Twenty Years of PTTC - Part I

Later this year, PTTC will celebrate the 20 year anniversary of its incorporation on November 4, 1993. The commemoration of this occasion began during an exhibit at AAPG’s ACE conference in May 2013 in Pittsburgh, at which PTTC had an exhibit showcasing some of its many accomplishments. In the summer of 2014, the 20th anniversary of the opening of its first office in Washington DC, PTTC will have a national tech transfer event in California. The event will not only highlight its years of success, but will be a large-scale example of the informative and affordable events PTTC has been known to provide to the industry. PTTC looks forward to continuing to enhance its services and work with the U.S. independent producing industry. Following is some information about PTTC’s early years. Look for a continuation of this history in future PTTC newsletters.

Our History. In 1993, a dedicated group of industry professionals, connected through Independent Petroleum Association of America (IPAA), met with the U.S. Department of Energy and explored the needs of small producers of oil and gas around the country. The continued meetings included participants from various state universities and geological surveys, and quickly incorporated the insight of a local beltway-contractor to flesh-out a plan that would soon be accepted as a promising vision for the cost-effective distribution of innovative technology to the independent oil and gas producers.

With start-up funding from DOE’s National Energy Technology Laboratory (NETL), the early plan was led by an energetic IPAA V.P., Deborah Rowell, and would include several steps that would meld to turn the fledgling not-for-profit into a strong grassroots organization. The original mission statement was not very different than today’s and read: The mission of the PTTC is to foster the effective transfer of exploration and production technology to domestic petroleum producers in all regions of the country.

After setting up an office in the basement of IPAA’s office building in DC and hiring a small staff, a solid Board of Directors was easily formed from the many regional producers and oil and gas associations involved with PTTC’s development. The Board included over 20 dedicated volunteers, Chaired by the late James E. Russell of Texas, and included representation from SPE, IPAA, IOGCC, Schlumberger, and GRI (later GTI), in addition to the many regional producers.

PTTC then began to secure relationships with other not-for-profit organizations in each of ten regions selected around the U.S. The qualifying organizations were universities and geological surveys, many of which are still involved in PTTC in some way, and became the Regional Lead Organizations (RLOs). After those relationships were formalized, PTTC staff, the Board, and the RLOs built 10 regional Producer Advisory Groups (PAGs) to assist in the formation, planning and management of the regional programs. This very impressive group of over 200 industry volunteers participated in regional meetings and often assisted with the very important first phase of PTTC, Problem Identification Workshops.

Today we continue this strong legacy through an excellent selection of workshops as indicated on the enclosed calendar. For several years now PTTC’s quarterly issues of Network News have alternated the focus from Unconventional Resources, Environmental Issues, Enhanced Oil Recovery and Independent Operators. See our Environmental focus in this issue. Look for more of our “story” in future issues of Network News.

If you have anecdotes, comments, or information that you want to share about PTTC, please forward them to Kathy Chapman, kchapman@pttc.org. We would love to hear from you and will incorporate them into our 20 year anniversary celebration. Thanks for your support.
the economy of several states and the U.S. as a whole. Water management is the key issue. Hydraulic fracturing uses enormous volumes of water, and water is an expensive resource to procure, and produced or waste streams are expensive to treat and dispose of. The newest technologies are the most cost effective ways to treat and recycle water to reduce the volumes needed for hydraulic fracturing and volumes needed to be disposed.

Many state, federal and non-profit agencies and organizations are getting into the water management business. The National Research Council held a 2-day conference in early June to address risk assessment for greenhouse gas emissions, and groundwater use and the impact on the ecosystems in areas of oil and gas development. The Texas Water Development Board is researching the use of brackish water (1,000 to 10,000 ppm) as a water resource to supplement freshwater aquifers. In Oklahoma several scenarios are being studied to reuse treated groundwater and cycle it back into streams and lakes to mix with surface water and provide an increased resource for municipal water supplies. The Ground Water Protection Council’s June newsletter reports on these efforts, and notes that voluntary reporting of chemical constituents injected during hydraulic fracturing is now being reported by over 600 companies in the U.S.

