

(From left, Troy Aikman, a hall of fame football quarterback for the Dallas Cowboys and investor in Ecosphere; Mike O'Kelley, Newfield operations; Robbie



Cathy, vice president of operations for Ecosphere, Aaron Horn, Newfield operations; and Mickey Donn COO of Ecosphere in the Woodford Shale with an Ecosphere mobile water treatment unit in the background.)

Newfield Contracts for Ground Breaking Clean Water Technology in the Woodford

Newfield is helping the environment while lowering costs...literally by the bucketful as it demonstrates the effectiveness of a new water treatment system in the Woodford Shale area of southeastern Oklahoma. This water process developed by Ecosphere Technologies Inc., a Florida-based water engineering and services company, has the ability to take millions of gallons of drilling processed water and recycle it into reusable, clean water.

“Treating and recycling flowback from a hydraulically fractured gas shale reservoir is vital to the development of shale plays like the Woodford,” said Mike O’Kelley, Mid-Continent Production Operations for Newfield. “The use and disposal of water in emerging shale plays is expensive and a significant public and environmental concern. Newfield’s use of Ecosphere helps us enhance the environment while recycling and lowering water transport costs.”

Many consider the Ecosphere process a breakthrough in water treatment. Its mobile units are the size of a tractor-trailer rig. The process combines advanced oxidation technology with reverse osmosis to eliminate any metals and



organic material from reclaimed water. This allows a significant volume of flowback to be returned to the environment as clean water.

Hydraulic fracturing in the Woodford requires 50,000 to 110,000 barrels of water per well. By treating flowback on location with this process, 75% of the volume treated becomes clean water. The other 25% becomes concentrated brine water, which can be re-used in subsequent hydraulic fracturing operations.

In Oklahoma, agencies are re-evaluating the state's comprehensive Water Plan that could impact long-term water use by the oil and gas industry. This makes Newfield's current work with Ecosphere even more timely.

Newfield executed a pilot project of this new technology with flowback water from the drilling process near Coalgate, Okla., in the fourth quarter of 2008. An Ecosphere mobile unit processed flowback from two horizontal Woodford Shale wells at 100 barrels per hour, from 12 to 14 hours per day for two weeks. An independent third party consultant group managed the sampling and analysis while adhering to Environmental Protection Agency guidelines. Analysis from this pilot was provided to state and federal agencies as validation of the technology and to help develop the state's future comprehensive water plan.

"The fresh water stream from the mobile water treatment unit can be used by farmers to irrigate land for crops or livestock," said O'Kelley. "It can be returned to a frac pond to be re used by the landowner, the operating company or even returned to a river. There are a variety of options this process gives a company."

An inexpensive method to treat wastewater is preferable to trucking wastewater to saltwater disposal wells. This has been the traditional method of handling water from the drilling process. Fewer trucks also mean less congestion on area roads.

By treating and recycling wastewater produced during the first two or three weeks after fracturing, rather than hauling the wastewater off to disposal wells, Newfield estimates it can save more than 200 truck trips per well and reduce carbon dioxide emissions by 50 tons per well.



Aaron D. Horn, a Mid-Continent Newfield engineer prepared a study for the Society of Petroleum Engineers in early 2009 on the breakthrough of this mobile water treatment and presented his findings at the society's environmental and safety conference in San Antonio, Texas, during March.

"The future development of natural gas producing shale plays hinges on environmentally friendly, cost efficient water management programs customized to each operational area," he wrote. "The Ecosphere process presents a unique opportunity for the oil and gas industry to improve economics while acting as environmental stewards. By properly leveraging this technology, operators can create a water management plan that decreases operating cost, conserves water, reduces carbon dioxide emissions and provides a safer working environment."

Horn went on to report: "U.S. energy independence lies beneath American soil in the form of trillions of cubic feet of natural gas in the Fayetteville, Woodford, Haynesville, Marcellus and Barnett Shales. The benefits derived from an economic, 'green' solution to the water problem associated with the development of these shales could have far-reaching political, environmental and socio-economic impacts."

Newfield is not the first field company to recycle wastewater. Oklahoma City-based Devon Energy pioneered recycling wastewater in the Barnett Shale formation through a heating and distillation process that was praised for being environmentally friendly. However, the Ecosphere process may well be less expensive to operate than the heat and distillation process.

"The ability of our system to recycle wastewater at less than half the cost of technologies that rely on heat should make it more popular with exploration and production companies," said Dennis McGuire, founder, president and chief technology officer of Ecosphere Technologies. "The process also has tremendous implications across the globe, since clean drinking water is a problem in many countries."