PTTC TECHNOLOGY CONNECTIONS
Appalachian Region
Timely, Informed Technology Decisions

Newsletter

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FROM THE DIRECTOR'S DESK...

It certainly has been a busy Fall 2003, so busy that I think I owed you another newsletter much earlier than this. I was quite involved in the first-of-its-kind Eastern Section AAPG - Eastern Region SPE meeting in Pittsburgh, which culminated with a field trip to the Trenton outcrop equivalents east of Pittsburgh and a PTTC workshop on **Subsurface Fluid Pressures and their Relation to Oil and Gas Generation, Migration and Accumulation**. In addition, we were trying to get all of the paperwork in order to create the Trenton-Black River Research Consortium and kick off our two-year research effort on this play, and we were trying to get our PTTC contract extended another five years. I am pleased to report that we were successful in all of these areas: the AAPG-SPE 2003 Eastern Meeting was a huge success; the Trenton-Black River industry-government research consortium is being formed; and PTTC received a 5-year extension from

DOE, allowing us to continue transferring technology to domestic producers.

We kicked off our new contract with several workshops, even as we waited for the official announcement and paperwork to be completed. We wrapped up our two-year PUMP project with a workshop October 2nd on **Improving the Bottom Line by Enhancing Your Data Management Skills,** and on October 6 the Ohio Oil & Gas Association and the Ohio Geological Society hosted a workshop on **Carbonate Well Log Interpretation and Reservoir Characterization of Carbonates in the Appalachian Basin** in Columbus.

We also got heavily involved with the West Virginia Development Office, who wanted to offer a series of energy-related workshops that were recommended in a report issued by the Governor's Energy Task Force. We ended up by co-hosting three of the four: **Coal Bed Natural Gas**; **Hydrogen**; and **Energy Infrastructure**, all at the Stonewall Resort in Roanoke, WV. These three workshop, plus the two mentioned above, got us off to a good start, but we need more ideas, more workshops. Next month your Appalachian Basin Producer Advisory Group (PAG) will meet in Morgantown to develop a workshop plan for 2004. If you have any comments or suggestion to make to this group, please contact Chairman Bernie Miller (bmiller@bretagnegp.com) or any of the other 15 PAG members.

Today I was supposed to join the 9 other PTTC Regional Directors for a meeting, but with three of them being from the University of Southern California, Louisiana State University and Oklahoma University, the National Director decided it wouldn't be safe to be in the same room, or even on the same conference call, until after the Bowl Season has resolved all of the issues, like "Who is really number 1?" So, we'll wait until January to get together, either in person or by phone. Until then, a happy holiday season to each of you, and a happy and prosperous new year.

Doug Patchen

RLO Director

PTTC RECEIVES 5-YEAR CONTRACT EXTENSION

The U.S. Department of Energy and the Petroleum Technology Transfer Council have agreed on a new 5-year contract extension, which will allow the 10 PTTC regions to continue their programs of technology transfer to domestic producers. DOE awarded $2.6 million for the first year of the award, which will be divided among the 10 regions and PTTC headquarters. Over the past 9 years, we have used our share of PTTC funds to present more than 85 workshops which have attracted more than 4300 attendees. During this time, we have attempted to present a wide range of topics and use a variety of workshop formats. Our more popular workshops include those on the hot Trenton-Black River and coal bed methane plays, fractured reservoirs, 3-D seismic, software and data bases, play-based workshops in the Knox and Upper Devonian sandstones, and our more recent series of workshops on well safety for well tenders.

Other financial resources are used to enhance and maintain the resource center, web page, on-line newsletter and to conduct outreach throughout the basin. We look forward to another five-year association with PTTC, allowing us to continue to serve you, the Appalachian producer.

AAPG-SPE 2003 EASTERN MEETING A HUGE SUCCESS

No matter what parameters you use to judge the success of a meeting - technical, social or financial - the first-ever combined meeting of the American Association of Petroleum Geologists and Society of Petroleum Engineers in the Eastern area was a huge success. More than 650 professional geologists and engineers gathered in Pittsburgh in early September, and by all accounts they really enjoyed the meeting, workshops, field trips and social events. These registrants came from 31 different states and 4 foreign countries, quite an achievement in itself.

