PTTC TECHNOLOGY CONNECTIONS
Appalachian Region
Timely, Informed Technology Decisions

Newsletter

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FROM THE DIRECTOR'S DESK

Earlier this week I was in Fredericksburg, Texas, a small community of 8,911 nestled in the Texas Hill Country 80 miles west of Austin. The town itself is fairly flat, but to the north and south you can see long, east-west trending ridges that are extensions of the Edwards Plateau to the west. The Edwards Limestone caps the plateau, and any rain that falls on this highly porous and permeable formation disappears into fractures and caverns, eventually ending up in an unconfined aquifer at the base of the unit above the Glen Rose Limestone or the Hensel Sandstone. The resulting springs along the escarpment gave rise to all of the major drainage in the area, and the headward erosion of these streams created a series of fertile valleys and upland interfluves - the Texas Hill Country - that attracted settlers to the valleys, while hostile natives occupied the dry plateau to the west. Settlers

farmed the Hensel Sandstone valleys, while the limestone-capped, eastward extensions of the Edwards plateau served as "wilderness highways" for marauding Indians who swooped down from above. The lesson, as taught by Peter Rose, AAPG President-Elect during a luncheon address, is that geology, even back in 1847 when the birthplace of Admiral Chester Nimitz was founded, had a strong influence on man and the spread of civilization. One hundred and sixty years later, the influence of geology on man and our way of life has not lessened. Geology is still the key to locating natural resources that are essential to maintain and improve our quality of life, and technology is the key to extracting these resources.

That being said, it is time to organize another series of technology-related workshops for 2005. Your new PAG, the voluntary Producer Advisory Group that drives the PTTC program, met in mid-January, and after electing six members to three-year terms and Rick Goings as their new Chairman, they got down to business on workshop topic selection. Several of these workshops are still being developed, but as of now we can announce a workshop on **Upper Devonian Sandstone Plays** in late May, and two **Trenton-Black River field trip/core workshop** combinations in early June, one in New York and one in Kentucky. In the Fall we will attach a workshop on going **From Rocks to Models** to the end of the 2005 Eastern Section AAPG meeting in Morgantown, and Greg Mason is developing a workshop on **Storm Water Regulations and SPCC Issues** for September or October, perhaps at Salt Fork State Park near Cambridge, Ohio.

Having mentioned that new PAG members have been elected, it seems appropriate to name them. Tommy Cate, Kent Schamp, Mike Wallen and Dave Wozniak were re-elected to new 3-year terms, and Bill Ray and Lee Robinson were elected as new members. These six join 12 distinguished holdover members to form a strong group that will represent you in this region. I would like to formally recognize and welcome the new members to our PAG and to publically thank outgoing members Rivers Ford and Tom Stewart for their contributions, as well.

I hate to end on a down note, but many of you undoubtedly are aware that the proposed budget for DOE will drastically cut funding for oil and gas research next year, and eliminate it totally after September 30, 2006. This would mean, among other things, the end of PTTC as a DOE-funded effort. If the loss of this program is a concern for you, I invite you to visit our PTTC homepage and click on a new button named "DOE R&D Funding Alert." Testimony can be submitted until April 30 to the Senate Subcommittee on Energy and Water. Guidelines are provided on the website.

Douglas Patchen

RLO Director

Abstracts Still Being Accepted for the Eastern Section AAPG Meeting

If you procrastinated too long and didn't get the abstract for that potential Levorsen Award-winning paper in on time, do not despair: you still have time. General Chair Lee Avary and Technical Program Chair Michael Hohn have announced that abstracts are still being accepted for the September 18-20 meeting, which will be held at the Radisson Hotel in Morgantown, WV. For details, see the Eastern Section AAPG portion of our PTTC website.

Chairs Avary and Hohn also pointed out that quality abstracts on any subject will be considered. Your abstract does not have to fit neatly into one of the topics listed on the Call for Abstracts. "Those were only suggestions," stated General Chair Avary, who went on to say that new technical sessions can be developed around abstracts of a similar topic, or general sessions can be created for papers on a variety of topics.

Petroleum Engineers to Hold Eastern Regional Meeting in Morgantown

The Eastern Region of the Society of Petroleum Engineers will hold their annual meeting at the Radisson Hotel in Morgantown, immediately preceding the AAPG Eastern Section meeting, September 14-16, at the same hotel. However, even on Saturday geologists who will take one of the field trips will be around the Radisson, and that evening students and industry interviewers will participate in a reception and poster session immediately in the foyer area.

The Technical Program Committee may still be seeking abstracts for papers on key issues like technology and coal bed methane; reservoir characterization; stimulation and production enhancement; drilling and completion; and case histories. The abstract deadline is April 18, 2005. If interested, go to www.spe.org, click on Calls for Papers under the Meetings and Conferences button, and follow the links to the Eastern Regional Call for Abstracts.

Oil History Symposium Attendees Impressed with WV Roots

A small, but highly energetic and involved group of oil historians who gathered in Morgantown for the *2005 International Symposium on the History of the Oil Industry* went home quite impressed with what they had seen during a two-day field trip that followed the technical sessions. Attendees from across the nation and around the world gathered at the Radisson Hotel in Morgantown, April 6-8 for technical sessions and social activities before departing for an overnight field trip to observe the remnants of the roots of the oil industry near Parkersburg, WV.

