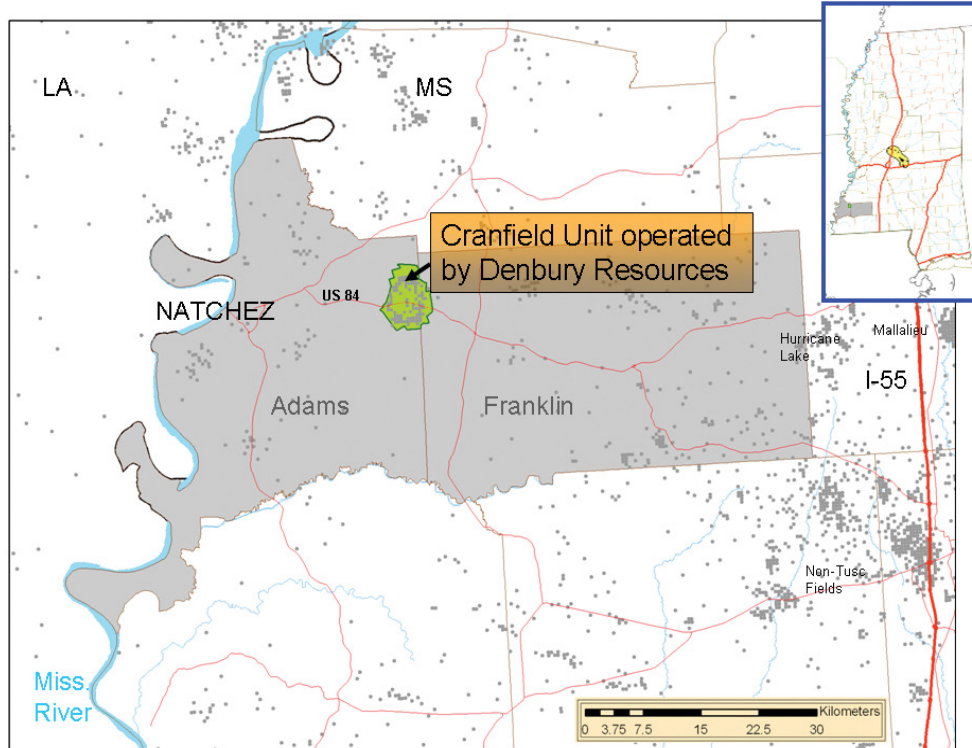


# CRANFIELD PROJECT

*Lower Tuscaloosa Formation, Natchez, Mississippi*  
Southeast Regional Carbon Sequestration Partnership



# NETL

NATIONAL ENERGY TECHNOLOGY LABORATORY

## BACKGROUND

The Southeast Regional Carbon Sequestration Partnership (SECARB) Cranfield Project has a goal of safely demonstrating large-scale, long-term CO<sub>2</sub> injection and storage in a CO<sub>2</sub>-enhanced oil recovery (EOR) and associated saline reservoir—activities that hold significant promise for future development within the southeast United States.

In July 2008, Denbury Onshore, LLC, began CO<sub>2</sub>-EOR operations at the Cranfield oilfield located east of Natchez, Mississippi. The SECARB Cranfield Team, led by the Southern States Energy Board and its partners, the Gulf Coast Carbon Center of the Bureau of Economic Geology at the University of Texas at Austin, deployed a variety of monitoring, verification, accounting (MVA), and assessment technologies focused on a commercial CO<sub>2</sub> injection environment, and collected data for long-term carbon capture and storage (CCS) analysis.

The CO<sub>2</sub> is injected into the lower Tuscaloosa Formation, a large and regionally extensive saline formation with the potential to hold centuries of CO<sub>2</sub> emissions in the Southeast United States. In August 2009, the project team met a milestone by monitoring injections of more than 1 million metric tons of CO<sub>2</sub>. As of March 2015, the project team monitored injection and storage of more than 5 million metric tons of CO<sub>2</sub> at the site.

## PROJECT OVERVIEW

The Cranfield Project is located approximately 12 miles east of Natchez, Mississippi. Denbury Onshore, LLC, is currently operating a commercial CO<sub>2</sub> flood of the field (using the subsurface injection of CO<sub>2</sub> for EOR). The SECARB Cranfield team characterized the surface and subsurface of the Cranfield site. Numerical models were developed and used to quantify the response of the reservoir to injection and migration of fluids. Monitoring was used to validate the conceptual and quantitative predictions made in the models and to support project goals.

