20 Years ago this week, PTTC signed its first extended contract under the Department of Energy. This was funding that would set in motion the joining together of oil and gas representatives from around the country and from all segments of the industry, bringing to mind the 1917 song title, *Hall, Hall, The Gang’s All Here*. This was a precedent setting merger of industry, academia, and federal and state government that would serve as a strong model for other industries.

PTTC signed its first subcontract in 1994 with BDM-Oklahoma, an organization that had been formed to work in Bartlesville, Oklahoma, managing the National Institute for Petroleum and Energy Research (NIPER), a DOE project office. The Bartlesville office managed most of the technology transfer funding for PTTC and its then 10 Regional Lead Organizations, universities and geological surveys in 10 states.

The Washington, DC-headquartered PTTC organization was proud and appreciative of its significant funding from DOE, eventually working directly under the DOE office of the National Energy Technology Laboratory, and boasting several grants and contracts over time that allowed PTTC and its RLOs to share cost effective technological information with the over 9,000 independent producers of oil and gas in the U.S. In fact, in its 20 years of workshops, PTTC has held over 1,900 workshops and served over 93,000 attendees. With planning support from IPAA and DC contractors, funding from DOE was heavily leveraged by the contribution of dedicated academic staff and industry supporters as well as direct state funding in several cases through the PTTC RLOs. Each RLO opened its doors to the public to allow information sharing, computer usage, and the making of valuable connections.

Executive Director Deborah Rowell led the charge to form the impressive 20 plus member Board of Directors and worked with the Regional Lead Organizations (RLOs) to help them form regional Producer Advisory Groups, representing over 200 industry professionals around the country. If you have followed the past several newsletter cover articles reminiscing about PTTC’s formative years, the common theme celebrates the people involved in PTTC and technology transfer in general. In the case of PTTC, it has not only been a village that has been incorporated, but a national industry.

PTTC hit the ground running with that original 1994 DOE funding, visiting the universities around the country to negotiate subcontracts, and setting a schedule for a series of industrywide Problem Identification (PI) Workshops seeking a grassroots response to the needs of the domestic petroleum industry. In 2014, PTTC has relived its roots, holding two PI Workshops in Houston and Morgantown in collaboration with EFD/HARC to determine needs and assist in the planning of next steps for the parties’ FIST project -- Flaring Issues, Solutions and Technologies. A third PI Workshop will be held in October in Denver (see calendar). Prior to the PI Workshops, the team kicked off the project with a breakfast meeting at URTeC, which was held in Denver in August. PTTC is excited to be participating in this project, and plans to continue it into Phase II.

Due to changes in federal direction and reduced DOE funding in recent years, PTTC has begun to transition into an independent organization without substantial federal funding. Workshop numbers have reflected a decline in 2012 and 2013, and several regions became inactive. However, in 2014 the number of workshops to date is 63, an increase over the 2013 total of 54 workshops. Efforts are moving forward to expand into “abandoned regions” and hold more workshops and attract new audiences.

As PTTC reaches this 20 year anniversary, we continue to reflect on the amazing work produced, the relationships we have formed, and the benefits realized by industry. Gratitude is again extended to the U.S. Department of Energy and the hundreds of individuals who have contributed to fulfillment of the mission of PTTC. Read on for information on EOR, industry-wide updates, the calendar of events, and regional sections to find out what is going on in your part of the country.

**People are the Key to PTTC Success**

**Focus on Enhanced Recovery**
atmospheric pollution and the proactive PTTC workshops being held in several locations across the country are bringing solutions that are both environmentally sound and economic.

PTTC workshops in 2014 have addressed a number of EOR topics, mostly related to CO₂. However, a workshop held in Illinois in April (see Network News, Vol. 20 No 2) devoted the entire day to ASP and chemical flooding opportunities in the Illinois Basin. In 2015 a West Coast workshop will address Thermal recovery technologies, a third major topic of EOR activity.

Other PTTC workshops have addressed a number of operational issues involving how to improve recovery from mature fields in the U.S. Reducing electrical costs, oilfield economics, improving drilling techniques, using old wellbore data to locate bypassed oil, and optimizing the integrity of old wellbores all stress the interest in mature fields and tertiary recovery technologies.

