Tuesday, February 28, 2005

Westchase Hilton • 9999 Westheimer
Social 5:30 p.m., Dinner 6:30 p.m.

Cost: $25 Preregistered members; $30 Nonmembers & Walk-ups

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by ***Brian Toelle***
Schlumberger
Pittsburgh, PA

An Overview of the Trenton–Black River Play

The modern petroleum industry was born in the Appalachian Basin with Drake's well near Titusville, Pennsylvania. This geologic province covers an area larger than 185,000 square miles and is more than 1,000 miles long and 300 miles wide. Since Drake's discovery this basin has seen numerous exciting and technically challenging plays. The most recent of these, as well as one of the oldest, is the Trenton–Black River gas play.

A characteristic seismic "sag" feature is associated with productive features. Amplitude variation with offset has been shown to be a useful tool in discriminating betwen limestone and dolomite.

The first hydrocarbon production from the Ordovician Trenton–Black River section was established in Ohio in the late 1800s. By 1933, 11 gas fields were discovered in fractured Trenton limestone reservoirs in north-central New York. During development of the deeper Teresa and Pottsdam sandstone oil plays in the 1960s, additional gas reservoirs in the Trenton were discovered but not developed because of economics factors.

Recent discoveries of significant gas accumulations have once again focused considerable activity in the Trenton–Black River trend. Its close proximity to the high-usage, northeastern US market has attracted exploration companies from outside the basin. This activity is currently centered on two locations within the basin: the fault-controlled narrow dolomitic bodies of the New York Finger Lakes region and the zones of fractured limestone in West Virginia.

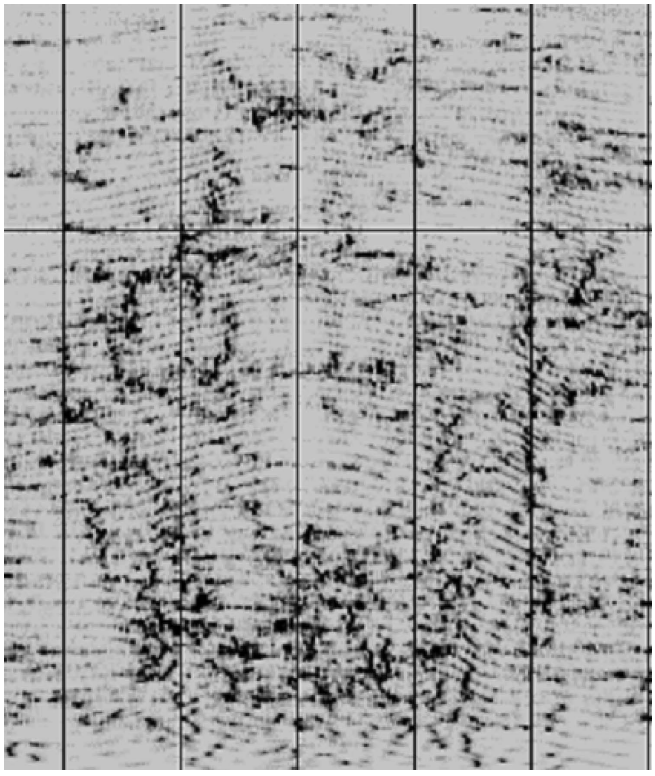

Figure 1. 2D variance section across a flower structure in West Virginia. Line courtesy of Columbia Natural Resources

West Virginia

The discovery of the Cottentree field in Roane County by Columbia Natural Resources established this portion of the trend in 1999. The Frederick C. Parker well encountered the Black River at 10,255 ft and produced an estimated 50 MMCF/D of gas. A second well, the Juanita Groves *et al.*, flowed an estimated 28 MMCF/D of gas from approximately 9,700 ft.

Results from drilling since that time suggest that this fractured limestone trend is related to the reactivation of deeper structures. These structures were originally created during the Iapetan rifting that occurred in Late Precambrian and Early Cambrian times and led to the formation of the Rome trough. Following deposition of the Trenton and Black River formations, some of these features were reactivated during the Taconic, Acadian and Allegheny orogenies. Two-dimensional (2D) seismic variance and blended attribute sections have proved to be important in identifying these reactivation zones. Figure 1 shows a 2D variance section across one of these basement-involved flower structures that has been re-activated along this trend. Production from fractured Trenton–Black River limestone was established over this structure.

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New York

Dolomitized portions of the Black River in the Finger Lakes region of New York have generated the greatest interest in this play. These features are believed to be similar to the Albian-Scipio trend in the southern Michigan Basin, which contains 128 million barrels of recoverable oil. These features are characterized by the formation of coarsely crystalline sparry dolomite with vuggy and intercrystalline porosity in fracture zones that have resulted from the reactivation of basement shears. These fault/fracture zones are believed to have been the conduits for dolomitizing hydrothermal fluids that were generated at depth during the Taconic Orogeny.

A number of seismic techniques are being employed on this play to locate these hydrothermal dolomite deposits. A characteristic seismic "sag" feature has become associated with these productive features. Amplitude variation with offset has also been shown to be a useful tool in discriminating between limestone and dolomite.

These tools, as well as the overall play characteristics and geologic history, will be discussed during this presentation. ■

Biographical Sketch

Brian Toelle received his BS in geology from Texas A & M University in 1978 and an M S in Structural Geology from Stephen F. Austin State University in 1981.

He worked as a geologist with Texaco exploration until 1989 and then as a geophysicist with GeoQuest Systems until 1992. He spent 5 years working for Saudi Aramco's Exploration department in Dhahran, Saudi Arabia interpreting 3D seismic surveys. Brian joined Schlumberger in 1997 and is currently the Principal Geophysicist for Schlumberger's DCS office in Pittsburgh. He is also currently working on his Ph.D. in Geological Sciences at Michigan State University.