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Regional Update

Summer 2004

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Workshop August 18, Norman, Oklahoma

Petroleum Geology of Deepwater Jackfork Group and Atoka Formation

Moore Norman Technology Center

A one-day workshop on August 18, in Norman, Oklahoma, presents Dr. Roger M. Slatt, Dr. James M. Forgotson, Jr., and Dr. Azzeldeen A. Saleh in an in-depth discussion of the *Petroleum Geology of the Deepwater Jackfork Group and Atoka Formation*. The meeting begins at 8:30 a.m. and will end by 5 p.m.

Dr. Slatt is the Director of the University of Oklahoma School of Geology and Geophysics and Eberly Family Chair Professor. He also is a 2001-02 AAPG Distinguished Lecturer. Dr. Forgotson is the Kerr-McGee Centennial Professor at the School, and Dr. Saleh is with the OU Institute for Exploration and Development Geophysics.

The meeting will consist of:

- General overview of deepwater (turbidite) petroleum geology;
- Petroleum geology of the Jackfork Group in eastern Oklahoma and Arkansas; and
- Examining the Atoka Formation in the Oklahoma part of the Arkoma Basin.

The overview will provide a common terminology and characteristics of deepwater reservoirs, including their worldwide distribution. New outcrop and subsurface information on some unique characteristics of Jackfork strata is included, which will affect both exploration and production rates. The Arkoma foreland basin is a mature exploration province that still has opportunities for further prospecting.

A stratigraphic model for the Atoka Formation in the entire Oklahoma part of the basin, covering more than 200 townships, will be presented. This model is based on detailed correlations of thousands of well logs within a sequence stratigraphic framework. This framework also includes both the Union Valley-Wapanucka strata at the base of the Atoka Formation and the Hartshorne-Booch strata, at its top, thus covering many reservoir rocks in the basin.

Registration will be on an as-received basis, with a cost of \$45, which includes coffee breaks, lunches, and the workbook. For more information, contact Michelle Summers, phone 800/330-3996; e-mail mjsummers@ou.edu.

New Technologies Spur Coalbed Methane Development

More than 50 industry people and students gathered on July 22, 2004, in Fort Smith, Ark., to learn about "The Status of Recent Coalbed-Methane Development in Arkansas and Oklahoma." Sponsors of the half-day program were the Arkansas Oil and Gas Commission, the Oklahoma Geological Survey, the South Midcontinent Region of PTTC, and the Arkansas Geological Commission.

In welcome remarks, Scott Bruner, interim director of the AOGC, announced that the program would include a brief introduction to coalbed methane theory, the status of CBM in Oklahoma, current drilling activity of a major CBM operator in the Arkoma Basin, a method to control fines in CBM wells, and the potential for further CBM development in Arkansas. He stated that his goal for the bi-state meeting was to "bring everyone up to date on coalbed methane activity in the region." There are Arkansas operators with wells in Oklahoma, and Oklahoma operators who have wells in Arkansas.

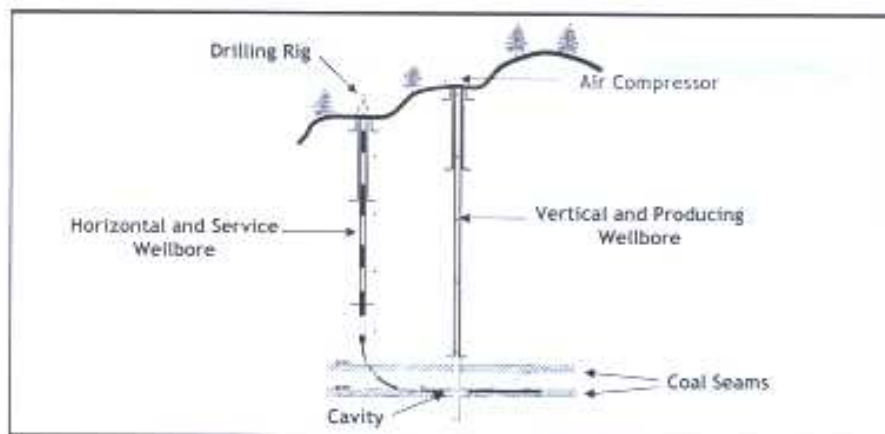
The first speaker of the afternoon, Brian Cardott of OGS, explained the geochemistry and maturation process of coal, the generation of gases from coal, and how to measure the gas content of coal. In pointing out differences between a coal reservoir and a elastic reservoir, he talked about the nature and importance of cleats (natural fractures) in coal. He described how the gas molecules desorb from inner coal surfaces, diffuse through the matrix and micropores, and finally flow out through the cleats or macropores, and explained an equation for calculating gas-in-place. He also provided information on Oklahoma's two coal belts, the Northeast Oklahoma Shelf and the Arkoma Basin. He presented numerous up-to-date maps and graphs comparing and contrasting the two regions with respect to number of CBM completions, well