David L. McKain, Co-founder and Curator of the Oil and Gas Museum in Parkersburg led the field trip, which included stops in Sistersville, at one time the self proclaimed "Oil and Gas Capital of the World;" Petroleum, formerly Petroleum Station, where as many as 15 oil wells were pumped from a single engine, called a telegraph, as early as 1862; California, named after a Way Station, the California House, so-named because so many travelers on their way to the California gold fields stopped off there on route; Parkersburg, a major oil center by the end of the 19th century; and Burning Springs, home of the Rathbones, who struck oil in 1860, and ushered in the era of the oil exploration in West Virginia.

Larry D. Woodfork, General Chairman for the Symposium, also expressed satisfaction with the turn out and the high quality of the talks and posters that were presented during the day and a half technical session. Some, but not all, of these will be summarized here.

The session opened with two talks that dealt with the first recorded uses of bitumen, oil and gas by the ancient Greeks and Persians, including their contributions to warfare. The following talk, by J. Fuller of London, England, dealt with an 1863 article by Henry Darwin Rogers in which he, Rogers, expounded on his ideas for the origin of petroleum, specifically that it was created by the thermal diagenesis of organic matter in source beds and then migrated upward into reservoirs. Originally Rogers thought that oil was produced from metamorphosed coal, but once he realized that some oil fields were located outside of the coal areas, he turned to other carbonaceous beds, which he identified as thermally altered shales of Devonian (Genesee Shale) and Ordovician (Utica Shale) age.

Peter Scholle, State Geologist of New Mexico, gave an interesting presentation on the public perception of the oil industry as reflected over time on post cards. In the late 19th and early 20th century, many towns and cities across the nation, including some in Pennsylvania, Ohio and West Virginia, issued post cards of various oil fields. However, the scenes on the cards would not be popular in our environmentally-conscious society of today in as much as they focused on crowded wooden derricks on deforested hillsides; large pools of oil on the ground near derricks;

gushers and torpedoed wells blasting oil skyward; and especially anything that was on fire, be it a derrick or an oil tank. But, these same post cards also showed a proud citizenry, dressed in their finest, walking among the spilled oil and burning debris. Today, it is difficult to find post cards depicting anything about the oil industry. If they are found, they usually are stylized, set in a collage of other scenes typical of the area, or shown in front of a flaming sunset.

Kathy Flaherty (Abarta, Pittsburgh), Steve Testa (Testa Environmental Corp, Mokelumna, CA) and Nick Tew (State Geologist, AL) presented a series of talks on the history of oil fields in Pennsylvania, California and Alabama. Ms. Flaherty discussed the history of the McDonald family of fields in southwestern Pennsylvania, a unique setting between the more established productive areas in western Pennsylvania and northern West Virginia. The fields were discovered between 1888 and 1896, and according to Ms. Flaherty they were explored and developed using new advances in technology that were evolving at the time. Production was established in five Upper Devonian sandstones, and was so prolific that it was measured in terms of barrels per hour. By November 1891 the fields were producing 84,300 barrels per day, and after 50 years, total production had reached 45,000,000 barrels.

Steve Testa discussed the discovery and subsequent development of the Los Angeles field (1892) and 13 fields that were developed in a linear trend along the Newport-Inglewood Structural Zone, an active fault characterized by major right-lateral movement in the southeastern part of the Las Angeles basin. The Los Angles field, near the present site of Dodger Stadium, initiated California's first oil boom. By 1913, drilling had established production on 360 acres, with 400 wells still in production, although the economic limit proved to be 4-8 acres per well, not 0.4 acres per well. In 1900, the Beverly Hills field was discovered, the first of 13 along the major structural feature in the basin. More than 3.4 billion barrels of oil have been produced from these fields, which represents more than 40% of total oil production in southern California. Much of this production came from two super giants, Huntington Beach and Long Beach fields, discovered in 1920 and 1921, respectively.

Alabama's oil and gas history dates back to 1865, when the presence of oil seeps first encouraged drilling. Interestingly, according to Nick Tew, the first wells were drilled by Jonathan Watson from Titusville, Pennsylvania, but resulted only in shows of oil in two wells. Drilling continued sporadically, but unsuccessfully, until the end of the 19th century. Finally, in 1902, the first commercial natural gas well was completed near Huntsville, and in 1909 additional commercial gas wells were completed in northwest Alabama. However, it was not until 1944 that Alabama became an oil producing state, when a discovery was completed in the Cretaceous Selma Chalk. Since that time, additional well-known discoveries have been made, adding names like the Jurassic Smackover trend, Mobile Bay, Black Warrior basin and coal bed methane to our oil and gas history. Currently, coal bed methane accounts for one third of gas produced in Alabama, raising the state to 9th nationally in gas production.