A recent Research Partnership to Secure Energy for America (RPSEA) Onshore Production Conference in Wichita, Kansas, co-hosted by PTTC Midcontinent, showcased 12 research projects for small producers. Several of the presentations addressed new ways to treat produced water and low impact oil and gas operations to protect sensitive environments. The other presentations focused on improved EOR technologies applicable to small producers and for specific reservoir conditions. Innovative concepts included materials to reduce the footprint in desert ecosystems, a novel pre-evaporation technology for reuse of produced water for irrigation, produced water treatment using co-produced energy on site, and environmentally-friendly EOR technologies.

PTTC’s affordable regional workshops connect independent oil & gas producers with information about various upstream solutions. For further information, check PTTC’s online calendar (www.pttc.org/national_calendar.htm) frequently as changes do occur.

### Upcoming Events

#### AUGUST 2013

8/11  Rocky Mountain: Stimulating Shale Oil/Gas Wells  -- Denver, CO.
8/14  West Coast: GIS  -- Bakersfield, CA.
8/15  Rocky Mountain: Confessions of a Frac Engineer  -- Denver, CO.
8/15  West Coast: GIS  -- Bakersfield, CA.
8/22  Eastern: Innovative Water Management Workshop  -- Morgantown, WV.

#### SEPTEMBER 2013

9/20  PTTC HQ: Applied Reservoir Geology for Engineers  -- Tulsa, OK.
9/24-25  Midcontinent: Applied Technology and Saving Power in the Field  -- Wichita, KS.
9/25  PTTC HQ: RPSEA Onshore Production Conference: Technological Keys to Enhance Production Operations  -- Houston, TX.

#### OCTOBER 2013

10/8  West Coast: Reservoir and Wellbore Scale Geomechanics  -- Long Beach, CA.
10/10  West Coast: Reservoir and Wellbore Scale Geomechanics  -- Bakersfield, CA.
10/14  Rocky Mountain: PETRA - Intermediate Mapping  -- Golden, CO.
10/17  PTTC HQ: RPSEA Onshore Production Conference: Technological Keys to Enhance Production Operations  -- Long Beach, CA.
10/29-30  PTTC HQ: RPSEA Ultra-Deepwater Technology Conference  -- Houston, TX.

### ATTENTION: SUBSCRIBERS

Moved or changed companies? Please indicate change(s) including your name, title, company/organization, address, city, state, zip, country, phone, fax, and email and send to HQ@pttc.org. If you would like to receive this newsletter, please notify us at HQ@pttc.org.

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<td>Houston, TX</td>
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<td>December 11-13, 2013</td>
<td>Denver, CO</td>
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<td>April 9-11, 2014</td>
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UPCOMING WEST COAST EVENTS

GIS WORKSHOP
August 14 & August 15
Bakersfield, CA

This one-day workshop will include lectures and examples followed by a hands-on exercise. The instructor will be using the DOGGR database with wells and oilfields for most of the workshop. The workshop will include the following discussion.

Data Formats and Symbolizing Data
Selecting Data and Creating New Files
Joining Tables to Create New Data and Coordinate Systems

PETROLEUM RESERVOIR ENGINEERING
August 19 thru August 23
Pismo Beach, CA

Petroleum Reservoir Engineering is a 5-day course designed specifically for those who have and are joining the petroleum engineering workforce but have engineering degrees in other related fields such as chemical, mechanical, etc.

The topics selected for discussion are essential to understanding oil and gas upstream operations. The course covers all related topics included in the first two reservoir engineering courses required for petroleum engineers and provides detailed discussions of petroleum geology, hydrocarbon phase diagrams, properties of reservoir fluids such as gas, oil, and brine, porosity, permeability, properties of reservoir rock containing fluids, types of petroleum reservoirs, primary, secondary, and tertiary recovery mechanisms, methods of reserve estimation for gas and oil reservoirs, decline curve analysis, fluid flow in porous media, capillary pressure, relative permeability concepts, flow rate and reservoir pressure distribution for vertical and horizontal wells, different reservoir flow regimes, and introductions to well testing and interpretation.