Carbon capture and storage is part of President Obama’s plan to address climate change as noted in his recent Climate Action Plan. The U.S. Department of Energy has responded in several ways. NETL is implementing partnerships with two independent research organizations; Carbon Capture Simulation Initiative (CCSI) and the National Risk Assessment Partnership (NRAP) in efforts to promote development of advanced carbon capture technologies. NETL has also awarded 13 new academic/industry projects that will address geologic storage geomechanical developments and study the storage potential in fractured reservoirs. More specific to the EOR activities, a new post-combustion project broke ground in September in Texas. The plant will use advanced carbon capture technologies to capture and compress CO₂ and transport it to Gulf Coast oil fields for injection in CO₂ floods.

The interest in carbon capture and utilization is not restricted to government agencies and funding. SPE recently announced creation of a new CCUS section that will promote development of carbon capture technologies with the specific goal of providing CO₂ for EOR activities worldwide. The annual CO₂ week held in Midland, Texas in December each year has made plans for this year’s event to include a full program of lectures and field trips.

Check out PTTC national and regional calendar of workshops coming up in your area.

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Dealing with Flare Gas in the Rocky Mountain Region 

by Mike Seal

The rapid expansion of shale gas drilling in regions of the Rocky Mountains far from existing oilfield infrastructure is causing an increase in the volume of natural gas flared from wells. According to a recent article in the Wall Street Journal, state officials said that wells in North Dakota burned off 10.3 billion cubic feet of natural gas valued at nearly $50 million in April alone. Drillers are forced to burn off whatever they can’t capture and ship to market because North Dakota lacks adequate gas pipeline and processing facilities. 99% percent of the gas is produced as a byproduct of oil production. Natural gas flaring degrades air quality and critics also say producers aren’t paying all the royalties and taxes owed on this gas. While Texas captures 99% of the natural gas produced, North Dakota burns 30% of its output.

The North Dakota Industrial Commission, which regulates and promotes the state’s oil industry, announced rules in July to deal with this situation. These regulations call for operators in the Bakken and Three Forks plays in the western part of the state to file plans to capture the gas produced in association with oil production and to impose production restrictions on operators who fail to meet those flaring reduction goals. Lynn Helms, director of the Department of Mineral Resources said the order, which gives operators 90 days after a well begins production to take steps to reduce the flaring at that well, is “a completely new way to control flaring.” Under the order, as of October 1 all Bakken and Three Forks oil and gas wells are subject to potential production restrictions if they are found to be flaring above the gas capture goal, which calls for capturing 76% of the gas produced. “There is a 14-day flow back period, and after that you have another 76 days of maximum efficient rate to evaluate your well and get it connected,” he said. By January 1, 2015, the gas capture goal increases to 77% of gas produced. By 2016, it’s up to 85% and by 2020, it reaches 95%.

PTTC and the Environmentally Friendly Drilling (EFD) program, managed by the Houston Advanced Research Center (HARC), have joined together to develop and implement a research effort to address gas flaring and stranded gas by utilizing novel technologies to monetize gas at the wellhead. These will hopefully reduce the need for pipelines. PTTC will organize and run various workshops related to problems identification and technology transfer/training. EFD, a nonprofit organization, will manage the program. 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.

PTTC Rockies is sponsoring a workshop at the Denver Athletic Club on October 23 called Monetizing Stranded Gas at the Wellhead. Dr. Richard Haut, a Senior Research Scientist at HARC, will be moderating this event. This will be a unique opportunity to learn about the FIST Project. For around the cost of lunch, you will participate in an interactive one-day session aimed at identifying your specific types of gas, site selection issues, economic factors, and total gas volume with an ultimate goal of developing strategies to have that gas make your operation profitable.

