PLAINS CO_2 REDUCTION PARTNERSHIP

Quarterly Technical Report

(For the period October 1, 2003, through December 31, 2003)

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ABSTRACT

The PCOR Partnership is off to a very exciting and ambitious start. Task 1 activities have included the planning and execution of an internal kickoff meeting, participation in the DOE's national kickoff meeting, and the planning and execution of the first meeting of the PCOR Partnership at the Energy & Environmental Research Center (EERC). Task 2 activities have focused on developing effective and critical partnerships. A plan has been developed to utilize Dakota Gasification Company's (DGC) experience and data with respect to their participation in the enhanced oil recovery project at Weyburn, Saskatchewan. A solid line of communication has been developed with the Interstate Oil & Gas Compact Commission (IOGCC) for the mutual benefit of the PCOR Partnership and IOGCC's compensatory efforts. Task 3 activities have been focused on developing a foundation of background materials in order to avoid a duplication of efforts and provide the best outreach and educational materials possible. Progress in Task 4, Characterization and Evaluation, has included the development of a database format, the preliminary collection of data regarding CO_2 sources and sinks, and data on the performance and costs for CO_2 separation, capture, and treatment to prepare the fluid for pipeline transportation. Task 5 activities have resulted in a conceptual model for screening and qualitatively assessing sequestration options. Task 5 activities have also been useful in structuring data collection and other activities in Tasks 2, 3, and 5.

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INTRODUCTION

As one of seven Regional Carbon Sequestration Partnerships (RCSPs), the Plains CO_2 Reduction (PCOR) Partnership is working to identify cost-effective CO_2 sequestration systems for the PCOR region and, in future efforts, to facilitate and manage the future demonstration and deployment of these technologies. In this phase of the project, PCOR is characterizing the technical issues, enhancing the public's understanding of CO_2 sequestration, identifying the most promising opportunities for sequestration in the region, and detailing an action plan for the demonstration of regional CO_2 sequestration opportunities. This report summarizes the activities for this reporting period. The activities are broken into five tasks.

Task 1 is Management, Reporting, and Technical Outreach. Task 2 is Deployment Issues and is designed to identify and evaluate technology deployment issues, including regulatory issues, and to facilitate the preparation of Phase II Action Plans. Task 3, Public Education and Outreach, is designed to raise awareness among the public regarding sequestration, one of several means of reducing CO_2 emissions, and provide input for potential Phase II Action Plans. Task 4, Characterization and Evaluation, will compile and assess information on sources, sinks, and options for CO_2 separation and transportation and will develop relational and geographic information system (GIS) databases for housing these data. Task 5 is Modeling and Phase II Action Plans. The goal of Task 5 is to identify promising CO_2 sequestration options in a systematic and objective manner using screen tools and a model.

EXPERIMENTAL

Phase I of the PCOR project is designed to identify promising CO_2 sequestration options for our region. Until the sequestration options are identified, we do not anticipate experimental activities will take place. The experimental portion of this program is scheduled for U.S. Department of Energy's (DOE's) Phase II RCSP program.

RESULTS AND DISCUSSION

Task 1 – Management and Reporting

Task 1 activities for this reporting period were focused on the establishment of the contract, development of a strong partnership team, and kickoff meetings. The following meetings were conducted at the EERC:

- PCOR Partnership Research Kickoff Meeting (October 22, 2003).
- PCOR Partnership Kickoff Meeting (December 11–12, 2003), Figure 1.

Figure 1. The PCOR Partnership kickoff meeting on December 11 and 12, 2003.

- Attendance at the DOE RCSP Kickoff Meeting in Pittsburgh (November 3, 2003).

In addition to these meetings, the PCOR Partnership program presented at the following meetings:

- Carbon Sequestration Strategy Meeting (September 10, 2003) Bismarck, North Dakota.
- North Dakota Petroleum Council's Annual Meeting (September 9–10, 2003) Bismarck, North Dakota.
- Meeting at DGC (October 23, 2003) Beulah, North Dakota.
- Basin Electric Power Cooperative 2003 Annual Meeting Preconference Workshop (November 5, 2003) Bismarck, North Dakota.
- Lignite Research Council Review Meeting (November 25, 2003) Bismarck, North Dakota.