What originally was envisioned as two cascading meetings at the same location, the same week, later evolved into two concurrent meetings, and finally into one truly combined meeting, with

shared technical programs and social events. Papers in the three concurrent technical sessions were organized by themes, and geology and engineering papers were presented in the same sessions when appropriate. In all, 72 papers were presented, along with 12 posters. In addition, student posters were presented as part of the first-ever Eastern Section Student Job Quest, an event that was open to all students, both geologists and engineers.

Other components of the technical program included a pre-meeting field trip to the roots of the oil industry on Sunday; an SPE short course and AAPG workshop on Sunday; a post-meeting field trip to the Trenton equivalents on Wednesday; and a PTTC-sponsored workshop, also on Wednesday.

PTTC had an important role in this meeting. Not only did we sponsor the post-meeting workshop, but we also recruited several speakers to present a more global view of the oil and gas industry. We were instrumental in bringing in George Eynon, Chairman of the AAPG House of Delegates to speak on "Canada's Oil & Gas Resources - Surplus to Requirements, But Not Enough to Satisfy US Demands;" Mike Decker, Chairman of the Potential Gas Committee to discuss the "Potential Gas Committee's 2002 Natural Gas Resource Assessment;" David Houseknecht from the USGS, who served as the all-convention luncheon speaker and gave a well-illustrated presentation on "ANWAR and NPRA - Geology and Potential for Undiscovered Petroleum Resources, Federal Lands of the Arctic North Slope;" Doug Wight, CDX Gas LLC, who discussed "Unconventional Drilling Methods for Unconventional Reservoirs" (i.e., coal beds); and Ernie Mancini, PTTC Regional Director in the Eastern Gulf, who spoke on the "Mesozoic Thrombolitic Reef Play, Northeastern Gulf or Mexico."

Abstracts for this meeting can be found on the Eastern Section AAPG portion of this website.

DOE AWARDS TRENTON-BLACK RIVER RESEARCH GRANT

The U.S. Department of Energy has awarded $1.012 million dollars to the Appalachian Oil and Natural Gas Research Consortium, through the West Virginia University Research Corporation, to create a geologic play book for Trenton-Black River exploration throughout the Appalachian basin. Additional funding for this $1.8 million project will be provided by state agencies in five states and by 19 gas producers who have committed to join the new **"Trenton-Black River Research Consortium."**

The prime objective of this basin-wide effort is to develop an integrated, multi-faceted, resource-assessment model of Trenton-Black River reservoirs in New York, Ohio, Pennsylvania and West Virginia. A second objective is to define possible fairways within which to conduct more detailed studies, leading to further development of gas resources in Ordovician fractured carbonates in the basin. A third objective is to develop an integrated structural-diagenetic-stratigraphic model for the origin of Trenton-Black River hydrothermal dolomite reservoirs. These objectives will be achieved by the creation of the new Trenton-Black River Research Consortium, an industry-government partnership which will conduct geologic, petrographic and geochemical studies in eight task areas. Teams will be formed from within the consortium to address each task.

The Kentucky Geological Survey will take the lead in Task 1, Structural and Stratigraphic Investigations. Major products of this task will include structural contour maps on the Precambrian surface, and possibly the Knox unconformity, top of the Trenton Limestone and top of the Ordovician. These maps will be created using available 2-D seismic reflection data, geophysical well logs and public domain gravity and magnetic data. Additional data are expected to be released for the project by company members of the consortium.

The Ohio Geological Survey will be responsible for Task 2, Stratigraphic Analysis and Thickness Mapping of Key Units. A regional network of cross sections will be constructed to define stratigraphic relations, facies changes and sequence boundaries. This cross section network also will establish the formations or intervals to be used in structural and isopach mapping, and will provide insight into the structural relationships among basement, Cambrian sandstone and Trenton-Black River fault systems. Another product will be a map of the thickness and extent of the basal sandstone, which could be a significant factor in the dispersal of basement fluids that influenced dolomitization of Ordovician limestones.

The Pennsylvania Geological Survey will be the lead group for Task 3, Petrographic Analysis, and Task 5,

Petroleum Geochemistry. The goals of the petrographic study are to provide descriptions of original depositional facies, a reconstruction of the diagenetic history of the rocks and documentation of porosity systems in the reservoirs. The petroleum geochemisty task will provide analytical data to help identify and map petroleum source rocks. Maps that may be produced include organic richness, type of organic matter and thermal maturity.