Meanwhile, in Lakewood, Colorado, a company called Pioneer Energy, established by a former NASA scientist, Dr. Robert Zubin has developed a machine called MAGS (mobile alkane gas separator) that captures and separates flared natural gas into usable and more easily transportable forms. The Denver Post reports that the prototype will be sent to North Dakota for testing in September. The MAGS Unit receives the gas, compresses it, removes the water and cools it to minus 70 centigrade so that it splits into three streams. The propane, butane and pentane are liquefied, tanked and shipped to market. The dried methane gas can then be used on site for well operations as a replacement for pricier diesel fuel. The final stream is ethane, which powers a generator that runs the MAGS unit.

West Coast Region

The West Coast PTTC program has provided 17 workshops year-to-date and is coordinating 2 additional workshops for 2014. The program is administered by Jerry Anderson, the West Coast PTTC director and Chair of PTTC, and Dan Tuttle the training coordinator. Full day workshops are held throughout California in locations in Sacramento, Bakersfield, Ventura and Long Beach. The programs are well attended with individuals from oil and gas companies, regulatory agencies, consultants, and service providers.

Topics presented in West Coast PTTC workshops in 2014 included: Petroleum Geology, Cementing, BOPE, Well Completions, Waterflooding, Wellbore Integrity, and Drilling Engineering.

Drilling Engineering 101 was held September 23 in Long Beach and September 25 in Bakersfield. This course was designed to introduce drilling concepts to the novice. The presentation is based on the book, Applied Drilling Engineering, an SPE text book available online. Topics covered include initial preparation for drilling operations, mud, cement, bit and casing design considerations, formation and fracture pressure considerations, and a brief discussion of directional drilling.

Workshops are now being developed for 2015 including Thermal Operations. As we move forward in our planning for 2015 workshops, we are utilizing suggestions to schedule workshops and providing quality instruction to the petroleum industry and related agencies.
Midcontinent Region

Over the last several months the Midcontinent region of the PTTC has been extremely busy. Most recently in September, PTTC in conjunction with the University of Kansas hosted a course called, Eastern Kansas Oilfield Essentials, as part of the Eastern Kansas Oil and Gas Operators Association (EKOGA) annual meeting. More than ninety operators turned out to hear four quality presentations from industry experts. The first talk called, Reducing Electricity Costs in Eastern Kansas Fields was given by Phillip Shelley – Director of Operations for Wheatland Electric Co-op in Scott City Kansas.

The talk focused on one of the most expensive components of any operation, electricity. Shelley began with a basic overview of how utility meters function and gave suggestions for energy cost improvements and efficiency in the field. He also discussed the importance of coordination of construction activities with local electric utilities and how it is possible for the average oil field operating company to reduce its electric power cost without turning off production.

The second speaker, University of Kansas Geological Survey Geologist David Newell, PhD, discussed Petroleum Geology of Eastern Kansas. Newell has had extensive experience in this region and spent time exploring the area’s subsurface. Newell highlighted the petroleum geology of eastern Kansas, specifically the Cherokee formation.

After lunch Dana Adkins-Heljeson - Program Asst., Programming and Web Development, Kansas Geological Survey discussed how to effectively use the Kansas Geological Survey website. Well known in the oil and gas industry as one of the best online resources for oil and gas operators working in the region, the data hosted on this site has helped operators and service companies find success for years. Dana Adkins-Heljeson has served as the lead developer and webmaster of this site and focused his discussion on effective use the KGS site including navigating production data, utilizing interactive maps, and online tutorials to name a few.

The next discussion at this year’s EKOGA training focused on oilfield economics for engineers and operators presented by Rodney Schulz from Schulz Financial. Mr. Schulz discussed some of the more common calculations made by petroleum engineers: Internal Rate of Return (IRR), Net Present Value (NPV) and Profitability Index (PI), as well as other calculations such as earnings, cash flow, etc. However, Schulz pointed out, at the outset, does anyone actually know the parameters used in the calculations? Schulz also posed the question, what are the uncertainties in costs, production rates and future product prices? He explained that oil and gas professionals work in an uncertain world with significant unknowns at every turn. The balance of his talk offered operators a few tools and thoughts on how to quantify and think about their own unique situations so that they can better serve their companies, the industry and society at large.