Normally, CO<sub>2</sub>-EOR operations occur in active fields that are in the late stages of water flood, but the wells at the Cranfield site had been abandoned for over 40 years. This project demonstrates the value of using old oil fields for storage, and highlights their immense research value.

SECARB's study operations occur in four integrated research program areas within Cranfield field: (1) the High Volume Injection Test area (HiVIT); (2) the Detailed Area of Study (DAS); (3) the Geomechanical area; and (4) the near-surface observatory, also called the "P-site." Carbon dioxide injection activities occur at the HiVIT and the DAS. Carbon dioxide from Jackson Dome, a natural source, is delivered to the Cranfield oilfield via pipeline.

SECARB partners and researchers worldwide use the data collected at Cranfield to further refine reservoir models for similar geological settings.

## PROJECT SUCCESSES

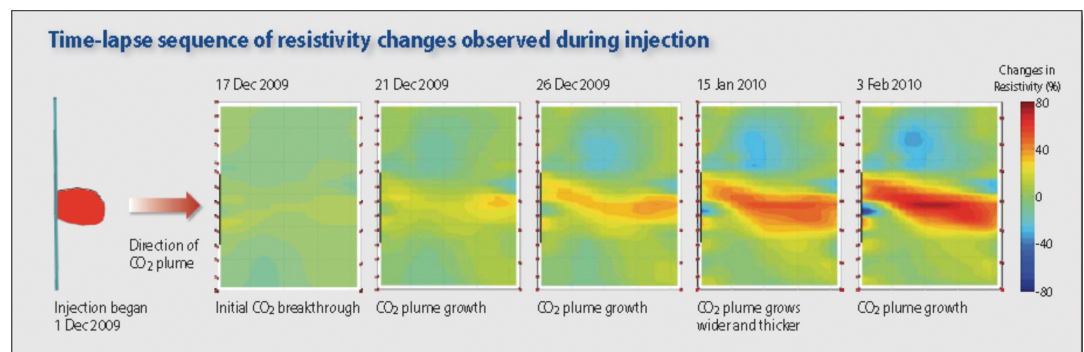
In November 2009, the U.S. Department of Energy (DOE) recognized the Cranfield Project for advancing CCS technology and meeting a "Group of Eight" goal for deployment of 20 similar projects by 2010. The Cranfield Project is the fifth project worldwide to reach this CO<sub>2</sub> injection volume while being monitored to demonstrate storage effectiveness and the first in the United States.

In 2010, the Carbon Sequestration Leadership Forum (CSLF) recognized the Cranfield Project for its outstanding accomplishments in advancing MVA technologies. The site features the largest suite of MVA technologies all focused on one spot.

Intense study was conducted of this new CO<sub>2</sub> flood of a long-abandoned oil field with many legacy wells of unknown quality. This created an opportunity to evaluate risks to future use of depleted oil fields for sequestration, including the following:

- A suspected leaking abandoned well was evaluated with many technologies to confirm it was not leaking
- Extensive study was conducted addressing pressure and CO<sub>2</sub> transmission across a known fault cutting through the field
- The first deployment of pressure surveillance in the above-zone monitoring interval to collect data on the performance of the lower part of the confining system
- Because the field had been abandoned for 40+ years, downhole pressure had equilibrated allowing for confidence in interpretation of new field pressure responses.

Project activities and outreach efforts at Cranfield began under the RCSP Initiative's Validation Phase and continue today. The team has excelled in creating a collaborative environment and opportunity for industry, national laboratories, the U.S. Geological Survey (USGS), and academic interaction. The site has hosted many experiments within and outside of the RCSP Initiative, such as the National Risk Assessment Partnership (NRAP), the Carbon Capture Project, GEO-SEQ project, the Center for Frontiers of Subsurface Energy Security, and other targeted projects.



## Contacts

**Traci Rodosta**  
Technology Manager  
Carbon Storage Program  
304-285-1345  
traci.rodosta@netl.doe.gov

**Darin Damiani**  
Program Manager  
Carbon Storage  
202-287-5282  
darin.damiani@hq.doe.gov