The course instructor is Dr. Mason Medizade who has taught many short courses for PTTC and other clients. The course is offered by Petrolects, LLC in San Luis Obispo, California: info@petrolects.com

RESERVOIR AND WELLBORE SCALE GEOMECHANICS
October 8 - Long Beach, CA
October 10 - Bakersfield, CA

The workshop is intended for technical personnel desiring to obtain basic knowledge on reservoir and wellbore scale geomechanics. The workshop will include the following discussion.

Theoretical Background
- Fundamentals of Rock Deformation and Stress
- Stresses in the Subsurface
- Stress changes and deformations induced by drilling and production operations
- 1D and 3D Earth Models with Geomechanical Properties

Reservoir Scale
- Compaction, Subsidence, and Well Damage
- Faulting, fracturing, and induced seismicity
- Thermal Geomechanics
- Caprock Integrity Analysis

Wellbore Scale Geomechanics
- Wellbore Stability and Solids Production
- Hydraulic Fracture Mechanics and Simulation
Rocky Mountain Region

Natural Gas Demand Outlook

On May 21, the Independent Petroleum Association of America (IPAA) and the Colorado Oil and Gas Association (COGA) hosted a talk by John Harpole at the Denver Petroleum Club that presented a detailed analysis of natural gas supply and demand. The talk was given at the Rockies Energy Action Lunch (REAL). John Harpole is the founder and president of Mercator Energy LLC, a natural gas services, brokerage and research company. He has travelled to China twice in the past three years to instruct employees of PetroChina on the regulatory and marketing history of natural gas in the United States.

Mr. Harpole began by saying that the supply curve for natural gas has moved and the demand curve needs to move in response. The free market system in the USA has allowed this country to produce gas faster, cheaper, better and smarter than any other country in the world, as exemplified by companies such as Mitchell Energy exploiting the Barnett Shale in Texas. This contrasts with China, which has three different pricing committees. EOG Resources is operating in China and receives $3.5-3.75 per MMBtu for its gas production, which is approximately one third the price China pays to import this product.

A plot of the ratio of futures to actual prices indicated that a strategist was doing well if the price of natural gas could be predicted correctly 50% of the time. Various slides dramatically showed how the estimates of the USA’s natural gas resource base have changed due to shale gas production. According to the Potential Gas Committee (PGC), during the last two years, the future gas supply estimate for the USA rose nearly 25% to a 48-year record of 2,688 TCF. In 2008, the Energy Information Administration (EIA) estimated the shale gas resource at 347 TCF, while in 2013 PGC estimated it at 1,073 TCF.

Shale gas production has been maintained despite the fact that more than 80% of the rigs originally drilling for dry gas are idled. Most of the U.S. shale plays are economical even with $70 oil due to NGL production. Ironically, oil and liquids production is driving gas production. A plot of Permian Basin data showed that incremental gas production from oil drilling amounts to 1.4 Bcf/day. This incremental gas is enough to supply increased demand for the next five years. In the U.S.

69-70 Bcf/day gas production will increase simply due to liquid-rich plays. Some experts expect total U.S. gas production to reach 100 Bcf per day. U.S. dry gas production is up from 2012 by almost 400 MMcfd simply due to increased efficiency.

Currently only 15% of onshore active rigs are working in dry gas areas. Production is growing despite a decline in gas drilling as faster drilling times yield more wells. Fracturing application has exploded with a 10-fold growth in pressure pumping in the last ten years. This shows a marked contrast with China where EOG has drilled 26 horizontal shale wells. On the last fracking job, the company had every fracking truck in Asia on site. In the U.S., there are 100-200 fracking jobs going on at any one time. Some geologists say that China may have more shale reserves than the U.S.

There are several possible methods to use this increased production, including CNG vehicles; coal to gas conversion for electricity generation; new industrial demand; and LNG exports.

There are about 110,000 natural gas vehicles operating in the U.S. To increase demand by one Bcf per day would require a tenfold increase in this number. It is optimistic to say this could be done by 2020. Power demand historically uses 20-33% of total U.S. natural gas supply, but this grew to 39% in 2012. However, coal to gas conversion is price dependent and falls when the gas price goes over $4.00.