The history of oil and gas in Alabama was followed by a presentation by Mary Barrett, who discussed the history of produced salt water disposal in Gulf Coast petroleum fields from 1901 to 1970. During the initial years of oil production, oil could not effectively be separated from water, with the result that oily water was spilled onto the ground. Later, more effective methods of separation were employed, but whereas the separated oil had value and was saved, the separated water had no value and was released. Eventually, the volume of produced water became so large that producers found it necessary to modify their disposal practices. Lawsuits filed by coastal rice farmers resulted in salt water being retained in earthen pits from May until September, after which time the water could be released during the rainy season. Other common practices in the early part of the 20th century included seepage and evaporation pits, purchase of drainage easements that fed into larger streams, transportation through pipelines to coastal bodies of water, and salt water injection wells, which date back to the 1930s. Over the years, most of these methods have been abandoned, with only injection wells now being a viable option.

Linda Flis (Fidelity E&P, Denver) wrapped up the first day by presenting two high-quality and very informative videos called "Lighting the Frontier: the Story of Colorado's Florence Oil Field," and "From Drillbit to Burner Tip: the Story of Natural Gas." The Florence video captures the dramatic story of the people and events that led to the discovery of oil near the bustling town of Florence, and emphasizes the role this field played in establishing Colorado as a major oil and gas producing state. The second video gives a more general overview of the natural gas industry and was produced to educate the general public. This video traces the story of natural gas from a geologist staking a drilling location through the separate steps of drilling, completion, production, gas processing, pipeline transportation and delivery to your home.

In general, the speakers tended to focus on dates, discoveries, names and events of a historical nature. But, hidden within their presentations, you could also gain insight into the development of technology from the early days of the industry until the present time.

Global Climate Change: the On-Going Debate

The speaker opened with this suggestion: the question should not be, "Is global climate changing?" Instead, the question should be, "If global climate is changing, what is man's role, if any, in this change?" And second, "If man has had a role, does he still have any control?" And third, "What is the role, if any, of carbon dioxide in global climate change?"

The speaker was Dr. Lee Gerhardt, former State Geologist of Utah and Kansas and a former President of AAPG's Division of Environmental Geosciences (DEG). Dr. Gerhardt presented his remarks as the featured speaker at the DEG luncheon during the AAPG Southwest Section meeting in Fredericksburg, Texas. He stated that global climate certainly is changing - it always has and probably always will - so the debate should focus on why it is changing, and in which direction, hotter or colder? Dr. Gerhardt, long an advocate for basing public policy on sound science, used a variety of data to track temperature change over time. He was able to show that temperature has changed continually over geologic time, and that several orders of temperature cycles can be observed. The primary controlling factors have been global ocean currents and wind patterns, and the position of land masses over time. He illustrated these points by showing graphs of temperature variation over millions of years, then the past two millennia, and then the past two centuries.

Dr. Gerhardt also showed a graph of the concentration of CO2 in the atmosphere over geologic time, and a remarkable trend was observed. The concentration of CO2 was very high during the Cambrian and Ordovician, but has decreased drastically over time, until currently it is less than 0.04% of the atmosphere. He concluded, "we are running out of CO2."

If CO2 is the culprit in temperature increases during the past several centuries, then a graph of CO2 concentration should track a graph of temperature fluctuations. However, this does not appear to be the case. The two curves - temperature and CO2 concentration - did not track, i.e., there does not appear to be a direct correlation between the two.

Dr. Gerhardt's conclusion, a conclusion that he stated is shared on the record by more than 17,000 scientists, is that climate is changing and that in the long term it is getting colder, not warmer, and will continue to cool up to the next ice age. However, in the short term, we can expect modest temperature increases.

Barnett Shale, Coal Bed Methane Plays

Daniel Jarvie (Humble Geochemical Services) presented a paper at the AAPG Southwestern Section meeting in Fredericksburg on how hydrocarbons were generated and stored in the Barnett Shale in the Ft. Worth basin play. The Barnett Shale is similar to the Huron Shale in the Appalachian basin in that both are coupled petroleum systems, i.e., both are source and reservoir rock. Additionally, both are good source rocks, based on organic richness, thickness and hydrocarbon-generating potential. But, both are poor reservoir rocks, with low porosity and permeability, although they do have a high capacity to store hydrocarbon gases in the adsorbed state. The Huron Shale is productive because its permeability is enhanced by natural fractures. The presence of these fractures imparts a dual porosity-permeability system to the shale reservoir. But, according to Jarvie and his co-authors, natural fractures do not appear to be a prerequisite for gas production from the Barnett Shale. Instead, the authors state that secondary cracking of higher molecular (heavier) hydrocarbons and non-hydrocarbons (resins and asphaltenes) to gas, the identification of the areas where this secondary cracking has occurred and the stimulation of the reservoir through man-made fractures are prerequisites for gas production from the Barnett Shale.

The Barnett has generated significant amounts of oil and gas, whereas the Huron is strictly a gas play. Within the Barnett, hydrocarbon generation varies from less than 20% at a 0.7% vitrinite reflectance to more than 50% of total hydrocarbon at 1.00% vitrinite reflectance. At the same time, some of the oil that is generated is decomposed to methane and smaller hydrocarbons. During migration, according to the authors, some petroleum, composed of hydrocarbons, resins and asphaltenes, are retained in the reservoir rock. If they remained there, these heavy, immobile entities (resins and asphaltenes) would occlude pore spaces and reduce permeability to levels below commercial flow rates. However, when the heavy non-hydrocarbon fractions are cracked to oil and gas, high flow rates are achieved. The retained hydrocarbons are then cracked to gas, enhancing the shale gas resource.