Also in September PTTC in conjunction with the Houston Area Research Council’s Environmentally Friendly Drilling Program hosted a course in Houston, Texas called, Addressing Gas Flaring by Utilizing Novel Technologies to Monetize Gas at the Wellhead. This workshop focused on existing technology aimed at utilizing unused natural gas at the wellhead while reducing emissions. This course was designed to be a unique interactive one-day session aimed at identifying specific types of gas, site selection issues, economic factors, and total gas volume with an ultimate goal of developing strategies to have that gas make their operation money. This course was part of a joint effort between the PTTC and the EFD program, managed by the Houston Advanced Research Center (HARC), aimed at developing and implementing a research effort to address gas flaring and stranded gas by utilizing novel technologies to monetize gas at the wellhead. The overall objective of the 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.

Finally in Midland, Texas, PTTC recently held a course entitled, The Trade Offs of Drilling the Perfect Horizontal Well led by K.C. Oren – VP, Sales and Marketing for Horizontal Solutions International. The personalities of engineers and geoscientists are often very different. When it comes to corporate risk-reward assessment, company incentives for these individuals are often counter to the overall corporate end goals: higher IP and superior well performance. For example, drilling team metrics and operations team’s objectives are often in competition to maintain geological target objectives (staying in zone) and, as a consequence, not achieving maximum overall production results (highest possible EUR). Divergent drivers such as these common examples may create even greater dichotomies between individuals due to personality differences, incentives and personal motivation, and other competing corporate goals, and therefore often create conflict between otherwise closely aligned asset team members. This course will explored the trade-offs of staying in the targeted zone (sweet spot) by carefully steering the well, and monitoring every move along the way versus drilling ahead for maximum ROP (rate-of-penetration) and less NPT (non-productive time). Additionally Oren introduced basic geo-navigation principals to be used for effective geosteering decision support. The overall goal of the course was to provide a basis for better understanding what makes the drilling team itchy and uncomfortable versus the overall benefits of staying in zone.

The next quarter will be another busy one for the Midcontinent section of PTTC. Visit PTTC.org for the latest course offerings in this region. If you have suggestions for course offerings please contact Jeremy Viscomi at viscomi@pttc.org.
**Midwest Region**

**Planning for the Future**

Midwest PTTC is working on plans for several workshops in the late fall of 2014 and in early 2015. The big event will be a three day workshop, *Basic Log Interpretation* in December 2014 or early 2015. As a follow up to the Basin Log workshop an *Advance Log Interpretation* course is planned for February 2015.

There are also plans to hold the PTTC and EFD traveling workshop, *Addressing Gas Flaring by Utilizing Novel Technologies to Monetize Gas at the Wellhead* in Illinois when the speakers and dates can be arranged for November or December 2014.

The very popular Mississippi Lime conference held in March 2014 in the Illinois Basin may be scheduled for a repeat performance in Texas in 2015. The Mississippi Lime play covers a very large area, and since many of the operators in the Midwest and Midcontinent Mississippi Lime play have offices in Texas, interest has been expressed by a number of people.

Keep an eye on the PTTC calendar for dates and information on these upcoming workshops. Flyers will be sent to interested parties in the Illinois Basin and Midwest region.

**Eastern Region**

**Appalachian Basin PTTC Partners with EFD for Energy/Environmental Workshops**

PTTC and the Environmentally Friendly Drilling (EFD) Systems Program have teamed to develop and host two Appalachian basin workshops on energy and environmental issues. The first of these will be a workshop on *Flaring Issues, Solutions and Technologies*, was held September 16 at the Erickson Alumni Center on the Evansdale Campus of West Virginia University in Morgantown, WV. Two weeks later a workshop entitled *Appalachian Basin: Life Cycle Wellbore Integrity — Drilling, Stimulation, Production*, which will be held October 1 at Lakeview Spa & Resort, east of Morgantown. For information on how to register, go to the PTTC or EFD calendars of upcoming events.