Ammonia is worth around $600 per ton on the world market, but can be produced for $180 per ton at the current NYMEX natural gas price. Fourteen ammonia plants closed in the U.S. between 1998 and 2006 due in part to high natural gas prices. The top five world producers would like to build new facilities in the U.S. One ammonia plant can consume as much as 100,000 MMBtu per day. Dow Chemical sees industrial demand increasing by as much as seven Bcf per day by 2020, but Mr. Harpole was skeptical.

In regard to LNG exports, in the U.S. there are 26 LNG export terminals in the planning stage. Japan has 26 LNG import facilities in Japan with 8 in Tokyo Bay alone.

In conclusion, Mr. Harpole said that he expects natural gas demand to exceed supply for at least the next three years.

Copies of the slideshow from this talk may be downloaded from the IPAA website.†

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### Incremental Demand/Supply Increase By 2020?

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<thead>
<tr>
<th></th>
<th>Low Case</th>
<th>High Case</th>
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<tbody>
<tr>
<td>1. CNG/Natural Gas Vehicles</td>
<td>0.5 BCF/day</td>
<td>1.0 BCF/day</td>
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<tr>
<td>2. Coal to Gas</td>
<td>5.0 BCF/day</td>
<td>8.0 BCF/day</td>
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<tr>
<td>3. Industrial Demand Growth</td>
<td>3.0 BCF/day</td>
<td>7.0 BCF/day</td>
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<tr>
<td>4. LNG Exports</td>
<td>3.0 BCF/day</td>
<td>6.0 BCF/day</td>
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<tr>
<td><strong>Incremental Demand Total</strong></td>
<td><strong>11.5 BCF/day</strong></td>
<td><strong>22.0 BCF/day</strong></td>
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<tr>
<td><strong>Incremental Supply Total</strong></td>
<td><strong>15.0 BCF/day</strong></td>
<td><strong>25.0 BCF/day</strong></td>
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*Current daily supply is 65 BCF per day.

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Recently the University of Kansas Tertiary Oil Recovery Program (KU TORP) celebrated its twentieth biennial Improved Oil Recovery (IOR) conference at the Hyatt Regency in Wichita. More than 100 individuals turned out for the two-day event, which included a regional technology bowl competition, industry exhibits, and technical content.

The conference began with a regional technology bowl (similar to the SPE Petrobowl) competition. Petroleum engineering students from the Universities of Kansas, Tulsa, Missouri Science & Technology and Oklahoma participated for bragging rights and a shot at the inaugural annual “golden pump jack” trophy. Each university provided two teams that faced off head to head in bracket style competition. Questions, while all linked to the petroleum industry, ranged from historical facts to real-world calculations.

Later that afternoon, event participants spent time visiting exhibits from regional service companies. In a departure from our previous format, the exhibition was integrated into the technical program, with booths set up in the same room as the speakers’ stage. For exhibitors it gave the opportunity for participants to get up close and personal with companies on breaks and downtime.

The keynote speaker was Scott Tinker, Director of the Bureau of Economic Geology, State Geologist of Texas, and producer and star of SWITCH—the documentary film on global energy. Dr. Tinker’s presentation highlighted emerging areas of interest to the oil and gas community. Among these were subsurface nanosensors that could be injected into a well and activated to assist with subsurface mapping and chemical delivery. Tinker also discussed the impact of mudrock reserves and the effect of alternative energy on the oil and gas industry.

Day two began with the second keynote address from Michael Economides, Ph.D., Editor-in-Chief of the Energy Tribune and author of The Color of Oil. An alumnus of the University of Kansas, Dr. Economides discussed geopolitics and its role in the development and delivery of energy around the globe.

Day two also included presentations from Bill Greiser of Halliburton who discussed microseismic mapping results from a horizontal Mississippian well, and using the mapped data to define fracture planes in terms of height, length, width, strike, and dip.

Terry Pallisch from Carbo Ceramics then discussed frac optimization and the importance of selecting the right proppant.

Finally KU TORP’s own Director, Jenn-Tail Liang Ph.D., discussed KU’s nanoparticle research. Dr. Liang said that to improve oil and gas recovery, we inject all kinds of expensive chemicals into the underground reservoirs. Because oftentimes these chemicals are going into hostile environments, industry is motivated to develop improved techniques to protect and control or delay the release of chemicals so that they can be successfully transported to target locations underground.