depth, coal seam penetrated, initial gas and water production, presence of horizontal well completions, and other parameters.

Doug Wight, CDX Gas, centered his remarks around the fact that unconventional (low permeability) reservoirs such as coal beds require unconventional drilling methods, i.e., cutting-edge technology. He then explained CDX's patented dual well system: a horizontal/service wellbore

Continued on page 3—Coalbed Methane

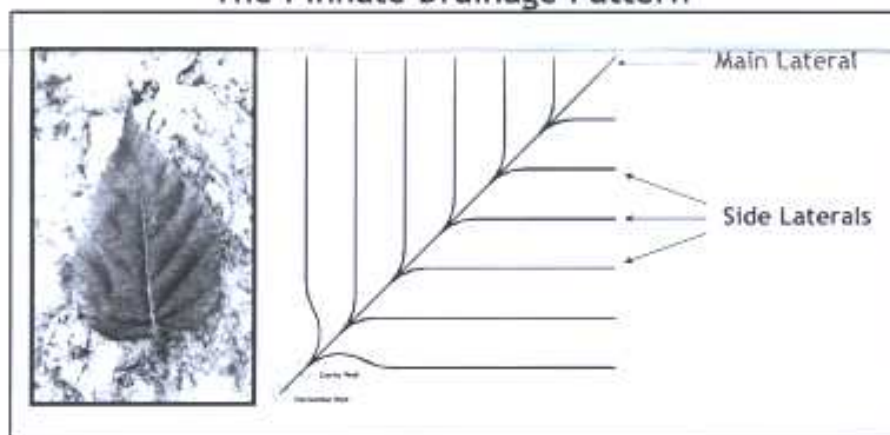
CDX's Dual Well System



CDX GAS

Figure 1.

CDX's Horizontal Drilling System: The Pinnate Drainage Pattern



CDX GAS

Figure 2: Illustrations printed with permission from CDX Gas.

Upcoming Events

August

- 10 *Advanced Plunger Lift Operations, Woodward, OK, *MWC, PTTC*
- 17 *Advanced Plunger Lift Operations, Oklahoma City, *MWC, PTTC*
- 18 *Petroleum Geology of the Deepwater Jackfork Group and Atoka Formation Workshop, Norman, *OGS, PTTC*
- 24 *Advanced Plunger Lift Operations, Tulsa, *MWC, PTTC*
- 31 *Advanced Plunger Lift Operations, Wilburton, OK, *MWC, PTTC*

September

- 1 *High Rod Producing Efficiency with Fluid Level Data, Tulsa, *MWC, PTTC*
- 2 *High Rod Producing Efficiency with Fluid Level Data, Oklahoma City, *MWC, PTTC*
- 7 *High Rod Producing Efficiency with Fluid Level Data, Ada, OK, *MWC, PTTC*
- 8 *High Rod Producing Efficiency with Fluid Level Data, Pawhuska, OK *MWC, PTTC*
- 29 *Methods of Completing Wells and Workovers, El Dorado, AR, *OGS, PTTC*

October

- TBA *Lunch-N-Learn, Fort Smith, AR, AOGC/SPE, *OGS, PTTC*
- 21-23 *Stratigraphic and Structural Evolution of the Ouachita Mountains and Arkoma Basin: Applications to Petroleum Exploration, Poteau, OK, OU, OSU, *OGS, PTTC*
- 26 *Trade Fair—Biggest One Ever, Oklahoma City, *MWC, PTTC*

November

- TBA *Lunch-N-Learn, Fort Smith, AR, AOGC/SPE, OGS, PTTC*
- 2 *Upgrading Downhole Pumping Equipment, El Dorado, AR, *OGS, PTTC*

Coalbed Methane—Continued

followed by a nearby vertical/producing wellbore. The main lateral from the horizontal well extends through the vertical well (Figure 1); the addition of numerous side laterals results in a pinnate (leaf) pattern (Figure 2), which is designed to intersect fractures. After production starts, the horizontal wellbore is plugged and abandoned.

