

# Kansas Geological Survey to test use of CO<sub>2</sub> in oil recovery and storing it underground

November 14 2014, by Lynn Watney

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The Kansas Geological Survey (KGS) at the University of Kansas is moving into a new phase of a multiyear study to test the safety and efficacy of injecting carbon dioxide (CO<sub>2</sub>) from industrial sources into the ground to produce hard-to-reach oil and to permanently store CO<sub>2</sub> deep underground.

The U.S. Department of Energy (DOE) has given the KGS the green light to proceed with plans that include drilling wells for enhanced oil recovery and sequestration of CO<sub>2</sub> in the Wellington oil and gas field southwest of Wichita. DOE has provided \$11.5 million since 2009 to the KGS for CO<sub>2</sub> projects. This phase of activity will involve another \$11.2 million investment by DOE.

CO<sub>2</sub> is a natural and essential component of the atmosphere, but it is also a greenhouse gas—a byproduct of fossil fuel emissions from vehicles and such stationary sources as electric, cement, ethanol and fertilizer plants—that is considered a cause of climate change.

Through a collaborative effort between government and industry, the Wichita-based oil and gas exploration and production company Berexco will begin drilling the wells in spring 2015 after monitoring infrastructure is in place to track the CO<sub>2</sub> once it is injected and verify the safety of the injection process.

Besides the KGS and Berexco, collaborators include the KU and Kansas State University departments of geology, Lawrence Berkeley National

Laboratory and Birdie Consulting.

The KGS is currently installing the infrastructure used to acquire pre-drilling baseline data.

"An extensive suite of state-of-the-art equipment is being deployed at the Wellington site, including instrumentation to sample and test water quality and pressures in the injection and monitoring wells," said KGS geologist and lead investigator Lynn Watney. "In addition, we will use seismic techniques to obtain snapshots of CO<sub>2</sub> plume movement, satellite-based tracking of land-surface deformation to monitor pressures, and thermal sensors to monitor the movement of the injected CO<sub>2</sub>."

The KGS has already installed a network of 15 seismometers that is recording background seismic activity. Now the KGS is drilling monitoring wells that will be used to obtain baseline water-quality readings in the shallow groundwater.

The well drilled by Berexco in spring 2015 will be used to inject CO<sub>2</sub> into oil-bearing rocks of Mississippian Age and release trapped oil inaccessible using conventional methods. Without the introduction of [enhanced oil recovery](#) methods, the Wellington field is nearly depleted.

"The Mississippian and other oil-bearing formations in Kansas offer the potential to produce millions of barrels of additional oil if the CO<sub>2</sub> injection methods prove to be effective and safe," Watney said.

Drilling for the CO<sub>2</sub> sequestration phase of the project is planned for fall 2015. Berexco, with the assistance of the KGS, has filed an application for a Class VI injection permit from the U.S. Environmental Protection Agency that will allow injection of CO<sub>2</sub> into the Arbuckle aquifer at a depth of about 5,000 feet.

The Arbuckle aquifer is a porous rock group that contains extremely saline water in this area and is separated from shallower, freshwater aquifers by thousands of feet of impermeable rock. The KGS is conducting the injection test to validate that the aquifer can contain the CO<sub>2</sub> long term.

"An Emergency Remedial Response Plan has been prepared that will be activated in the unlikely event that any elevated pressure or CO<sub>2</sub> concentration levels are detected." Watney said. "This plan involves automatic shutdown of operations at the site and informing all stakeholders and the nearby communities."

Linde LLC and Praxair Services Inc., large suppliers of industrial gases, will provide the CO<sub>2</sub>, a byproduct of their industrial processes. Both companies are interested in the potential of using CO<sub>2</sub> in the recovery of additional [oil](#) in Kansas. Sequestering CO<sub>2</sub> also will help reduce their carbon footprint.

**More information:** More information and updates on the KGS's south-central Kansas CO<sub>2</sub> project is available online:

[www.kgs.ku.edu/PRS/Ozark/index.html](http://www.kgs.ku.edu/PRS/Ozark/index.html)

Provided by University of Kansas

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