For these reasons, vitrinite reflectance is a key exploration tool and is used to locate the commercially productive gas window. According to Jarvie et al, above true vitrinite reflectance values of 1.20% the Barnett is gas productive; at values ranging from 1.00 to 1.20%, the shale may be productive, depending on source richness, depth and reservoir containment. Therefore, determination and mapping of reliable vitrinite reflectance values is extremely important to identify Barnett Shale prospects.

During the old days of the Eastern Gas Shale Project in the 1970s, the geochemical parameters for the Rhinestreet Shale all indicated that the Rhinestreet, like the younger Huron, should be a good gas producer. However, nowhere does the Rhinestreet produce gas as efficiently as the Huron. During one Devonian shale conference, a researcher made the comment that the Rhinestreet might be "oil blocked," thus reducing its permeability to gas below commercial flow rates. On the western edge on the basin, where the Rhinestreet Shale is relatively shallow and immature, perhaps secondary cracking of residual hydrocarbons remaining in the Rhinestreet has not occurred. But, farther to the east, at greater depths, cracking may have occurred in isolated areas. Perhaps it is time to take another look at the geochemistry of deeper gas shales in the Appalachian basin.

Also at the Fredericksburg meeting, Brian Brister (Gunn Oil Company) presented an overview of the coal bed methane play in the Raton basin in New Mexico. The Raton and Vermejo formations both contain numerous thin (average 2 ft) coals interbedded with sandstone and mudstone. Locally, however, some coals exceed 5 feet in thickness, which was sufficient to attract the interest of the coal industry. The mines, however, proved to be uneconomic, due in part to the high methane contents. Using the rule of thumb that if a coal is thick enough to mine, but too gassy to be mined, then it has coal bed methane potential, the oil and gas industry, led by Pennzoil, began exploration drilling to evaluate the potential of these coals in the late 1980s. Low gas prices and the lack of a

pipeline caused Pennzoil to withdraw from the area. But, following the construction of a pipeline in 1999, the play resumed and now more than 400 wells on 160 acre spacing produce gas in an environmentally sensitive area. Cumulative production is 65 Bcf.

Two interesting exploration tools are being used in the play. One is the mapping of intrusives, the other is the mapping of sandstones greater than 6 feet thick with density-neutron crossover. The proximity of coals to intrusives has served to make the coals more thermally mature, and has created "sweet spots" for gas generation. In the Appalachian basin, I am not aware of anyone having mapped intrusives in coal bed methane play areas. However, I have seen maps of thermal gradient that indicate areas of greater than normal thermal gradients. The current thinking is that the coal beds that overlie these areas acted as thermal blankets and absorbed the excess heat. This could have created local areas that are slightly more mature than other areas where the same coal is at the same depth. Just something to think about.

Thermoacoustic Liquefaction of Coal Mine Methane to Produce LNG

DOE has announced that a final report entitled "Thermoacoustic Liquefaction of Coal Mine Methane to Produce LNG for Heavy Vehicle Applications" has been received and posted on the internet. The report has been included in DOE's Information Bridge, which offers on-line public access to a vast collection of DOE research and development reports submitted by contractors. This vehicle serves to increase the public awareness of DOE-funded research articles, provides findings to a wider and more diverse audience, and adds to the body of scientific knowledge in the oil and gas research field.

If you are interested in reading this report, which was prepared for a project site in the Appalachian basin, go to www.osti.gov/servlets/purl/835866-ZeHF1/native/.

North American Coalbed Methane Forum Celebrates 20th Anniversary

The North American Coalbed Methane Forum recently recognized and celebrated their 20th anniversary during a meeting at the Hilton Garden Inn-Southpoint near Canonsburg, Pennsylvania, April 12-13, 2005. The organizers of the North American CBM Forum, which originated in the Fall of 1985 as the Pittsburgh Coalbed Methane Forum, added a Mission Statement and Historical Background summary to the meeting announcement as a way of promoting 20 successful years of transferring CBM technology to industry.

The one-day technical session was highlighted by an overview of the 20-year history of the CBM Forum, presented by Ihor Havryluk, current Forum Secretary and long-time supporter of the Forum and proponent of CBM in general. Presentations on Pennsylvania's Energy Policy, CBM production history in the United States, a legal update and natural gas supply and pricing rounded out the morning session.

Pramod Thakur, currently the Forum's President and another long-time supporter of the Forum and a leader in the development of CBM technology, seemed to be a logical choice to begin the afternoon session with a presentation on the advances in CBM technology over the 20-year history of the CBM Forum. His presentation was followed by talks on more contemporary issues, utilizing coal beds for CO2 Sequestration and exploiting CBM resources in southern West Virginia by means of modern horizontal drilling technology. The fourth afternoon presentation addressed an important issue that is apparent in most public databases: gathering permeability data from coreholes. These data, along with gas content data, are essential for CBM development, but are generally not found in public databases.