The New York State Museum is a new partner that will assume a lead role in Task 4, Isotope Geochemisty and Fluid Inclusion Analysis. Samples of matric dolomites, fracture- and vug-filling dolomites and unaltered limestones will be subjected to analysis of and for fluid inclusions, stable isotopes, trace elements and strontium isotopes. The goal is to develop an overall model of dolomitization of these rocks.

The West Virginia Geological Survey will focus on data gathering, data base development and project management. They will share the responsibility for Task 6, Analysis of Production Data/Histories and Horizontal Well Technology with the New York State Museum, and assume full responsibility for Task 7, Data, GIS and Website Management, and Task 8, Play Book Compilation and Project Management.

Company members of the research consortium can assume either an active or a passive role in the research effort, whichever makes them more comfortable.

The project officially began October 1, 2003 and is expected to be completed by September 30, 2005.

ENERGY ROAD MAP WORKSHOP SERIES WRAPS UP

A highly diverse audience of more than 50 individuals gathered on a cold and snowy day at the Stonewall Resort near Roanoke, WV for the final workshop in the series of four Energy Road Map workshops. This series was recommended by the Governor's Energy Task Force, chaired by Patrick Esposito, and included workshops on Wind, Coal Bed Natural Gas, Hydrogen and Energy Infrastructure.

Workshop Organizer Patrick Mann stated that the goals for the workshop were to assess the security of West

Virginia's energy infrastructure, and to determine what West Virginia could do, as a state, to assure security and adequate infrastructure for future needs. Patrick Esposito discussed three infrastructure action items and related action steps advanced by the Governor's Energy Task Force: stimulating private-sector investment in infrastructure; becoming a leader in energy infrastructure development; and identifying the needs, including security, and ways to provide incentives for energy infrastructure development. The overall goal of this workshop, he concluded, was to assess West Virginia's infrastructure needs and development opportunities.

On the natural gas side of the program, Jim Crews (NiSource) discussed natural gas price drivers, competition, gas quality and possible expansion. He commented that although gas prices, as driven by weather and storage, are high at the moment, the only increases in drilling are in southern West Virginia and southwest Virginia (coal bed methane & conventional targets) and western New York (Trenton-Black River). Drilling in western Pennsylvania, central West Virginia and eastern Ohio is on the decline. However, the situation is even worse in the Rockies and Gulf of Mexico, where overall drilling is on the decline, so the market is a friend of the producer in the Appalachian basin. Currently, Appalachian basin production is increasing 0.5% a month, but producers are competing with LNG for pipeline non-firm receipt capacity.

Dan Kortum (Dominion) suggested that capacity plus need equals the whole story in natural gas infrastructure. He stated that limited pipeline capacity is the single most important obstacle to significant natural gas development in West Virginia, although new construction and facility upgrades also are important issues. New construction is necessary if new areas are to be added to the market, especially construction of large diameter transmission lines. Expansion into the electricity market also is a factor, making the construction of new transmission lines into areas with electricity markets more attractive. He concluded that additional pipeline capacity is needed; new markets offer the best opportunity for new lines; regulated projects are the most likely to succeed; long lead times are necessary for construction; a new financing paradigm is required; and all stakeholders need to become involved in a solution.

COAL BED NATURAL GAS WORKSHOP ATTENDEES OFFER SUGGESTIONS

More than 160 interested stakeholders attended the second workshop in West Virginia's Energy Road Map Series, to listen to speakers and participate in breakout sessions designed to identify what industry needs to more fully develop the State's coal bed natural gas resources. The primary goals of the workshop were to identify issues with coal bed natural gas that are perceived as impediments to the development of this resource in West Virginia, and to identify steps that the State can take to remove these perceived road blocks to coal bed natural gas development. Workshop organizers proposed to accomplish these goals by bringing together a diverse group of gas producers, coal companies, land companies, transmission companies, state regulatory officials and lawyers with the hope that each could learn from the others.

A challenge was issued to work shop attendees at the outset that this was not intended to be a seminar where one was expected to just sit and listen. Instead, this was a needs identification workshop where all voices would be heard, a report would be issued and something would be done in the near future. Although the workshop would end that day, the process would continue, with the intent that the process would lead to an acceleration of the development of the coal bed natural gas resource in West Virginia.

