Assessment of CO_2 Storage Resources in Depleted Oil and Gas Fields in the Ship Shoal Area, Gulf of Mexico

Award Number: DE-FE0026041

Project Summary:

The objective of this project was to complete a detailed characterization study of the northern Ship Shoal area, offshore Gulf of Mexico for large-scale carbon dioxide (CO_2) sequestration. This effort included a detailed review and interpretation of publicly available geologic data to identify targets and seals; development of an integrated 3D geologic, geomechanics and fluid flow model for the Ship Shoal Block 84 and 107 fields area; simulation of long-term injectivity, fluid flow migration, storage permanence, and induced fault reactivation; risk assessment for CO_2 injection; analysis of existing hydrocarbon infrastructure for CO_2 transport; and an estimation of potential CO_2 storage volume.

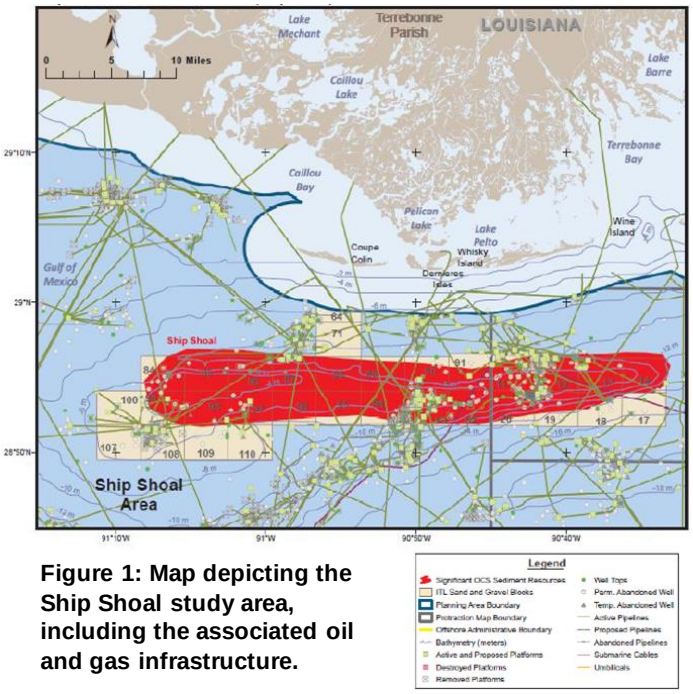

Figure 1: Map depicting the Ship Shoal study area, including the associated oil and gas infrastructure.

.

Prime Performer:
Geomechanics Technologies, Inc.

Principal Investigator:
Dr. Michael Bruno

Project Duration:
9/15/2015 – 3/14/2018

Performer Location:
Monrovia, California

Field Sites:
Ship Shoal area, Gulf of Mexico

Program:
Carbon Storage

Project Outcomes:

The fluid flow models developed during this project showed very low risk of CO_2 leakage, with CO_2 contained in either the Pliocene or the Miocene Formations. The geomechanical modelling results showed low to no risk for fault slips or fault reactivation after 30 years of CO_2 injection and migration. Existing well bores were reviewed and categorized according to cement integrity. “Cautionary” wells exist that may provide leakage pathways for stored CO_2. Ship Shoal’s risk was compared to that of In Salah, Sleipner, Kevin Dome, Loudon, Illinois Industrial CCS and Wilmington Graben using Geomechanics Technologies, Inc’s Quantitative Risk & Decision Analysis Tool for caprock integrity evaluation. Results showed that the risk at the Ship Shoal fields is similar to the known active CCS sites, but lower than the Wilmington Graben site. Researchers digitized all the offshore and onshore pipelines documented within close proximity to the top 25 nearby CO_2 emission sources in an interactive website (http://www.geomechanicstech.com/shipshoal.html).

Presentations, Papers, and Publications

[Final Report: Automated High Power Permanent Borehole Seismic Source Systems for Long-Term Monitoring of Subsurface CO_2 Containment and Storage](#) (March 2019) – James Kengo Andersen