The final presentation of the day was a summary of the first commercial CBM project in the Illinois basin. Kashy Aminian, meeting

coordinator, then presented closing remarks and reminded attendees that the next meeting will be held in the fall.

We at PTTC's Appalachian Regional Resource Center congratulate the Forum officers and Board of Directors for 20 solid years of service and technology transfer. During this time, the Forum has expanded their scope, initiated scholarships for students funded by the Forum, and has developed an award system to recognize those pioneers and current leaders in the drive to establish CBM as a viable gas resource in the Appalachian and other basins.

Potential Gas Committee Prepares to Release 40th Anniversary Report

The Potential Gas Committee (PGC) - the only organization in America that publishes natural gas resource estimates for the United States on a regular basis - is prepared to release their latest biannual report. The new report contains updated resource numbers for the Atlantic Area, which includes the Appalachian basin and East Coast offshore, the first among the last several reports to do so. Also, the estimates in the entire Gulf Coast (onshore and offshore) and the Green River and Uinta basins of the Rockies have received special attention. And finally, all of the reports included in the previous report have been updated.

This report, published by the Potential Gas Committee at the Colorado School of Mines, is authored by more than 140 local experts from across the United States. All of these local experts are volunteers, dedicated to support the delivery of this high-quality product that provides detailed information regarding future natural gas supply for the United States.

However, according to PGC Chairman of the Board Michael Decker and Potential Gas Agency Director John Curtis, a decline in external funding sources has placed the future of this 40-year effort in jeopardy. Therefore, Decker and Curtis have issued a joint appeal to industry to consider donations to support and sustain this volunteer effort.

Decker and Curtis offer 6 reasons why industry should support the PGC. First, the PGC is the only entity that publishes natural gas resource estimates for the entire United States on a regular basis. The regional and basin-level production trends and forecasts permit the reader to evaluate deliverability trends. Second, the PGC supplies an overview of new and emerging resources. More recent reports have included complete sections on gas hydrates, LNG, CNG and deep (15,000 ft) drilling for domestic natural gas. Third, the PGC report identifies other North American gas resources. In addition to U.S. resources, individual overviews of Canadian and Mexican natural gas resources are included. Fourth, the PGC report identifies legally restricted natural gas supplies. The amount of natural gas currently affected by legal restrictions and other impediments to access is estimated and included in the report. Fifth, the PGC report outlines storage issues. A report on underground natural gas storage and infrastructure is included. And sixth, the report is the reference manual for natural gas industry professionals. It includes a listing of natural gas composition databases; a compilation of current major producers by PGC Provinces; and a natural gas primer.

Contributors will receive complimentary copies of the 40th Anniversary Report commensurate to the level of their contribution. Finally, and perhaps most importantly according to the PGC leaders, donors will be provided access to an outstanding network of industry experts from across the United States and North America, all sharing information that can directly affect a company's competitive position.

WV Geological Survey Releases Publication of Well Data

The West Virginia Geological Survey has announced the release of a digital publication of its oil and gas well data on CD as a tool to aid in the exploration and development of the State's oil and

gas resource base and to increase our understanding of the State's subsurface geology.

The survey's digital database has been developed over the past 39 years and now contains data on more than 138,000 oil and gas wells completed and permitted since the late 1800's. Originally, the database was created by Survey staff members to support the research and information programs of the agency and to assist in providing information on request from the public sector. Now the Survey is releasing the data to assist those who are interested in developing a better understanding of the Mountain State's geology and to encourage more active exploration and development drilling programs by industry.

Released as Digital Data Series-5 (publication DDS-5), "WVGES Oil and Gas Well Data for West Virginia," these files were designed to be used in a relational database system. The files, however, can be adapted for use in other types of systems or used individually. The publication contains eight ASCII files, with coded data fields translated: well locations; well completion and ownership; pay, show and water intervals; stratigraphic tops and thicknesses; plugging; production reported since 1979; e-logs available in the Survey's log library; and well samples and cores available in the Survey's sample library. The ASCII files total more than 422MB of data. Record formats for the data files and a "ReadMe" file are provided in PDF format.

The cost of the publication is $495. This includes postal delivery via first class U.S. mail; shipment via other means is available for an additional charge. To order, call Susan Kite at 304-594-2331. For further information, visit the Survey website at www.wvgs.wvnet.edu or contact Lee Avary or Mary Behling at the above phone number.

Depositional Facies Successions of the Trenton-Black River in Central Pennsylvania

Jaime Kostelnik (Pennsylvania Geologic Survey), the featured dinner speaker at a recent meeting of the Pittsburgh Association of Petroleum Geologists, described the process of correlating petrographic, core and outcrop data to define the sequence of depositional facies in the Trenton and Black River carbonates in central Pennsylvania. Specifically, she described work done on the Union Furnace outcrop along PA Route 453 near Tyrone that should be of interest and value to anyone who desires to more know more about these two carbonate units in the basin. She and her co-workers measured and described a 240-meter thick section from just below the base of the Black River to the top of the Coburn Formation, the uppermost formation in the Trenton Group at this locality. Their very detailed descriptions allowed them to define a series of facies successions that is indicative of deposition in both homoclinal and distally steepened carbonate ramp environments.