Some major advantages of this one-wellsite completion system are minimal surface disturbance, drainage of large area (e.g., 1 wellsite for 1,200 acres), quicker/higher gas recoveries, uniform drainage and pressure depletion, and less produced water. Based on several assumptions, Wight presented a hypothetical comparison of a fracture-stimulated vertical CBM well vs. a horizontal multi-lateral (pinnate) well, showing cost/MCF of \$1.69 and \$0.86 respectively. CDX Gas started to apply this technology on the Arkansas side of the Arkoma Basin in 2000 and has drilled 21 pinnate wells to date. Wight's presentation was followed by a lively question and answer period.

Lavelle Robert, Halliburton Energy Services, addressed several factors related to the multiple fracturing of coal seams. He examined the role of fines and showed how a low-gel borate frac fluid and a surface-modification agent could control fines, thereby enhancing both fracture conductivity and relative permeability. Robert

also talked about the use of CoalStimSM, a chemical wash, as an economic way to increase well productivity. It can serve as a remedial agent to push fines away from the near wellbore area or as a primary completion technique to stabilize the coal face. Responding to a question from the audience, Robert said CoalStimSM has not yet been applied to a horizontal open hole well.

Rounding out the workshop, Bill Prior of AGC, enthusiastically promoted the idea that with new technologies now available, coals that wouldn't have been considered as possible CBM producers 10 years ago should now be considered. Currently, the main drilling target in Arkansas is the Pennsylvanian Lower Hartshorne Coal. The other coal basin is the southeastern Arkansas lignite resource area, which contains Eocene and Cretaceous low-rank coals. Preliminary work by the USGS indicates the potential rank of some deeper deposits in this area may be in the producible gas range. The goal of the Desha Basin Project, a multi-state government-funded consortium, is to core 5 deep test wells and determine coal rank and gas content. As the project is fully funded and completed, Prior says perhaps even newer technologies will be available to make this basin a gas producer.

Jane Weber, OGS

Ground Water Protection Maps Available

To help protect ground water resources during well completion and plugging operations, the Oklahoma Corporation Commission has been remapping the state's water basins to determine the mandatory depth for placing surface casing. The maps were originally prepared using surface topography as a datum. These new versions characterize the base of treatable water with subsurface datums obtained from the analysis of electric logs. To use the maps, given depth values must be subtracted from elevation to obtain subsea depths for the base of treatable water.

To date, 34 counties have been completed: Blaine, Canadian, Carter, Creek, Custer, Dewey, Ellis, Garvin, Grady, Haskell, Hughes, Kingfisher, Latimer, Le Flore, Lincoln, McClain, McIntosh, Muskogee, Nowata, Okfuskee, Okmulgee, Payne, Pittsburg, Pontotoc, Pottawatomie, Roger Mills, Rogers, Semi-

nole, Sequoyah, Stephens, Tulsa, Wagoner, Washington, and Woodward. The maps, one county per sheet, are drawn at a scale of 1 inch equals 2 miles (~1:126,720). They are contoured at 100-foot intervals.

Prepared by Geologist Dennis Niskern of the Corporation Commission, this map series is being distributed by the Oklahoma Geological Survey as a service to the public.

Black and white photocopies can be purchased over the counter or postpaid from the OGS Publication Sales Office, 2020 Industrial Blvd., Norman, OK 73069; phone 405/360-2886; fax 405/366-2882; e-mail ogssales@ou.edu.

The maps should be requested by county name. The price is \$3 per county (folded sheet), plus 20% for postage and handling, with a minimum postage charge of \$2 per order.

***BIGGEST FAIR EVER!
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**Head out to the MWC Trade Fair
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October 26th, OKC Fairgrounds
Travel and Transportation Bldg.
10 a.m. to 3 p.m.**

***Free Fajita Buffet Catered by
Ted's Escondido***

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