and the new partnership with EFD and HARC are directly related to protecting the environment and promoting safety. Reduction of gas flaring is an important issue that involves clean air and production technologies. PTTC’s workshops will help to spread information on how operators can reduce or eliminate gas flaring and/or methane emissions like those shown on the cover page photo.

PTTC workshops in the Eastern Region are strongly involved with water resource and CO₂ emission issues in the Marcellus and Utica plays. In the populated areas of Pennsylvania, West Virginia and Ohio the public is directly impacted by any problems that threaten safe water and clean air.

Electrical power generation and transmission are addressed in PTTC workshops in Kansas and by NETL’s Smart Power Grid demonstration. PTTC’s Midcontinent region has recently held workshops in Kansas and Texas addressing problems related to casing and cementing. Leaks through the casing or poor cement jobs are the most common cause of water contamination in onshore wells. The West Coast PTTC is also addressing wellbore integrity, stressing the need for designing for structural integrity throughout the well’s life cycle.

The Rocky Mountain PTTC is addressing some of the more human environmental issues of noise and dust pollution where oil and gas active areas directly impinge on nearby residents. Several companies are offering options for mitigation of industrial dust and noise from drilling and production operations.

PTTC is proud to once again be a sponsor for the International Petroleum Environmental Consortium (IPEC) Conference in October.

PTTC has also been involved with the Research Partnership to Secure Energy for America (RPSEA) program. RPSEA has three main focus areas Unconventional Resources, Small Producers and Ultra-Deepwater. PTTC’s Midwest region co-hosted a Small Producer workshop on EOR in the Illinois Basin. EOR is primarily an economic issue, but there are environmental benefits and reduced footprint from maintaining production from mature fields and wells versus developing new wells.

The RPSEA Ultra-Deepwater (UDW) program has a number of active research projects all aimed at improving safety and environmental protection in the Gulf of Mexico and marine environments. The UDW program will hold its annual 2-day convention in Houston, TX on September 3-4, 2014 at the Norris City Center. Forty some projects will review a wide range of state-of-the-art technologies in subsea imaging, improved design for offshore intervention vessels, improved subsea power transmission, and protection of marine mammals. See the RPSEA website [www.rpsea.org](http://www.rpsea.org) for more information.

### Upcoming Events

#### JULY 2014

- **7/15** West Coast: **Waterflooding 101** - Long Beach, CA.
- **7/17** West Coast: **Waterflooding 101** - Bakersfield, CA.
- **7/19** Rocky Mountain: **Beyond Porosity: Lithology from Logs for Geologists** - A pre-convention short course at the RMS-AAPG Annual Meeting - Denver, CO.
- **7/20** Rocky Mountain: **Source Rocks 101** - A pre-convention short course at the RMS-AAPG Annual Meeting - Denver, CO.

#### AUGUST 2014

- **8/12** Midcontinent: **Saving Electricity in Producing Fields** - Midland TX
- **8/19** West Coast: **Wellbore Integrity throughout its Life Cycle** - Long Beach, CA.
- **8/20** West Coast: **Wellbore Integrity throughout its Life Cycle** - Bakersfield, CA.

#### SEPTEMBER 2014

- **9/18** Rocky Mountain: **Environmental Best Practices in Colorado Oil and Gas** - Golden, CO.
- **9/23** West Coast: **Drilling Engineering 101** - Long Beach, CA.
- **9/25** West Coast: **Drilling Engineering 101** - Bakersfield, CA.