The carbonate formations at this locality consist of cyclic sequences of interbedded peritidal to subtidal limestones and deeper water calcareous shales. The facies deepen upward, beginning with peritidal and tidal flat sediments at the base of the Black River to subtidal, lagoonal facies protected by a barrier bank, and then a subtidal, middle ramp facies that is extensively burrowed and bioturbated, typical of the Black River. All of these facies are associated with deposition on a homoclinal ramp. The overlying Trenton formations were deposited on a distally steepened ramp, beginning with a subtidal, outer ramp facies at the base of the Trenton consisting of dark gray mudstones and nodular limestones, followed by an uppermost facies of dark gray shale and mudstone interbedded with organic rich mudstone. Beds in the uppermost facies are hummocky, not nodular.

The authors supplemented their outcrop descriptions and interpretations with data from petrographic analysis and from cores taken adjacent to the Union Furnace outcrop. The supplemental data revealed a few additional features that were masked by deformation and weathering of the limestone beds on the outcrop, but in general the

facies that were recognized on the outcrop can be recognized in cores near the outcrop and in sidewall cores. By combining core and outcrop descriptions with petrographic studies of core and outcrop samples she and her co-workers were able to identify and document the definitive criteria necessary to recognize facies in the Trenton and Black River, both in outcrop and in core, for this part of the Appalachian basin.

Their conclusion was that although the Trenton-Black River is a seismic play in the minds of many, a better understanding of the facies and depositional environments is absolutely necessary if one is to understand the process of diagenesis that affected the original rock textures and porosity during reservoir development.

PTTC Regional Webmasters Meet in Houston

Representatives from Headquarters and all 10 regions attended in person or by conference call a meeting of regional webmasters in Houston on January 25, 2005. The goal of the meeting was to provide high quality, but consistent websites to producers in all 10 PTTC regions. The preliminary agenda served as a guide for discussions, but several additional topics were addressed as discussions followed a natural flow. Website consistency (logo, standardized website menus, common look and feel), challenges encountered in updating and maintaining regional websites, keeping websites dynamic and interesting, adding a new feature called "What's New This Week in PTTC" and adding a Map of DOE-Funded Projects were discussed and plans were formed for implementation of new ideas. All regional calendars should include both PTTC and "other industry" events. The option for PTTC regions to implement on-line registration and payment was discussed. On-line payment presents some challenges, but these challenges can be overcome.

Attendees shared lessons learned about e-mail broadcasts and on-line video presentations. These on-line presentations are easily viewed (with connection speed faster than dial-up) and would be reasonably affordable for the regions to produce. HQ is actively pursuing videotaping and Texas Region is going to experiment with it in an upcoming March workshop.

Petroleum Technology Transfer Council Announces

Election of New Board Members Douglas G. Patchen and Richard Goings

Don Duttlinger, Executive Director of the Petroleum Technology Transfer Council (PTTC), announced that Dr. Douglas G. Patchen and Mr. Richard Goings were elected to the PTTC national Board of Directors during a recent meeting of the Board in Washington, DC. Dr. Patchen currently serves PTTC as Director of their Appalachian Region, a seven-state area that extends from New York to Tennessee, with a Regional Resource Center at West Virginia University. Mr. Goings, of Dominion Exploration & Production, Inc., Stonewall, WV, recently was elected Chairman of the Appalachian Region's 18-member Producer Advisory Group, a position that carries with it a 3-year term on the national Board.

Dr. Patchen has been on the staff of the geological survey since 1966. Prior to being named Chief Geologist, he was Head of the Oil and Gas Section. In 1990, Dr. Patchen accepted a dual appointment with NRCCE to direct a newly-formed regional consortium, the Appalachian Oil and Natural Gas Research Consortium (AONGRC).

AONGRC's partners include the departments of Geology & Geography and Petroleum & Natural Gas Engineering at WVU, and the geological surveys in Kentucky, New York, Ohio, Pennsylvania and West Virginia. In 1995, AONGRC was awarded a contract by PTTC to implement their national program in the Appalachian Region.

In announcing the appointment, Mr. Duttlinger stated that he and the other members of PTTC's 22 member BOD look forward to working with the newest additions to the national board.

The PTTC is a producer-driven, not-for-profit, nationwide organization formed in 1994 to accelerate the dissemination of new and proven technology to domestic oil and gas companies, and to determine and communicate the industry's technology needs to the research and development community. It is funded primarily by the U.S. Department of Energy, Office of Fossil Energy, with additional funding from industry, state geological surveys and the universities that house the 10 regional resource centers.

PTTC's mission is to assist U.S. independent oil and gas producers to make timely, informed technology decisions. During the 10-year history of the PTTC in the Appalachian Region, AONGRC has developed and hosted more than 90 focused technology workshops to transfer technology and data to nearly 5,000 workshop attendees.