The very diverse group responded well to the challenge, and offered numerous suggestions on the role the State could play in each of three key areas: Ownership, Landowner & Regulatory Issues; Economic Impediments & Incentives; and Infrastructure.

Individuals were pre-assigned to one of 17 round tables, each large enough to seat 10 people, one of whom was a Table Leader who had been recruited and trained to facilitate discussion, record comments on flip charts, and report back to the general group at the conclusion of each of the three breakout sessions. These flip charts were retained by the Steering Committee to be used in writing a workshop report.

The comments were so numerous, so varied, and some so complex, that they are still being analyzed by the Steering Committee. Once the final report is issued, a summary will appear in this newsletter.

WHAT WILL BE OUR ROLE IN A HYDROGEN ECONOMY?

One of the recommendations of Governor Wise's Energy Task Force was that the State of West Virginia should "utilize its abundant coal and natural gas resources in the production of hydrogen, which is poised to have a major impact on the American economy through the development of hydrogen-powered fuel cells for automobiles and other applications." As an initial step to implement this action, the West Virginia Development Office and West Virginia University, with the cooperation of the Appalachian Region of PTTC, hosted the 3rd in a series of four energy workshops, November 11 at the Stonewall Resort near Roanoke, WV. The goal of the workshop was to assess West Virginia's potential for participating in the hydrogen economy.

Dr. Rita Bajura, Director of DOE's National Energy Technology Lab, set the tone for the day when she told attendees that because hydrogen can be produced from a variety of domestic energy sources, including both coal and natural gas, it (hydrogen) is gaining the support of the coal, renewable, nuclear and natural gas segments of industry. Currently, 1.5% of the world's energy comes from hydrogen, including 10 hydrogen refueling stations in the U.S. The challenge to us is that because hydrogen is not a natural resource, it must be produced, and this introduces safety and economic issues that must be addressed. Hydrogen is expensive to produce, transport and store, but, according to Dr Bajura, "technology can enable coal to be the preferred source for future hydrogen production," which is good news for a coal-producing state like West Virginia.

Although coal's importance to a state like West Virginia is without question, West Virginia and other Appalachian basin states also have a well developed natural gas infrastructure, in which hydrogen pipelines could be placed parallel and adjacent to existing natural gas pipelines. And, all of the Appalachian basin states are close to the east coast energy markets. In addition, West Virginia has more potential geologic reservoirs for the sequestration of carbon dioxide by-products than any other Appalachian basin state. All of these are positive factors to move the state forward in this area.

We have the technology to gasify coal and sequester carbon dioxide, so we should be able to continue to use coal to produce electricity and produce hydrogen for the transportation sector in the future,

as well. Dr. Bajura closed by posing several questions. First, if the nation's energy needs double by 2050, can hydrogen be expected to meet half of this need? And second, should there be a West Virginia Hydrogen Initiative? And, if so, should this initiative be focused on coal-based hydrogen production?

This last question was placed into perspective by one of the speakers on the first (Production and Distribution) panel, Jeff Withum from Consol Energy, who stated that currently 95% of our hydrogen production uses natural gas reforming technology. Although coal gasification is the oldest method of hydrogen production, it is not economically competitive with the natural gas technology unless chemical manufacturing and/or electrical generation from coal is added to make the entire process more economically competitive. He concluded that FutureGen could be the best long-term solution for the production of hydrogen. Other speakers concurred that coal can be a player that can compete with natural gas in the hydrogen economy.

Speakers on the second panel focused their comments on Applications, Markets and Resources. Several key points were made by these speakers. One was that it may be necessary for us to increase the production of hydrogen before we can develop a fuel market. Hydrogen-based transportation probably will arrive here only after it is proven in other, more populous areas or states. Another speaker concluded that fuel cell vehicles will drive the hydrogen economy, and hydrogen will be derived from both renewable and non-renewable sources. General Motors expects to sell hydrogen vehicles by 2010, and they are confident that these vehicles will be cost competitive.

Two questions were posed to each of five breakout groups: what do you see as the best opportunities for West Virginia in the hydrogen economy? And, what key actions can the state take to promote these opportunities?

According to attendees, among the biggest advantages/opportunities West Virginia has are the potential for FutureGen to be located here, the ability to exploit an existing natural gas infrastructure, having the ability to create industry-government-academic research consortia and marketing ourselves outside the state. The key action items include developing a hydrogen plan, streamlining or simplifying CO2 injection permitting, charging the Economic Development Office to identify the best sites, providing tax incentives for a hydrogen research consortium, and developing a marketing strategy.