Any materials for these meetings have all been sent to the DOE Contracting Officer's Representative (COR) under separate notification.

Task 2 – Deployment Issues

The goal of Task 2 is to identify and resolve sequestration deployment issues for the PCOR Partnership region, including 1) safety, regulatory, and permitting requirements; 2) public perceptions; 3) ecosystem impacts; and 4) monitoring, measurement, and verification requirements. During this reporting period, PCOR Partnership members met with representatives from DGC to discuss and request information pertaining to the DGC–Weyburn enhanced oil recovery/CO_2 sequestration project. Information sought for Task 2 activities includes safety, regulatory, and permitting requirements for both Canada and the United States, specifically related to transportation; environmental impact statements; public perception issues and resolution; and monitoring, measurement, and verification requirements and activities. Per DGC's request, a detailed list of requested information will be compiled by PCOR Partnership task leaders and provided to DGC for review and response.

Mr. John Harju attended the IOGCC Annual Meeting in Reno, Nevada, October 2003, to discuss the regulatory context of carbon sequestration and coordination of PCOR Partnership efforts with IOGCC. The meeting included discussions with Kevin Bliss (IOGCC), Lynn Helms, (Director, North Dakota Industrial Commission – Oil & Gas Division), Larry Bengal (Director, Illinois Department of Natural Resources, Office of Mines and Minerals, Division of Oil and Gas), Bob Mau (Eagle Operating Inc.), and Ron Ness (North Dakota Petroleum Council). Mr. Harju also discussed the potential participation of Bob Mau, Ron Ness, and others as members of the PCOR Partnership Advisory Committee.

Ongoing activities initiated during this reporting period included literature reviews and the formation of a working group, comprising key stakeholders, to support Task 2 activities.

Task 3 – Public Education and Outreach

Public Education and Outreach activities for this reporting period included 1) involvement in program meetings; 2) the review of critical background documents and preparation of a spreadsheet, background materials, and PowerPoint products as part of an assessment of the PCOR Partnership region; 3) development of a revised work plan including a revised timeline of activities; 4) the initiation of a Working Group contact list; and 5) preparation of a draft fact sheet intended as an introduction to the PCOR Partnership and its role.

Task 3 personnel reviewed a number of background documents for the RCSP program as a basis for planning and outreach materials. These include RCSP print and web-based outreach materials (e.g., "Carbon Sequestration, Media Background Briefing," Frequently Asked Questions on CO_2 Sequestration), the Keystone Center's Climate Change Curriculum prospectus, the Keystone Center's document entitled "Baseline Views on Geologic Carbon Sequestration: Summary of Interviews with NGOs," and DOE National Energy Technology Laboratory's (NETL's) "Carbon Sequestration Technology Roadmap and Program Plan."

Task 3 personnel prepared a spreadsheet, background materials, and PowerPoint products as part of an assessment of the PCOR Partnership region's contributions with respect to the United States overall and with other RCSP regions regarding CO_2 sources, emissions, and historical and projected CO_2 intensity.

With respect to developing a PCOR Partnership Outreach Working Group and a revised work plan, Task 3 personnel produced a draft Outreach Work Plan including a revised timeline of activities and initiated a Working Group contact list.

With respect to outreach materials, Task 3 personnel produced a draft fact sheet intended to introduce the PCOR Partnership and outline its role in DOE's RCSP Program and the region and to stimulate interest of the part of the prospective members of the partnership.

Task 4 – Sources, Sinks, and Infrastructure

Subtask 4.1 – Task Management

Activities under Subtask 4.1 were focused on organizing working groups, assigning specific tasks enumerated under the project work plan, and preparing materials for meetings. The collection and cataloging of relevant literature was initiated, and a reference manager system was established. Key meetings with partners that required travel included:

- Meeting with Environment Canada in Calgary, Alberta, in October. This meeting occurred in conjunction with a conference entitled "CO_2 from Industrial Sources to Commercial Enhanced Oil and Gas Recovery."

