

# PROJECT facts

U.S. DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY  
NATIONAL ENERGY TECHNOLOGY LABORATORY

Sequestration

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## NATURAL ANALOGS FOR GEOLOGIC SEQUESTRATION

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### Background

Large geologic deposits of high-purity carbon dioxide (CO<sub>2</sub>), created entirely by natural geologic processes, occur in many sedimentary basins. They have acted as relatively stable repositories for CO<sub>2</sub> over many thousands of years and prove that geologic sequestration offers a secure, environmentally sound way of storing CO<sub>2</sub>. Most importantly, they provide an excellent natural laboratory in which to study the effects of long-term CO<sub>2</sub> exposure on the reservoir minerals. These conditions cannot be replicated by short term laboratory experiments or geologic sequestration tests. CO<sub>2</sub> fields may be viewed as unique "natural analogs" that can be used to assess crucial aspects of geologic sequestration. These assessments would include: integrity of storage, candidate site screening and selection, and operational safety and efficiency. Thus, these CO<sub>2</sub> deposits offer considerable potential for understanding and publicizing geologic sequestration and can serve to build public confidence in this CO<sub>2</sub> management technique.

At present, five large natural CO<sub>2</sub> fields in the United States provide a total of 25 million tons of carbon dioxide that is injected into oil fields for enhanced oil recovery (EOR). This project will perform a multi-disciplinary geologic engineering study of U.S. CO<sub>2</sub> deposits. The overall objective is to compare the naturally occurring CO<sub>2</sub> reservoirs with the capability of depleted oil and gas fields to securely and economically sequester carbon dioxide.

### Primary Project Goal

The overall goal is to study natural CO<sub>2</sub> fields to document empirically, both to the scientific community and the public at large, the capability of depleted oil and gas fields to sequester carbon dioxide safely and securely. The effort will also investigate long-term reactions between CO<sub>2</sub> and the various minerals in the reservoir and cap rocks.

### Objectives

- Evaluate the safety and security of geologic sequestration
- Adapt specialized CO<sub>2</sub> operations technology to an emerging sequestration industry
- Document analogs for public review

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## PROJECT PARTNERS

Advanced Resources International  
 Kinder Morgan CO<sub>2</sub> Company, Ltd.  
 Ridgeway Petroleum Corporation  
 British Geological Survey  
 NASCENT Project  
 Australian Petroleum Cooperative Research Center

## COST

Total Project Value: \$1,736,390  
 DOE Share: \$1,123,390  
 Non-DOE Share: \$ 613,000

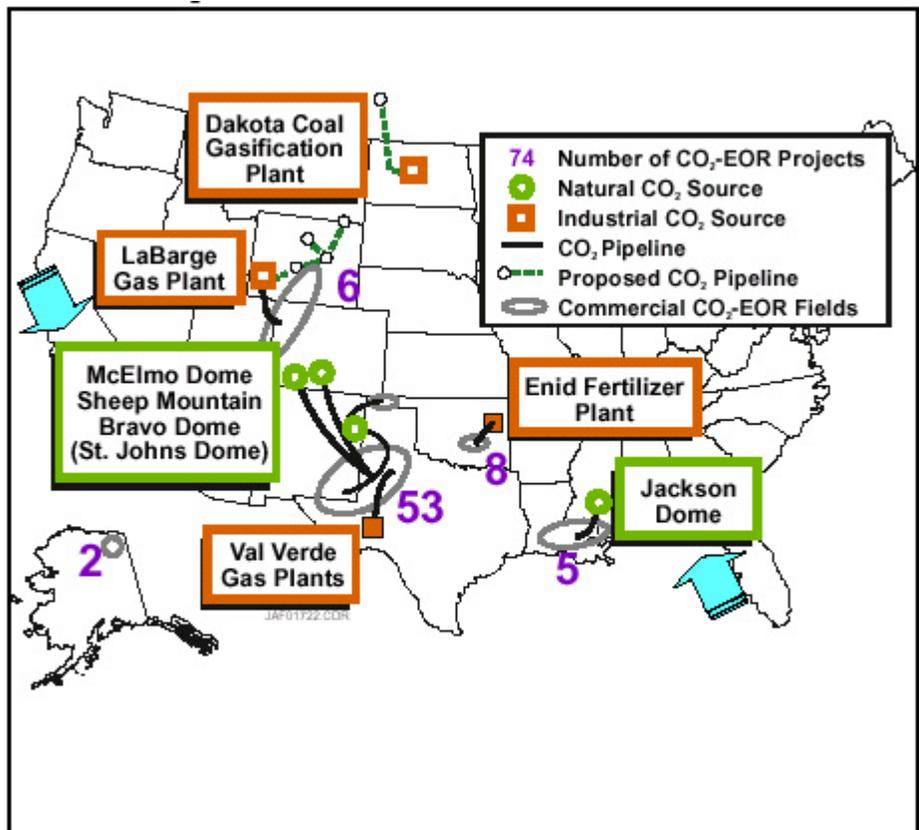
- Evaluation of environmental and safety related factors will be made based on the results of a geochemical analysis of CO<sub>2</sub> impacts and geochemical modeling

## Accomplishments

Literature reviews and collection of geologic and reservoir data have been performed. ARI is about one-third of the way towards completing the first comprehensive analysis of three large natural CO<sub>2</sub> fields: Kinder Morgan's McElmo field in Colorado, Ridgeway's St. Johns Dome in Arizona and New Mexico, and Denbury Resources' Jackson Dome field in Mississippi. Existing well log and other geologic information has been collected and is currently being used to build robust geologic models of the three fields.

## Benefits

This project will provide information that can be used to develop technologies for safe and secure sequestration of CO<sub>2</sub> in natural geologic formations. Furthermore, the project provides an opportunity to study CO<sub>2</sub> sequestration in a non-intrusive manner at natural sites and to obtain data not otherwise obtainable on the long-term effect of CO<sub>2</sub> on mineral strata.



Location of natural CO<sub>2</sub> study sites in the USA and the CO<sub>2</sub> infrastructure for EOR projects