The Gas Flaring workshop is one of three to be hosted across the country and collectively they are the first task to be performed in a joint PTTC-EFD program to develop and implement a research effort to address gas flaring and stranded gas by utilizing novel technologies to monetize gas at the wellhead. The overall objective of the Morgantown workshop is to develop and demonstrate technologies to monetize stranded gas and reduce or eliminate gas flaring and/or methane emissions associated with production. Additional workshop objectives are to: Determine the extent of gas flaring/stranded gas in the basin; Summarize state regulations regarding gas flaring; and Introduce proven technologies currently in use to address the problem and monetize gas at the wellhead.

The opening keynote address, *Novel Technologies to Monetize Gas at the Wellhead*, was presented by Rich Haut, Houston Advanced Research Center (HARC). The keynote was followed by a moderated operator discussion, during which gas producers and IOGA representatives in attendance were given the opportunity to address the group.

Following lunch, technology providers took center stage, beginning with a presentation by Audrey Mascarenhas, Questor Technology, on *Economic & Effective Gas Incineration* to improve the efficiency of flaring and thus reducing emissions. Don Moss, Wellhead Energy Systems, followed with a presentation on *Gridfox™ Smart Energy Conversion: Converting Stranded Gas to Electricity at the Wellsite*. A third invited vendor, GE Gas Power Group, made a presentation on *Options in the Field for Converting Flare Gas to Alternate Energy Sources*.

The afternoon session concluded with a summary of *Regional Regulations Regarding Gas Flaring* presented by the State Regulatory Agencies in PA, OH, KY and WV.

The well integrity workshop will be presented by Talib Syed and Jessica McDaniel. Mr. Syed holds a B-Tech in Chemical Engineering from the University of Madras, India and an M.S. in Petroleum Engineering from Oklahoma University. His current areas of interest include hydraulic fracturing of tight oil and gas reservoirs (drilling and completion), CO2 geologic sequestration, slurry fracture injection and well integrity projects.

Syed’s course will focus on two critical components of wellbore integrity: casing design and cementing. Key aspects of casing design will be discussed so that course attendees will gain a firm understanding of why a good casing design is critical to ensure that the well retains its structural integrity throughout its life cycle. The importance of obtaining a good primary cement job also will be covered, including good cementing practices and evaluation utilizing current cement bond logging techniques – ultra sonic imaging tool (USIT), circumferential acoustic scanning tool (CAST) and segmented bond tool (SBT)—in addition to conventional CBL/VDL techniques.

Well integrity considerations for hydraulically fractured wells also will be covered. However, it is not a primary objective of this course to have attendees become experts in casing design and cementing, or in the interpretation of cement bond logging techniques. Rather, the objective is to enable them to have a strong and clear understanding of these two critical well integrity components.
The morning presentations will be divided into two parts; well integrity (definitions, well construction, barriers, issues and challenges) and basic casing design (principles, problems, design considerations, failure examples). Cementing and logging to determine cementing quality will be covered early in the afternoon, followed by wellbore and mechanical integrity test methods and a review of the Dimmock, PA event.

Jessica McDaniel of CSI will make the final presentation of the day, Improving Zonal Isolation in the Marcellus Shale. Ms. McDaniel will discuss the results of a recent CSI study of wellbore failures, the reasons for those failures and their successful remediation by CSI and the operators.

**SPE - New Technical Section - Carbon Dioxide Capture, Utilization and Storage**

SPE’s newest Technical Section, Carbon Dioxide Capture, Utilization and Storage (CCUS) is open for members to join. The new section is in response to petroleum engineers worldwide that have expressed an interest in ways to reduce emissions and for technologies to store or sequester CO₂.

SPE’s CCUS section will address solutions that “involves capturing CO₂ emissions from large point sources such as power plants and either reutilizing or storing the emissions to keep them from entering the atmosphere.”

SPE members have collected decades of experience with CO₂ floods and this knowledge of EOR technologies is applicable for gas storage operations. SPE acknowledges that “the E&P segment of the oil and gas industry is anticipated to play a major role in the advancement of CCUS including broader application of CO₂-EOR. Moreover, lessons learned in the ongoing commercial activities within the oil and gas disciplines of underground gas storage and CO₂-EOR are directly transferrable to CCUS, thus expanding career opportunities for petroleum engineers.”