#### 21st IPEC Conference

**OCTOBER 14-16, 2014 | Houston, TX**

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Industry Works to Mitigate the Impact of Noise and Dust from Colorado Operations by Mike Seal

Rapidly increasing oilfield activity and the encroachment of suburban housing development on farmland is leading to conflict on Colorado’s Front Range. Homeowners, who rarely own the mineral rights, are becoming concerned about adjacent drilling operations. To address this issue, U.S. Representative Jared Polis (D-Boulder) is proposing to put local control initiatives on a November ballot. One of the items on these initiatives would increase the required distance from drilling rigs to homes from the current state requirement of 500 feet to 1,500 feet to a half-mile. Because of the proliferation of homes on small-acreage ranchettes, Governor Hickenlooper, a former geologist, is concerned that this could eliminate almost 60% of drilling locations. To forestall the ballot, he has put forward a compromise bill that would permit local governments to enact health and safety standards more stringent than state rules, have local inspections of oil and gas sites, and negotiate with operators for setbacks greater than 500 feet. However, this compromise bill has not found a consensus among legislators and constituents.

Meanwhile, operators have been working to reduce the impact of their activities. Among the measures they have implemented is the construction of sound walls. The current sound limits for Colorado are 55-80 decibels during the day and 50-75 at night, measured 350 feet from the source. These sound walls bring the noise down by 20 to 30 decibels, in addition to reducing night time light and dust. The Denver Post reports that affected residents are generally happy about the noise reduction, but are not pleased about the look of the walls or the obstruction of their views. Some people are suspicious of the activities behind the walls now that they are obscured.

One sound-wall company that is benefitting is Behrens and Associates Environmental Noise Control, based in Los Angeles recently bought 5.5 acres east of Longmont at Firestone for offices and a large warehouse. Their chief executive Don Behrens is quoted in the Denver Post as saying that the company is working on about 50 wall projects, including consultations for use of walls to protect the greater sage grouse nesting areas near Hayden on the Western Slope. Behrens said “During the mating season, the male sage grouse needs, like, three acres. If there is noise on that three acres, he is driven out of the area.”
Midcontinent Region

Midcontinent Continues to Provide Quality Content for the Region’s Operators

The PTTC midcontinent region has a mission to provide the regional oil and gas industry with access to the latest technology and best practices applicable to their area. Over the last several years the PTTC in this area has provided hours of content and information to hundreds of regional operators and service companies. This spring and summer has been no exception. Recently this group developed and produced a highly successful geology field trip aimed specifically at the Mississippi lime as well as a Root Cause Failure Analysis and Wellbore Stability courses. Earlier this spring PTTC midcontinent provided a day of content focused on reducing electricity in old fields followed by a day discussing artificial lift. Below are some short highlights of these events.

Saving Power in Old Fields (Wichita, KS): For several months operators have been asking for this course. Realizing that one of the most expensive components of any operation can be the cost of electricity this course offered essential tips and techniques to reduce this expense. The course instructor, Michael Paik discussed how electric power cost is not a fixed cost but a variable cost and that it is possible for the average oil field operating company to reduce its electric power cost without turning off production.

Paik stated the objective of the training was for attendees to leave the room with the practical “mental tools” to begin power cost reduction immediately.

This was not a class in electrical engineering, but rather a practical, dirty-hands training in cutting power cost. Participants were encouraged to bring copies of their power bills to reference during the billing part of the course. Overall rated this course highly and KU is looking at bringing back Michael for a similar course in Eastern Kansas.

While state statute assures the right to extract minerals and oversees the process from state agencies, more communities are asking for additional local control of operations. Noise, light, and dust mitigation beyond what is required in state regulations is one strategy the oil industry is using to accommodate residents and communities that view the industrial operations in residential areas as an intrusion.
Artificial Lift Options for Kansas Operators (Wichita, KS): Artificial lift in Kansas can represent many unique challenges for operators. This workshop brought in two experts Russell Stevens from Shores Lift Solutions and Allen Miller from Miller Pump Systems to teach participants about selecting the proper lift system and determining the flow capacity of the well.

During the day participants learned how to select and design optimum rod lift including the fundamentals of rod lift, evaluation of software options, selection of down-hole pumps and rod handling.

Finally, at the end of the day participants will learned about selecting and designing progressive cavity pumps as well as a short overview on ESP pump applications.

