Commercial-Scale CO_2 Injection and Optimization of Storage Capacity in the Southeastern United States

Award Number: DE-FE0010554

Project Summary:

The project objective was to explore the optimization of commercial carbon dioxide (CO_2) injection and storage within the vertical geologic continuum from depth to surface by employing enhanced reservoir simulation methods to simulate plume(s) migration within the many possible storage layers comprising the massive clastic wedge that spans the Gulf Coast. Further, new storage efficiency factors were generated that consider regional injection and its impact on neighboring formations. Specifically, this project developed a detailed commercial-scale geologic model; simulated CO_2 injection operations in multiple reservoir scenarios; developed optimized costing scenarios; completed supplemental caprock core analysis; developed new storage efficiency factors that account for geomechanics; and developed simplified screening models capable of rapidly approximating project results. The effort ultimately developed a best practices manual.

Prime Performer:
Advanced Resources International, Inc.

Key Performers:
Southern Company Services, Inc.
University of Alabama at Birmingham

Principal Investigator:
George Koperna

Project Duration:
10/1/2012 – 3/31/2017

Performer Location:
Arlington, Virginia

Program:
Carbon Transport & Storage

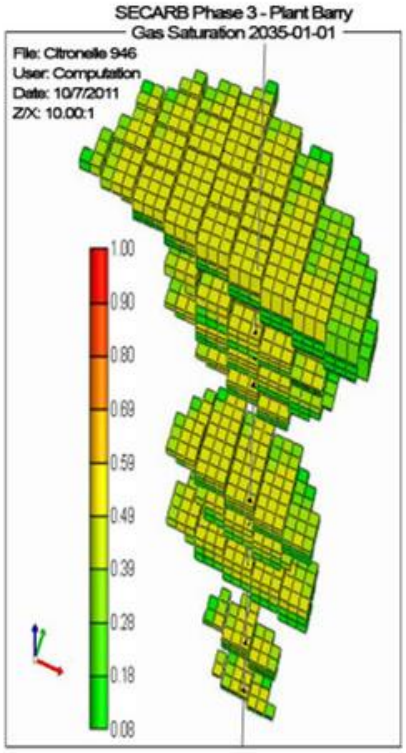

Figure 1: A storage reservoir model, utilizing the reservoir approach, depicting the CO_2 plume at the Southeast Regional Carbon Sequestration Partnership Anthropogenic Test Site 10 years after the end of injection operations

Project Outcomes:

Advanced Resources International built a geologic model based on the Citronelle oil field and looked at 40 years of injections into the Paluxy, Washita, Lower Tuscaloosa, and Wilcox formations. The project modeled (1) initial standalone injection into each unique sand body, (2) sequential injection into two reservoirs (dual injection scenario), and (3) sequential injection into four reservoirs (quad injection scenario). The project also used neural network software to successfully generate synthetic porosity log curves from induction electrical logs in vintage wells. Results provide new understanding about how to utilize stacked reservoirs.

Presentations, Papers, and Publications

Final Report: SECARB Commercial-Scale CO_2 Injection and Optimization of Storage Capacity in the Southeastern United States (October 2017) George Koperna, Dr. Jack Pashin, Dr. Peter Walsh