Using drug delivery technologies from the pharmaceutical industry, a nanoscale chemical delivery system has been developed at KU to entrap and protect such chemicals from hostile underground environments.

In another part of the Midcontinent Region, PTTC recently presented a basic open hole logging course in Houston, Texas. The course brought together geologists, engineers, geophysicists, and geotechs, looking to establish an understanding of basic petrophysical measurements and interpretation techniques.

Additionally the course provided a “hands-on” approach to basic openhole well log analysis and interpretation and focused on the traditional interpretation targets of lithology, porosity, and fluid saturation.

In November the University of Tulsa will hold its 20th International Environmental Petroleum Conference in San Antonio, Texas. The event entitled, Environmental Issues and Solutions in Exploration, Production, Refining & Distribution of Petroleum will be held November 12-14, 2013 at the Hyatt Regency San Antonio Hotel.

Highlights include: Environmental Issues in U.S. Shale Plays, Horizontal Drilling and Remediation Wells, Fracing & Environmental Issues, Produced Water Treatment & Management Strategies.

Activity in the midcontinent is definitely growing and as independent operators continue to explore technology PTTC will be there with the topics and technology they need to continue to be successful now and in the future.
Midwest Region

In the Midwest PTTC, upcoming meetings are in planning stages. We are working to prepare a workshop featuring research programs under the RPSEA umbrella, with our technology transfer focus on translation of research in terms relevant to Illinois Basin reservoirs. A Fall workshop is in the planning stages, to present a wide array of current or recently-completed work pertinent to drilling and enhanced oil recovery strategies in the Midwest’s small, often lower-pressure, mature oil fields. Watch your PTTC calendar and e-mail for an announcement soon, or contact Joan Crockett to join our mailing list.

The Midwest Region of PTTC covers a large swath of the United States, with our region’s aerial coverage extending from Michigan, south through the Illinois Basin and onwards south through western Tennessee, to the onshore oil and gas productive lands in Alabama and Mississippi. Michigan Basin is part of the Midwest region, working independently through their long-running and well-established, excellent program at Western Michigan University and the Illinois Basin continues its programs run under the PTTC umbrella. We are working on evaluating the desires and needs for extending Midwest PTTC programs, and could use input from stakeholders in the expanded Midwest region. This will necessitate developing partnerships or alliances to offer PTTC programs in areas that may be currently under-served, particularly the area south of Kentucky. PTTC’s trademark of affordable, low cost, high value, focused workshops and our national network of contacts may allow us to re-vitalize, renew and re-establish programs that are of direct meaning and usefulness.

However, any consideration of extension of Midwest PTTC programs cannot be done without input and support of stakeholders in the expanded Midwest region. If you wish to discuss pursuit of new or renewed PTTC programs in under served Midwestern areas, please contact Joan Crockett, Geologist and PTTC Coordinator for the Midwest Region, at 217-333-6630 or jcrocket@illinois.edu.

PTTC is a national not-for-profit corporation under IRS Code section 501(c)3, and therefore donations are tax deductible. We appreciate your support.

Sincerely,

Mary Carr
Director, Rocky Mountain Region PTTC

FUTURES IN ENERGY is a unique oil and gas industry outreach program offering training in oil and gas technology for motivated and talented high school juniors and seniors from the Rocky Mountain communities. Our goal is to generate interest among students in the career opportunities in our industry as well as develop a better informed public. Over the past decade the Futures in Energy Program has trained 112 teachers and 136 students. A large percentage of these students have gone on to careers in the Oil and Gas industry as geologists and engineers.

The 2013 Futures in Energy program was held June 17-21 at Colorado School of Mines, Golden, CO. The program was very successful thanks to the help of 12 sponsors (see below); a total of 24 high school students were given an interactive training program focusing on oil and gas exploration technology. Participants were supplied with free room and board, and instructional material. The course included classroom training, talks by local industry people on careers in the energy field, field visits to oil and gas operations and a geologic field trip.

Andy Leonard was the instructor, and students attended from all over Colorado and California. As always, the field trips were the highlight of the program (see photos below).
AAPG’s Annual Conference & Exhibition (ACE 2013) is behind us, and although we enjoyed bringing this highly-successful and well-attended meeting to the basin, we are relieved that it is over, and eager to get back to doing what we have done for the past 18 years—organizing and hosting PTTC workshops for petroleum geologists and engineers here in the Appalachian basin.