PTTC Celebrates 10th Anniversary in the Appalachian Basin

It all began nearly 10 years, ago, May 16, 1995 to be exact, when the Appalachian Basin Regional Lead Organization hosted the first of three PTTC Problem Identification workshops in Morgantown, WV. We started small; only 31 attended the initial workshop, and only 23 and 29 attended the workshops that followed in North Canton and Ashland, respectively, both in September of the same year. In spite of this, we persisted, and the first Focused Technology workshop, "Access to Electronic Oil & Gas Databases" drew 100 registrants to Morgantown on March 27, 1996.

The database workshop was developed because those who attended the three problem identification workshops agreed that access to data was the biggest need at the time. One of the other needs identified in those workshops was for more play-based information. Through the years we have found this to be true. In the table below, it is easy to see that when we have developed and hosted a play-based workshop, whether on Devonian sandstones, coal beds or the hot Trenton-Black River play, these workshops have been well attended.

As the years have passed, we have tried to remain faithful to the expressed needs of you, the industry in the basin. Guided by our volunteer Producer Advisory Group, and by input from workshop attendees, we have tried to organize workshops around central themes of value to you. We hope we have been successful; certainly we have enjoyed the experience and hope that you have, too.

Just in case you are interested, here is a complete (I think) list of workshop dates, titles, locations and number of attendees. As you can see, we have hosted 94, and have 5 additional workshops scheduled for the upcoming months. Sometime later this year, hopefully still as a part of our year-long 10th anniversary celebration, we will host our 100th workshop - but what will the topic be?.

To find out, you might have to be there!

PTTC Workshops Co-hosted and Held

Date	Workshop Title	Location	Attendance
FY95			
05/16/95	Problem Identification Workshop	Morgantown	31
09/06/95	Problem Identification Workshop	N. Canton	23
09/21/95	Problem Identification Workshop	Ashland	29
FY96			
03/27/96	Access to Electronic Oil & Gas Databases	Morgantown	100
04/09/96	West Virginia Gas Plays	Bridgeport	25
05/09/96	Computers, Data Acquisition & Internet	Pittsburgh	20
06/11/96	Pennsylvania Gas Plays	Pittsburgh	71
09/18/96	Introduction to Power Point	Morgantown	10
FY97			
11/12/96	Techniques to Discover By-passed Reserves	Warrendale	50
05/19/97	Applying 3-D Seismic Technology	Morgantown	92
06/24/97	SMT & GeoGraphix 3-D Software	Morgantown	12
05/28/97	Environmental Compliance Seminar I	Jackson Co	
06/03/97	Environmental Compliance Seminar II	Arnoldsburg	
06/18/97	Environmental Compliance Seminar III	Jane Lew	
06/24/97	Environmental Compliance Seminar IV	Wayne Co	
06/2697	Environmental Compliance Seminar V	North Bend	360
09/23/97	Oil & Gas Software Fair	Buffalo	96
09/28/97	New Technology Workshop	Lexington	28
FY98			
11/04/97	GeoGraphix Basic & Intermediate School	Morgantown	7
11/18/97	Oil & Gas Software Fair	Pittsburgh	69
11/19/97	New Technology Seminar	Pittsburgh	25
11/20/97	Horizontal Drilling	Pittsburgh	42
03/10/98	Advanced Technologies for Managing Produced Water in Wells	Columbus	46
05/12/98	Application of Advanced Geophysical Technology in the Appalachian Basin	Morgantown	34
06/29/98	Advance Well Logging Techniques in the Appalachian Basin	Lexington	20
05/11/98	Hands On Workshop Demonstrations by SMT & GeoGraphix	Morgantown	14
07/08/98	Methods of Geographic Analysis	Morgantown	18
08/20/98	Coiled Tubing Technology	Morgantown	26
08/28/98	Geographic Information Systems	Lexington	28
09/10/98	Sequence Stratigraphic Analysis	Pittsburgh	63

FY99

11/12/98	Generating Prospects Using a PC-based Program	Morgantown	11
11/19/98	Secondary Gas Recovery - A Case Study	Pittsburgh	63
03/02/99	Geological/Geophysical Mapping for the 21st Century	Morgantown	15
03/23/99	Optimizing Production and Operating Efficiency	Columbus	50
04/07/99	Wireline Logging and New Technologies for the Appalachian Basin	Morgantown	41
05/08/99	Affordable Geophysics for Tough Times	Morgantown	30
06/21/99	Microbial Options for Increasing Oil Recovery	Zanesville	14
06/25/99	Software Productivity Tools	Lexington	14
08/23/99	Expanding the Petroleum Potential of the Appalachian Basin	Pittsburgh	38
09/16/99	Coal Bed Methane in Eastern Basins	Lexington	112
09/28/99	Creating Oil and Gas Related Web Pages	Morgantown	9