WELL TENDER WORKSHOP SLOGAN: "MORE IN '04!"

Last summer we made an effort to host workshops that the "guys in the field," the well tenders, would appreciate. Our goal was to provide them with training that would make their jobs more interesting and safer.

Matt Vavro, a well-known, regionally-located consultant specializing in field training, coordinated these workshops for PTTC with the help of Roger Willis, from Universal Well Services. The workshops were so well received that they attracted the attention of PTTC headquarters and several other PTTC regions. Lance Cole, PTTC's National Project Director, and two Directors of other PTTC regions attended one of the five workshops that we hosted. As a result, Mr. Vavro was invited to attend the national Board of Director meeting in July to explain his program, and how it could be modified to fit other regions.

However, we are not through in the Appalachian basin. Based on current interest, we plan to host other workshops in the Spring and Summer of 2004, possible beginning with a workshop in north central Pennsylvania and perhaps another in north central West Virginia. If you are interested in having one of these workshops in your area, please contact me.

CO2 SEQUESTRATION CONSORTIUM WINS AWARD

The U.S. Department of Energy has awarded grants to seven regional partnerships of state agencies, universities and private companies to determine the best approaches for capturing and storing carbon dioxide, a gas that can contribute to global climate change. Collectively, these seven consortia involve more than 140 organizations covering 33 states, three Indian nations and two Canadian provinces. One of the consortia will focus its efforts on the Appalachian basin.

Battelle Memorial Institute, Columbus, OH coordinated a partnership among state agencies and companies in

Ohio, Kentucky, Pennsylvania, West Virginia and Indiana, which has been designated as the Midwest Regional Carbon Sequestration Partnership (MRCSP). This group will assess the technical, economic and social acceptability of carbon sequestration as part of a strategy to reduce CO2 emissions.

The MRCSP will identify the main greenhouse gas sources in their region, and assess the ability and cost to sequester these gases in the region's deep geologic formations and agricultural, forest and degraded land systems. Geologic sequestration research will be led by the Ohio Division of Geological Survey in cooperation with their counterparts in Indiana, Pennsylvania, Kentucky and West Virginia, and experts at Consol Energy.

Potential geologic sequestration formations include deep coal beds, aqueous formations, depleted or partially depleted oil and gas reservoirs and organic-rich black shale intervals.

NATURAL GAS DEMAND: A 30 TCF MARKET?

Mr. Dick Snyder, Director of Marketing for CenterPoint Energy, recently presented his views concerning **Natural Gas Demand Destruction or a Funny Thing Happened on the Way to a 30 Tcf Market** at the semi-annual meeting of the Potential Gas Committee in Williamsburg, VA. During his presentation, Mr. Snyder made the following points**.**

United States natural gas demand is driven by five market sectors: electric power generation, industrial, residential, commercial and others. Various models have been developed to predict the future needs of these sectors, but only one demand model (the Energy Information Administration, EIA) for the year 2020 has electric demand growing from 5.3 to 9.3 Tcf/year. This same model predicts that industrial demand will grow from 7.53 to 10.1 Tcf/year, whereas residential demand is expected to remain essentially flat.

The "wild card," in his view, is the industrial sector. Industrial demand decreased approximately 20% from 1997 to 2002, and another 5% decrease is being projected between 2002 and 2003. Fertilizer manufacturers look elsewhere when gas prices exceed $4.00/Mcf, so currently this market is going overseas.

Other natural gas intensive sectors are aluminum, steel and paper manufacturing, but all of these sectors are down as well. China and Australia are capturing large portions of these energy-intensive industries.

Based on this information, one possible scenario presented by Mr. Snyder is a 27.9 Tcf/year demand market by 2020, divided among the major sectors in this way: electric, 9.3 Tcf/year (33% share); industrial, 5.9 Tcf/year (21.1%); residential, 6.0 Tcf/year (21.5%); commercial, 4.2 Tcf/year (15.1%); and other, 2.5 Tcf/year (9.0%).

One other possible scenario has coal entering the energy picture with a bigger role, which would restrict natural gas demand to 25.9 Tcf/year. Currently, natural gas demand is approximately 23 Tcf/year.

(Editor's note: Mike Decker provided the information used above.)