We are working concurrently on three workshops that should have broad appeal, one in Morgantown, WV on August 22, and two in Canonsburg, PA on September 4 and 5.

The August workshop will address “Innovative Water Management” technologies developed by four different research groups during the past several years. From the very beginning of the development of the huge Marcellus Shale play, water concerns have been first and foremost in the minds of the public, environmental groups, local and state government, regulatory agencies and industry. The source and quantity of water that is used to drill and frac these wells is one part of their concern; how to treat and properly dispose—or reuse—flowback and produced water is equally as important.

The U.S. Department of Energy has sponsored a number of projects in recent years—organizing and hosting PTTC workshops for petroleum geologists and engineers here in the Appalachian basin.

The source and quantity of water that is used to drill and frac these wells is one part of their concern; how to treat and properly dispose—or reuse—flowback and produced water is equally as important.

The U.S. Department of Energy has sponsored a number of projects in recent years designed to develop innovative water management solutions for shale formations that require large volumes of water for hydraulic fracturing. Our upcoming workshop will present several widely different approaches to reducing the environmental impact of shale gas development and help us to understand how to best manage the water resources available. Examples from several shale plays and basins will provide information on how water management can be tied to unique local criteria. Techniques for the Marcellus Shale will be provided by both a research scientist and a Marcellus operator who understands that enhanced water management is a key to economic success in this play.

The two September workshops will be co-hosted by the Houston-based Environmentally Friendly Drilling Systems Program (EFDSP). A special registration fee will be offered for EFDSP members, and for those who choose to attend both workshops.

The first of these, on September 4, will be a workshop on “Wellbore Integrity,” a topic of much concern in the Marcellus play ever since problems with stray gas and casing/cement were first encountered in the Dimmock, PA area. The following day, the second workshop will focus on an exciting energy option, “Natural Gas Power for Shale Development: Using Natural Gas Fuel for Drilling and Hydraulic Fracturing.”

Hopefully, these workshops will bring together individuals from local communities, government agencies, researchers, environmental groups and oil and gas companies, and collectively they can identify and discuss social, environmental, and technical issues related to natural gas drilling, completion and production. Technical issues will include examination of natural gas power and fuel systems, logistics, site considerations and their environmental footprint, and a discussion of how these new technologies will address air emissions.

These three workshops will bring our 18-year total to 164 workshops held in seven states and 36 cities, and will add to the nearly 8,700 registrants who have attended these workshops. It all began in mid-May 1995, when we hosted the first of three Problem Identification workshops in Morgantown. We followed this workshop with two more, in Ohio and Kentucky, and then began a series of what we called at the time “Focused Technology Workshops” that has continued to this day.

Over the past two decades we have attempted to present a balanced portfolio of workshop, those with appeal to geologists, engineers, geophysicists and those who prefer computer mapping, modeling and data management. Our most popular workshops have been those that concentrated on gas plays, like the Trenton-Black River and more recently the Marcellus and Utica shales, but coal-bed methane and carbon capture and storage workshops also have proven to be popular. Core workshops and geology field trips always have been popular, although we had to limit attendance at these. For the engineers, we have offered 32 workshops on drilling, logging, stimulation and production, and for the geophysicist, 6 workshops on 3-D seismic, microseismic and new software to manipulate vast amounts of geophysical data. We also have offered 29 workshops on software training, databases, websites and GIS, and 16 safety-oriented workshops, including our very well-attended series of well tender workshops.

But, as we enter into a year-long celebration of the 20th anniversary of the birth of PTTC and the first PTTC workshops, we believe that with our new regional, grass-roots organization up and running we are only beginning to bring the latest in new technology and new plays to oil and gas operators in this and other producing basins.

