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Devon Energy Corp., University of Oklahoma develop rock lab

Devon Energy Corp. and the University of Oklahoma have developed new methods to study shale formations that could house significant reserves of oil and natural gas.

BY JAY F. MARKS jmarks@pubco.com
Published: June 17, 2011

NORMAN — [Devon Energy Corp.](#) and the [University of Oklahoma](#) have been breaking new ground over the past several years to improve their understanding of the rocks that are integral to the oil and natural gas industry's current success.

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Students' skills in demand
Dean Larry Grillot of the University of Oklahoma's Mewbourne School of Petroleum and Geological Engineering said the school's relationship with Devon Energy Corp. is a good example of how industry and higher education should work together.
It helps develop new research methods that benefit Devon, while giving OU students an opportunity to work with the latest technology in the industry.
"We teach from our research," Grillot said.
Professor Carl Sondergeld said students in the rock lab learn skills that are in demand worldwide due to the rush to develop shale resources.
"It makes them globally attractive," he said.
Collaboration boosts OU
The University of Oklahoma has increased its visibility in studying shale formation by working with Devon Energy Corp. Professor Carl Sondergeld said he has consulted with Norway's Statoil and France's Total since OU created its rock lab with Devon. Now officials are looking to form a consortium of companies to continue that research with as many as seven other oil and gas producers. "We can do a lot more with a larger group," said Jeff Hall, Devon's central region vice president of exploration.

Devon has invested almost \$20 million in research and facility development at [OU's Mewbourne School](#) of Petroleum and Geological Engineering over the past six or seven years, helping create a unique laboratory for studying shale and other rocks with technology borrowed from other industries.

[Jeff Hall](#), Devon's central region vice president of exploration, said the company needed to know more about the shale formations where it was finding natural gas.

"We had significant questions that we needed answered," he said. "The problem with shales is you can't answer those questions with microscopes and hand lenses.

"You have to get down to the molecular level."

Shale pioneer

Devon became a pioneer in drilling for shale gas in [North Texas' Barnett Shale](#) following its 2002 acquisition of Mitchell Energy & Development Corp.

Before that, shale formations had been viewed as the source rock for oil and natural gas, but not somewhere those commodities could be found.

Hall said the decision to drill horizontally into shale formations raised a lot of questions about how to proceed in those areas.

"All of a sudden, it became real clear we didn't know a lot about shales," he said. "The whole industry didn't."

Hall said traditional oil and gas industry methods proved to be insufficient in examining shale, so more sophisticated equipment was needed.

Company officials sought out the experts at OU for help with a geophysics study of seismic data from the region. That morphed into a geological study that created a number of petroleum engineering questions.

"The only way you're going to solve these problems is multidisciplinary research," Hall said.

He said the beauty of working with OU is that all of those authorities work in the same place.

[Professor Carl Sondergeld](#) said Devon's success in producing natural gas from shale made him realize the storage capacity of shale, but the university needed better instruments to see inside such rock formations at a molecular level.

Hall said Devon and OU officials figured out how to use a scanning electron microscope to learn more about shale formations.

[Mark Curtis](#), a postdoctoral researcher, demonstrated how a scanning microscope can detail the surface of a sample from western [Oklahoma's](#) Cana Woodford Shale.

He said that allows researchers to study the microstructure and porosity of shale formations.

Curtis was working with a sample that was only three microns thick. A human hair averages about 50 microns.

"We applied technology to the oil and gas industry that probably had never been applied before," Hall said. "Now we've got the lab and the technology to answer those questions.

"We're on the cutting edge of understanding them. But we've got a lot more work to do."

Better production

Hall said the lessons Devon has learned from its work with OU researchers have helped the company increase its production efficiency from 8 percent to better than 40 percent. He said the studies undertaken by OU researchers have helped Devon determine its best practices rather than rely on trial and error.

Sondergeld said the continued study of shales has helped Devon figure out what liquids to use for hydraulic fracturing.

Oil and gas producers face various different technological challenges, so it is important to understand the geologic formations in their operating areas down to the molecular level, Hall said.

Such understanding is not easy to achieve.

The [Floyd Shale](#) in [Alabama](#) looks identical to the Barnett Shale under a microscope, but it is not the same geologically since fault lines never sealed hydrocarbons into the shale, Sondergeld said.

Hall said producers only figured that out when their efforts did not yield the expected production.

Sondergeld said it is important to look at potential oil and gas formations on multiple scales, a notion echoed by Hall.

"That prevents our group from going down a rabbit trail and hitting a dead end," he said.

New samples to study

Potential shale plays used to be compared to the Barnett, but now there are samples from successful plays to study.

Such lab tests can offer producers a "comfort factor" on the potential success of a new project, Hall said.

"When we get rock, we bring it down to the lab and look at it," he said. "This is what the industry is doing now. "We're looking for those big resource plays."

Sondergeld said the big issue is finding areas where oil and gas reserves can be recovered economically.

"They're easy to find, but hard to mine," he said.

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PUBLISHED ON 7/31/2011