FY00

10/12/99	Using Ohio's Well Run Time Oil & Gas Database	Zanesville	15
10/20/99	Into the New Millennium: the Changing Face of Exploration in the Knox Play	Akron	96
11/11/99	The Challenge of Drilling in the Trenton-Black River Group	Morgantown	106
03/01/00	DigiRule Software Workshop	Morgantown	10
05/10/00	Generating Products from Public Databases for The Oil and Gas Industry	Morgantown	41
06/10/00	Building a Website from the Ground Up	Lexington	7
06/14/00	Real-Time Stimulation Solutions	Morgantown	31
09/07/00	Reservoir Characterization of the Upper Devonian Elk Sands	Cranberry	76
09/13/00	Innovative Technology for Coal Bed Methane in The Appalachian Basin	Beckley	58
09/19/00	PA-IRIS (Internet Retrieval Imaging System)	Morgantown	14
09/29/00	PA-IRIS (Internet Retrieval Imaging System)	Indiana, PA	24

FY01

10/11/00	New Methods for Acquiring Permeability Data From Appalachian Basin Reservoir Rocks	Morgantown	11
10/25/00	Nuts and Blots of Digital Geologic Analysis	Akron	37
12/13/00	Advanced Exploitation Technology for Managers	Morgantown	26
04/30/01	Reconnaissance to Reservoir - GeoGraphix's Discovery in Action	Morgantown	60
05/01/01	Appalachian Update: Trenton-Black River Exploration and Production	Morgantown	165
08/06/01	Ordovician Carbonates Core Workshop	Morgantown	48
08/07/01	Appalachian Update: Trenton-Black River Exploration and Production Round 2	Morgantown	119
08/13/01	Coal Bed Methane Reservoir Engineering	Morgantown	24

FY02

10/23/01	Case Study of Upper Devonian Sandstone Oil Reservoirs	Morgantown	18
11/01/01	Optimized Horizontal Well Technology	Delaware, OH	18
11/08/01	Field-Oriented Research Projects for Independents	Washington, PA	15
12/14/01	Optimized Horizontal Well Technology - Part B	Washington, PA	15
04/25/02	Exploration and Development of the Trenton-Black River of the Appalachian Basin	Canton, OH	176
05/16/02	Integrating GPS and GIS for the Petroleum Ind	Lexington	17
05/29/02	Gas Storage: Case Studies and New Potential	Morgantown	33
06/04/02	Outcrop analogs for the Trenton-Black River	Lexington	58
08/06/02	Unconventional Reservoirs	Morgantown	19

FY03

12/03/02	Exploration and Evaluation of Fractured Reservoirs	Washington, PA	142
03/06/03	Seismic Imaging of Structural, Stratigraphic & Diagenetic Plays	Morgantown	47
04/22/03	Applied Reservoir Characterization For Independent Operators	Washington, PA	38
04/22/03	Well Tender Safety	Pikeville, KY	100
04/24/03	Well Tender Safety	Buckhannon, WV	109
06/03/03	Paraffin, Asphaltene & Scale in Crude Oils: Theory, Problems and Solutions	Washington, PA	28
06/18/03	Produced Water: Reducing Problems and Costs	Zanesville, OH	25
07/08/03	PTTC-IOGA-NY Core Workshop	Clymer, NY	24
08/07/03	Geophysical Log Correlation - Subsurface Ordovician Rocks Beneath the Plateau	Knoxville, TN	37
08/26/03	Well Safety for Well Tenders	Bremen, OH	118
08/28/03	Well Safety for Well Tenders	Indiana, PA	258
08/29/03	Well Safety for Well Tenders	Indiana, PA	(above)
09/10/03	Subsurface Fluid Pressures	Pittsburgh	22

FY04

10/02/03	Improving the Bottom Line by Enhancing Your Data Management Skills	Morgantown	28
10/06/03	Carbonate Well Log Interpretation and Reservoir Characterization	Columbus	38
10/29/03	Coal Bed Natural Gas	Roanoke, WV	165
11/19/03	Hydrogen	Roanoke, WV	67
12/11/03	Energy Infrastructure	Roanoke, WV	80
05/27/04	Horizontal Drilling: A Technology Update	Cambridge, OH	78
06/07/04	Understanding the Trenton-Black River Reservoir	Morgantown	53
06/15/04	Introduction to Petra Geological Interpretation SW	Lexington	27
07/19/04	Integrated Coal Bed Methane Exploration Model	Morgantown	53
09/02/04	Well Tender Operations & Safety	Meadville, PA	66

FY05

10/06/04	Fractured Reservoirs	Columbus	63
10/21/04	Well Safety for Well Tenders	Marietta, OH	64
03/08/05	Carbonates 101 Short Course	Washington, PA	73
05/26/05	Upper Devonian Sandstone Plays	Washington, PA	
06/01/05	Outcrop Analogs for TBR fractured dolomite Reservoirs	Lexington	
06/07/05	Outcrop Analog for TBR HTD Reservoirs	Albany	
09/21/05	From Rocks to Geologic Models	Morgantown	

SUMMARY

FY	No. Workshops	Cum Workshops	Total Attendees	Cum Attendees
95	3	3	83	83
96	5	8	226	309
97	10	18	638	947
98	12	30	392	1339
99	11	41	397	1736
00	11	52	478	2214
01	8	60	490	2704
02	9	69	369	3073
03	13	82	948	4021
04	10	92	655	4676
05	3	95	200	4876

51/workshop average