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<th>Date</th>
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<td>9/5</td>
<td>Natural Gas Power for Shale Development; Using Natural Gas Fuel for Drilling and Hydraulic Fracturing (Environmentally Friendly Drilling Systems Program)</td>
<td>Canonsburg, PA.</td>
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Meeting the Environmental Challenges of Oil and Gas Production

NETL’s Spring 2013 EP Focus addresses environmental issues from the Arctic to the Gulf of Mexico. “As shale production moves the nation toward an energy future unimaginable less than a decade ago, research progresses within NETL to secure the next generation of oil and natural gas production potential. Quite possibly, the most dramatic potential lies in Alaskan Arctic regions and the deepwater and ultra-deepwater areas of the Gulf of Mexico, two environments that raise significant challenges to traditional development. Efforts at NETL aim to address these challenges.”

NETL’s partnership with the University of Alaska, Fairbanks in the Arctic Center for Oil Spill Research & Education has addresses spill prevention, how to respond, monitoring and mitigation of potential marine oil spills in the Arctic. Challenges in the harsh Arctic waters and tundra and in deep waters require different skills than more traditional land based environments.

Oil production from deepwater offshore reservoirs has risen significantly in the past decade and water production has increased at a ratio of 4 barrels of water for every 1 barrel of oil produced. A DOE spokesman said, “The handling of produced water will become increasingly more important and appears to be a challenge that will not go away.” The salinity of produced water is similar to that of seawater so is not the same problem as for onshore water production. Produced water offshore is handled by topside treatment technologies to remove dispersed and dissolved oil and reduce the toxicity using gravity and flotation/filtration processes, oxidation, and bio reactors.

A project recently completed through NETL’s RPSEA Ultra-Deepwater Program by Tubel, LLC in partnership with the University of Houston developed a sensor and power deployment system for horizontal well sections in ultra deepwater to control and monitor hydrocarbon production. The “next generation” intelligent production system uses wireless power and data transfer, and provides a unique method for optimizing multilateral well performance.

Another featured article address wastewater treatment for the Marcellus Shale. Altela Inc. and its joint venture partners installed two new wastewater treatment facilities in 2012 in fields in Pennsylvania to treat and recycle produced water on-site. AltelaRain® is a unique, cutting-edge water treatment technology that is a cost effective and energy efficient water desalination process.


NETL Improves Directional Drilling

The Department of Energy’s National Energy Technology Laboratory (NETL) was recently recognized for its contributions to directional drilling. “On May 3, 2013, the lab accepted an award for its role in a joint project that helped develop what is now Schlumberger’s Slider product line.” The award cited NETL assistance in “small business innovation and for promoting industry to use the Slider technology—a goal aimed to stimulate the economy and endorse national energy advances.”

The Slider technology improves the efficiency of conventional downhole motor and measurement-while-drilling (MWD) drilling systems. The MWD system collects downhole data on rock formations to allow engineers to better evaluate the rock as the drill bit passes through. The real-time data significantly reduces the risk of formation damage and provides drilling efficiency and accuracy. Slider drilling technology encompasses both hardware and software innovations. Schlumberger and Slider recognized NETL’s role is helping them develop improved drilling technology now in use across the U.S.


Alternative Water Sources for Power Plants using GIS and Google Earth

Under a grant from NETL Arthur Langhus Layne (ALL) Consulting LLC of Tulsa, OK developed an internet-based geographic information system (GIS) that catalogs non-traditional sources of water for coal-fired power plants based on Google Earth data. The Alternative Water Source Information System (AWSIS) allows power plant operators to locate alternative sources of water to supply the need for large volumes of water for electrical power generation. Coal-fired power plants produced 40% of electricity used daily in the U.S. and use 150 billion gallons of fresh water per day in the process, primarily for cooling. The goal of the project was to help power plant operators find non-traditional water resources to reduce the stain on fresh water aquifers.

Described by ALL, “Here’s how it works. Using the Google Earth interface, the user can select a power plant by clicking on a map symbol or by searching for a specific power plant by plant name or operator. A pop-up balloon displays basic plant information. With another click, the user can get additional plant information and a summary of alternative water sources within a 15-mile radius—which can include abandoned mine pools, oil- and gas-produced water, saline aquifers, or publicly owned treatment plants. If the summary indicates the presence of alternative water sources within 15 miles, clicking a tab will display its available location, volume, and quality.” The AWSIS database provides information about water flows over 1,000 gallons per minute. This volume represents 20% of the requirements for a 500-megawatt coal-fired plant’s cooling tower.