Introduction to the Lower Mississippian Geology of the Southern Ozarks (Rogers, AR): It’s no secret that over the last couple years the Mississippian Lime play of Northern Oklahoma and Southern Kansas has spurred a revival of sorts for the oil and gas industry in the north midcontinent region. While drilling activity is up in this area there is still much to be learned about the complex geology of this important play.

Recently KU TORP in conjunction with the Kansas Geological Survey, Kansas Geological Society, and the University of Arkansas hosted a field trip designed to explore the lower Mississippian geology of the tri-state region to study key outcrops in the area.

Led by Dr. Walt Manger from the University of Arkansas, the group departed from Rogers, Arkansas and traveled north through Bela Vista, Arkansas, Jane and Pineville, Missouri. During day two the group explored outcrop formations around Beaver Dam and Petro, Arkansas. Each stop was selected to showcase the unique geology of the Mississippian formation in the area. These outcrops are widely believed to be similar to what operators are producing from in Mississippi Lime Play.

Root Cause Failure Analysis (Wichita, KS and Midland, TX): Brought back by popular demand Russell Stevens from Shores lift solutions provided a single day of content focused on Root Cause Failure Analysis. Known as one of the most comprehensive RCA training courses in the industry, Stevens provided information critical to solving repeat failures in problem wells as well as recommendations for immediate changes or future changes when incurring the next well intervention. Utilizing an extensive library of photos and failure documentation, Stevens showed how engineering and production personnel can identify failures in the field to allow immediate corrective action to be taken.

Wellbore Integrity (Wichita, KS and Midland, TX): In this course Talib Syed provided a day’s coursework highlighting two critical components of well integrity—CASING DESIGN and CEMENTING. Syed discussed key aspects of casing design to help attendees gain a good understanding on why a good casing design is critical in ensuring that the well retains its structural integrity throughout its life cycle.

Additionally Syed spoke about the importance of obtaining a good primary cement job including good cementing practices and evaluation including current cement bond logging techniques—ultra sonic imaging tool (USIT), circumferential acoustic scanning tool (CAST) and segmented bond tool (SBT) in addition to the conventional CBL/VDL techniques. Well integrity considerations for hydraulically fractured wells were also covered in the course.

Midwest Region

The Midwest PTTC co-hosted the RPSEA ONSHORE PRODUCTION CONFERENCE: Illinois Basin and Surfactant Flooding—a conference to disseminate results from the RPSEA Small Producer Research Program. The Research Partnership to Secure Energy for America (RPSEA) is a non-profit organization partially funded by the U.S. Department of Energy to disseminate technology transfer from funded research projects. The workshop was held on April 30, 2014 at The Old National Events Plaza (formerly The Centre) in Evansville, Indiana.

The RPSEA Small Producers Program conducts research that targets technologies that are beneficial to onshore operators working in the United States. The workshop was held in Evansville, as a good central location for operators in the Illinois Basin. It presented an opportunity for geologists, engineers, service company representatives, field operators and oil field staff in the Illinois Basin to hear the latest perspectives and technologies developed from across the country that may be used in the Paleozoic reservoirs in southern Illinois, Indiana and western Kentucky.

The presentations focused on chemical EOR technologies that are applicable in the Illinois Basin or other Midwest areas. Updates on ASP flooding in the Bridgeport and Cypress Sandstones at Lawrence Field, IL and the New Albany Gas Shale play were included. A study on polymeric surfactants using Illinois Basin fluids for Tertiary Recovery was presented. Other chemical flooding presentations discussed technologies developed in the Mid Continent for Paleozoic clastic and carbonate reservoirs, which are applicable in Illinois Basin reservoirs. The speakers joined in a round table discussion and question and answer session following the day’s presentation. Cores and posters from research projects conducted by the Illinois State Geological Survey were on display as were posters from the GTI’s New Albany shale project at the reception at the close of the day.

