

Quarterly Technical Report

Reactive Multiphase behavior of CO₂ in Saline Aquifers beneath the Colorado Plateau

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ABSTRACT

The six coal fired power plants located in the Colorado Plateau and southern Rocky Mountain region of the U.S. produce 100 million tons of CO₂ per year. Thick sequences of colocated sedimentary rocks represent potential sites for sequestration of the CO₂. Field and laboratory investigations of naturally occurring CO₂-reservoirs are being conducted to determine the characteristics of potential seal and reservoir units and the extent of the interactions that occur between the host rocks and the CO₂ charged fluids. The results are being incorporated into a series of two-dimensional numerical models that represent the major chemical and physical processes induced by injection.

During reporting period covered here (July 1 to September 30, 2003), the main achievements were:

- Preparation for Project Review visit in Salt Lake City by new Project Manager
- Submittal of two scientific papers to a special issue of *Chemical Geology* on CO₂ sequestration
- Set-up of website reporting results of this project
- Publication of summary article in Utah Geological Survey "*Survey Notes*" (circulation of 3000)

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EXECUTIVE SUMMARY

This project is nearing the end of the contracted three year period, and the emphasis during this reporting period has been on data synthesis and technical transfer of results, as specified in the contract deliverables. A major achievement reported from the last quarter were three papers presented at the Second Annual Conference On Carbon Sequestration, held in Alexandria VA on May 5-8. These papers have subsequently been published in the conference CD. In addition to these three papers, two manuscripts have been submitted to a special issue of *Chemical Geology* dealing with geological sequestration. One of these papers describes the geology, hydrology, geochemistry, and extent of water-rock interactions occurring in the natural CO₂ at Springerville-St. Johns, Arizona. Evidence of interactions between naturally occurring CO₂-charged fluids and the reservoir rocks is presented. The second paper presents numerical simulation results of the mobility of CO₂ during injection into an unconfined aquifer on the Colorado Plateau that is not domed shape. The major physical and chemical processes induced by injection are represented by the model. The model predicts that at least 70% of the injected CO₂ will be permanently sequestered.

Two other examples of technical transfer of project results during the reporting period were the installation of a web site for recording project progress:

<http://ugs.utah.gov/emp/co2sequest/index.htm>

and a review article in Utah Geological Survey "Survey Notes" (August, 2003).

The new NETL Program Manager, David Hyman, visited Salt Lake City on August 5-6, 2003, and reviewed all aspects of the project.

EXPERIMENTAL

Not applicable

RESULTS AND DISCUSSION

This project is in its few months, and activities concentrated on wrap-up of deliverables and technical transfer.

The two manuscripts submitted to the special issue of *Chemical Geology* were titled:

Investigations of CO₂ Mobility in Natural Reservoirs Beneath the Colorado Plateau and Southern Rocky Mountains

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2. Utah Geological Survey, Salt Lake City, Utah

and,

Simulation of reactive transport of injected CO₂ on the Colorado Plateau, Utah, USA.

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These two papers are still under review by the journal, and copies will included with the Final Technical Report for this project.

On August 5, 2003, the new Program Manager (David Hyman) visited Salt Lake City in order to review project progress. During this review, presentations were given by Rick Allis, Mike Adams, and Tom Chidsey, and a packet containing copies of papers and reports was submitted. The trip included a visit to the Midway-Heber tufa mounds which are examples of the effects of prolonged outflow of fluids saturated on CO₂.

A web page on the Utah Geological Survey website was set up during the reporting period so that the project results would be more easily accessible. The carbon sequestration site (<http://ugs.utah.gov/emp/co2sequest/index.htm>) include pages on background information about the project, a copy of the project abstract, an overview of results, material from one of the poster displays, a list of publications, and contact information.

The August issue of “*Survey Notes*”, a publication by the Utah Geological Survey that three times a year, contained an article summarizing project results (“Storing Carbon Dioxide beneath the Colorado Plateau, by R.G. Allis; Survey Notes, 35, number 3, pp. 7-8). The article was targeted for the interested lay person, given the readership and circulation (3000).

All deliverables for this project are now considered complete, with the exception of the final Technical Report. Material for this report has already been partially compiled.

CONCLUSIONS

This report largely covers aspects of technical transfer of project results that have followed the Second NETL Conference on Carbon Sequestration in May, 2003. Two manuscripts have been submitted to an international journal for publication, a website specific to this project has been set up, and review article on the project has been published in a local journal that circulates in the Intermountain West.

REFERENCES

References have already been given in the Results Section and will not be repeated here.