For more information on CCUS and how SPE members can join the new section, go to: www.spe.org/tech/2014/09/new-spe-technical-section-carbon-dioxide-capture-utilization-and-storage-ccus.
Energy through Carbon Capture and New Technologies

The National Energy Technology Laboratory continues to sponsor research and fund projects to increase energy efficiency through new technologies to reduce carbon emissions, improve carbon capture technique and decrease the carbon footprint.

Post-Production Carbon Capture

The world’s largest post-combustion carbon capture project broke ground in early September in Texas. Petra Nova has designed the project to use innovative carbon capture technology and apply it to an existing coal-fired power plant. The goal is to enable cleaner, safer and more sustainable energy production using fossil energy resources. The Petro Nova project was awarded $167 million from DOE to install the Houston area plant. When the project is complete it will capture 1.4 million tons of CO$_2$ that would have been released into the air by previous technologies. This equates to taking 250,000 cars off the highways.

The Carbon dioxide will be compressed and processed for CO$_2$ injection into nearby Texas oil reservoirs to boost production from East Texas and Gulf Coast fields, many of which have been producing oil for over 100 years. www.netl.doe.gov/newsroom/news-releases/news-details?id=3b109ce0-94e4-4d3a-a5bb-179082efc8d

Carbon Capture and Climate Change

Carbon Capture and Storage (CCS) is a critical part of President Obama’s Climate Action Plan. NETL’s laboratories collaborate with a number of other research institutions to promote advanced carbon capture technologies. Two of the collaborative efforts are the Carbon Capture Simulation Initiative (CCSI) and the National Risk Assessment Partnership (NRAP). NETL’s research team is providing the predictive computational modeling needed to address the challenges of CO$_2$ capture and storage. DOE’s “goal of having CCS technologies ready for demonstration in the 2020–2025 timeframe requires the development of new approaches to reduce the 20–30 years typically required for commercial deployment of new technology concepts.”

CCSI is a public-private partnership of five national laboratories, several academic intuitions and private industry corporations as stakeholders. The team has developed a suite of computational tools and models—CCSI Toolset—that are expected to reduce carbon management technology development time by 25% and save over $500 million. The Toolset is designed to allow industry to build pilot scale demonstrations and then scale up faster and at greatly reduced costs.

The NRAP project is assessing carbon storage risks and looking at a variety of geologic storage sites and conditions, including local geology, existing wells, faults or nature fractures and investigating the behavior of CO$_2$ after it is injected in a storage site or reservoir. NARP research is being conducted at five National Laboratories and with the assistance of a number of universities and industry participants. NRAP has developed “first-generation predictive models that, for the first time, offer a means to quantitatively forecast the probability of potential impacts-of-concern that could arise from specific CO$_2$ storage sites. The models calculate risk profiles that can be used to quantify the likelihood of long-term risks and liabilities, as well as help design efficient monitoring programs for risk-based standards.” www.netl.doe.gov/newsroom/news-releases/news-details?id=3b1c9ec1-633e-48f9-a4b1-9ade6f039592

Awards for Geologic Storage of Carbon Dioxide

Related to the research efforts of the National Laboratories, DOE announced awards to 13 projects in early August. The projects are to develop technologies and methodologies for geologic storage of CO$_2$ under two areas; Geomechanical Research, and Fractured Reservoir and Seal Behavior. DOE awarded $13.8 million with non-federal cost share of $3.8 million to conduct the research. Awardees under Geomechanical Research: Northern Illinois University, Battelle Memorial Institute, The Pennsylvania State University, Sandia Technologies, Montana State University and Colorado School of Mines. Awards under Fractured Reservoirs: Princeton University, Colorado School of Mines, Washington University, The University of Texas at Austin. Details on the awards and technologies to be studied can be found at: www.netl.doe.gov/newsroom/news-releases/news-details?id=84ca18f9-58d7-4339-b08a-78eaa71a21f

These articles are Excerpted from NETL Press Releases in August and September 2014 www.netl.doe.gov