The workshop was well received with 70 people in attendance and lots of interest expressed in EOR activity in the Illinois Basin, and the value of learning from research and case studies conducted in other regions that are applicable in the Illinois Basin.
Marcellus & Utica Plays Continue to Grow

“The shale gas revolution affects everything: production, CO₂ emissions, price, employment, infrastructure development and imports.” So stated Dr. Tim Carr, a professor in the Department of Geology & Geography at West Virginia University, during remarks made at the recent meeting of the Northeastern Agricultural & Resource Economics Association’s Post-Conference Workshop in Morgantown, WV.

Dr. Carr’s presentation—“You Say You Want a Revolution: Shale Gas and Shale Oil in the US”—summarized his observations and predictions on the dramatic increase in oil and gas production in the US, particularly in the Appalachian basin, and the challenges and opportunities this revolution presents. We currently are seeing the largest growth in oil and gas production in the world, with liquids from the midcontinent and Appalachian areas displacing imports from the Middle East and Appalachian gas displacing gas from our own Gulf Coast.

But, Dr. Carr pointed out, not everything is positive: the necessary infrastructure to fully develop these resources is lacking, and “too much of a good thing” has resulted in lower wellhead gas prices.

However, on the positive side he noted that production of domestic oil and gas is up, CO₂ emissions are down, employment is up, we are enjoying an industrial renaissance in midstream and downstream infrastructure and manufacturing, and imports are down.

The dramatic growth in the drilling of horizontal wells to the Marcellus Shale in Pennsylvania and West Virginia was illustrated in a series of slides, beginning in 2005 when only two wells had been drilled, one each in Pennsylvania and West Virginia, and continuing through 2013. The number of horizontal wells in the play grew slowly at first, with 51 wells by the end of 2006; 187 by the end of 2007, at which time a trend was beginning to emerge; and 637 by the end of 2008, when the trend was fully evident, from northeastern Pennsylvania to north central West Virginia. A parallel trend in liquids production also could be observed on the west side of the dry gas trend at this time.

During the following year, 2009, an explosion in horizontal drilling began, with the number of wells increasing to 2,594 by year’s end; to 6,936 by the end of 2010; and 9,856 by the end of 2011. Two “sweet spots” were now evident, one a dry gas area in northeastern Pennsylvania, and the other a dry gas and adjacent wet gas-liquids area in southwestern Pennsylvania and north central West Virginia.

Drilling in the wet gas portion of the trend increased in 2012, when the well count reached 11,789 overall, and scattered wells began to be drilled in northwestern Pennsylvania counties. By the end of 2013, a total of 13,079 horizontal wells had been drilled or permitted, with dense drilling in the two sweet spots. Dr. Carr included a preliminary wet gas/dry gas line on this final map, and added a second line depicting the southwestern limit of the over pressured area, in which horizontal wells respond quite favorably to large hydraulic frac jobs that have made this play profitable.

Gas and oil production from the Marcellus and Utica shales also increased dramatically during this time, from essentially nothing in 2005 to 4 Tcf of gas and more than 9 million barrels of liquids in 2013. Northern Appalachian (defined as Ohio, Pennsylvania and West Virginia) annual gas production is now estimated at 15 Bcf/d, of which 82% is from shale wells, although only 2.5% of the total gas wells are shale wells.

The annual liquids production from these same states is now 12 million barrels, of which 29% is from shale wells, although shale wells represent only 0.65% of all wells producing liquids.

In West Virginia alone, gas production grew from approximately 225 Bcf in 2007, with very little production from shale wells, to nearly 850 Bcf in 2013, of which 74% came from shale wells, in spite of the fact that shale wells represent only 0.4% of all producing gas wells in the state. During this time interval (2007 – 2012) the number of horizontal Marcellus wells from which production was reported increased from 2 to 640; the number of well pads from 2 to 233; and the number of wells per pad from 1.0 to 2.9.

