the ENERGY lab

PROJECT FACTS

Carbon Sequestration

Carbon Dioxide Sealing Capacity: Textural or Compositional Controls?

Background

Increased attention is being placed on research into technologies that capture and store carbon dioxide (CO_2). Carbon capture and storage (CCS) technologies offer great potential for reducing CO_2 emissions and, in turn, mitigating global climate change without adversely influencing energy use or hindering economic growth.

Deploying these technologies in commercial-scale applications requires a significantly expanded workforce trained in various CCS specialties that are currently under-represented in the United States. Education and training activities are needed to develop a future generation of geologists, scientists, and engineers who possess the skills required for implementing and deploying CCS technologies.

The U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL) has selected 43 projects to receive more than $12.7 million in funding, the majority of which is provided by the American Recovery and Reinvestment Act (ARRA) of 2009, to conduct geologic sequestration training and support fundamental research projects for graduate and undergraduate students throughout the United States. These projects will include such critical topics as simulation and risk assessment; monitoring, verification, and accounting (MVA); geological related analytical tools; methods to interpret geophysical models; well completion and integrity for long-term CO_2 storage; and CO_2 capture.

Project Description

NETL is partnering with Brooklyn College to determine the role of textural (e.g., the pore-throat size; distribution, geometry, and sorting; grain size; degree of bioturbation; specific surface area; preferred orientation of matrix clay minerals; and orientation and aspect ratio of organic particles) and compositional parameters (e.g., silt content; ductility; compaction; mineralogical content; proportion of soft, deformable mineral grains to rigid grains; cementation; organic matter content; carbonate content; and ash content) that control the CO_2 sealing capacity of caprock formations. Caprocks are low-permeability formations located above the CO_2 injection formation and can act as a seal to prevent the upward migration of CO_2 into other formations (including drinking water sources) or its escape into the atmosphere.

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U.S. DEPARTMENT OF ENERGY

PROJECT DURATION

Start Date
12/01/2009

End Date
11/30/2012

COST

Total Project Value
$296,881

DOE/Non-DOE Share
$296,881 / $0

Government funding for this project is provided in whole or in part through the American Recovery and Reinvestment Act.

The proposed research will also serve as scientific training for at least one graduate student and one undergraduate student. The students will collect samples, search scientific literature, perform most lab measurements, write scientific dissertations, and participate in disseminating project results through publications and by attending scientific meetings.

Goals/Objectives

The objective of the project is to investigate the role of textural and compositional parameters that control the CO_2 sealing capacity of rocks (Figure 1). The research will advance scientific discovery and understanding of CCS and will be intimately related to promoting CCS teaching and learning activities at Brooklyn College.

Benefits

Overall the project will make a vital contribution to the scientific, technical, and institutional knowledge necessary to establish frameworks for the development of commercial-scale CCS. Further, it will advance knowledge of the sealing capacity of rocks such as shales and anhydrites and, in turn, provide a better understanding of the processes that take place in geologic reservoirs that are subjected to CO_2 injection. The research will also fill a gap that exists in the national database regarding the sealing capacity of caprocks, with special reference to existing and potential CCS targets.

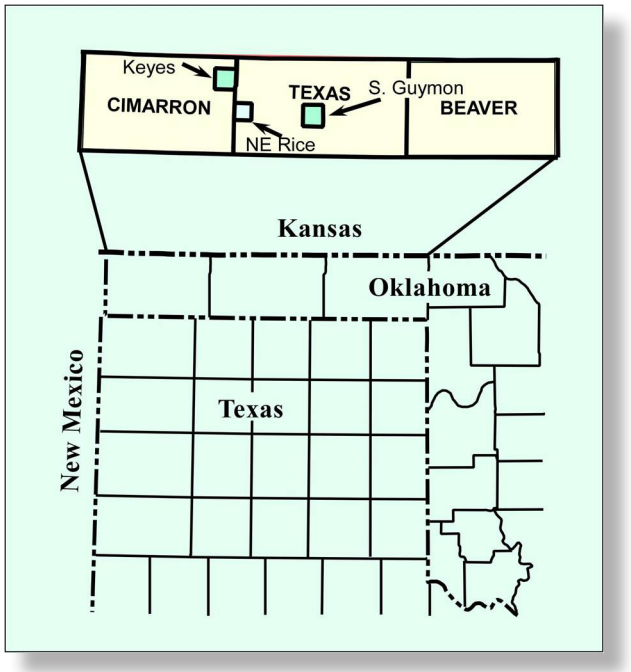

Figure 1. Map indicating the location of the three gas fields (Keys, NE Rice, and S. Guymon) to be investigated in this project.