Oil production in West Virginia showed a similar growth. In 2007, oil production approached 2 million barrels, the historical level seen for several decades, but dropped to 1.25 million barrels in 2009. The following year, 2010, saw an upsurge in both conventional and unconventional oil production, which reached more than 2.5 million barrels in 2013, of which 37% came from shale wells. Shale wells, however, represent only 2% of the State’s total oil wells.

The industrial renaissance has been highlighted by new pipeline construction from the Northern Appalachian productive area to markets in the NE and SE, gas processing plants and other new gas facilities. Dr. Carr cited PLG Consulting as the source of one of his final slides that depicted the coming three phases of the shale gas revolution: phase 1, gas and power-intensive industries (steel, fertilizer, methane); phase 2, downstream products (resins, chemicals), and phase 3, “manufacturing” (raw material cost driven).
DOE Digest

Smart Grid - Modern Power

DOE’s National Energy Technology Laboratory is addressing the need to modernize and improve the nation’s power supply. NETL has produced a video that explains and illustrates the needs of the nation’s rapidly changing electrical demands. The ageing power grid across the U.S. was designed over 50 years ago and many of the power plants and power lines are decades old. The age of instant communication through computers and Smart phones requires vastly more electricity than the power grid was designed to supply. Infrastructure over the past decades has upgraded the grid, but not overhauled the system or put a new power grid in place.

America uses more electricity than ever, and we make more electricity than ever, however, the transmission systems needs to keep pace with supply and demand. Our aging power grid threatens industry, damages the environment, undermines our energy security and slows our economy. Today’s telephones, cars, airplanes, and computers have new power demands not dreamed of when the current power grid was designed.

America’s digital economy demands higher quality power. Currently we rely on large power plants, a modern grid will accommodate many small power sources closer to where the energy is needed, and incorporate modern energy technologies including solar and wind power.

A modern power grid will have higher reliability, provide greater national security, lower costs, and reduce our dependence on foreign sources of energy. The goal is to produce power wherever the source is and transmit it to wherever it is needed. A modern power grid will have improved two-way communication with smart meters, smart sensors and smart controls to ensure reliability.

Local generation of electricity is a major component of a Self-healing power grid. With a self-healing grid more power can be transmitted safely and ultimately save billions of dollars by delaying or avoiding unnecessary construction. The Smart Grid will help determine how we use power, where we need power and accommodate peak power demands.

NETL has 32 Smart Grid Demonstration Projects that are funded through the National Recovery Act of 2009. The Smart Grid demonstration projects include regional partnerships and utility scale demonstrations. NETL has developed the Dynamic Line Rating system as part of the Smart Grid demonstration. Dynamic Line Rating will be an integral part of a modern power grid. Dynamic Line Rating will contribute to:

- Fewer blackouts
- Greater safety from attack and disasters
- Environmental improvements
- Greater productivity and increased gross national product
- Greater reliability
- More Jobs

NETL’s dedication to helping develop a modern, smart power grid is a commitment to improving the energy economy of America. Energy is a highly complex subject from production of coal, oil, gas, and renewable power sources to power plants that alter raw energy sources into usable power and transmission of power to all kinds of modern equipment all across the country. Environmental concerns are addressed at every step of the power generation from extracting the raw materials to safe transmission and use of power. Safety and environmental protections to ensure that water sources, land and air are clean and uncontaminated are provided by multiple federal, state and industrial regulations and oversight.

NETL’s message is clear, “The American economy and our way of life depend on electricity.” NETL is helping to modernize our power grid and provide safe, clean power in an environmental sound manner.

Excerpted from the NETL’s video “NETL and Our Modern Power Grid,” [youtube.com/watch?v=hRIy5MzNS0&feature=youtu.be](https://www.youtube.com/watch?v=hRIy5MzNS0&feature=youtu.be)