- Meeting with DGC in Beulah, North Dakota, in October. The purpose of this meeting was to initiate data collection, particularly with respect to CO_2 capture and separation technologies, pipeline construction specifications, and DGC's participation in the Weyburn CO_2 project.

- Meeting with North Dakota State University (NDSU) in Fargo, North Dakota, in November. The purpose of this meeting was to establish lines of communication between NDSU and the EERC, and to initiate the research activities that will be conducted by NDSU under Subtask 4.3.1.

- Meeting with University of Regina (UR) and Saskatchewan Industry and Resources (SIR) - Exploration and Geological Services in Estevan, Saskatchewan, in November. The purpose of this meeting was to 1) establish contact and discuss potential collaboration with the International Test Center for CO_2 Capture at UR, 2) establish contact and discuss potential collaboration with SIR, and 3) tour the demonstration-scale amine-based separation technology that UR has built to capture CO_2 from flue gas at SaskPower's Boundary coal-fired power plant.

Subtask 4.2 – Characterization of PCOR Regional CO_2 Sources

Activities under Subtask 4.2 were primarily focused on establishing working groups to identify data needs and data sources. The e-GRID and TTN databases were obtained and efforts to evaluate, verify, and validate the data were initiated. Methods for calculating CO_2 emissions for facilities for which emission data were unavailable, incomplete, or otherwise inappropriate for the purpose of PCOR were developed.

Subtask 4.3 – Characterization of PCORP Regional CO_2 Sinks

Activities under Subtask 4.3 were focused on establishing working groups to identify data needs and sources. The gathering of geologic data for North Dakota was initiated, and a variety of data sets related to petroleum exploration and production were obtained from the North Dakota Industrial Commission – Oil and Gas Division. The characterization of the petroleum, saline aquifer, and coal geology of the Williston Basin was also initiated during Quarter 1.

Subtask 4.3.1 – Evaluate Alternative Agricultural and Management Practices

Activities to be conducted by NDSU under Subtask 4.3.1, which is focused on characterization and evaluation of the potential for terrestrial sequestration in the marginally productive, semiarid lands of the western portion of region, were initiated.

Subtask 4.4 – Characterization of PCOR Infrastructure

Activities under Subtask 4.4 were focused on establishing working groups to identify data needs and sources, and the review of performance and costs for CO_2 separation, capture, and treatment to prepare the fluid for pipeline transportation. Highlights for this quarter include the establishment of working relationships with DGC, which has valuable insight and experience with respect to the construction and maintenance of a large-volume, international CO_2 pipeline, and the participation in a breakout session focused on CO_2 infrastructure issues at the "CO_2 from Industrial Sources to Commercial Enhanced Oil and Gas Recovery" conference in Calgary, Alberta.

Task 4.4 data collection included a detailed assessment of data on the performance and costs for CO_2 separation, capture, and treatment to prepare the fluid for pipeline transportation. The data are from publicly available literature. The degree of detail and breadth of information varies widely depending on the nature of the CO_2 source. Areas where little of no public literature was found are obvious targets for future data collection.

Subtask 4.5 – Input for Task 5

No activities were conducted for Subtask 4.5 during Quarter 1. Activities under Subtask 4.5 will not be initiated until substantial amounts of source, sink, and infrastructure data have been collected and evaluated. A GlS housing the data from all activities is currently under development (see Figure 2).

Task 5 – Modeling and Phase II Action Plans

Task 5 activities have focused on the development of a conceptual model which will be used to screen and compare various sequestration options for Phase II demonstration projects. A visual representation of the conceptual model we plan to employ for scenario selection was developed and is presented in Figure 3. We are anticipating the development of several sets of criteria that will be used to screen various sources and sinks on the basis of physical properties. Once we have down-selected sources and sinks on the basis of physical properties, we will develop a series of scenarios based on engineering and scientific judgment. We will then develop

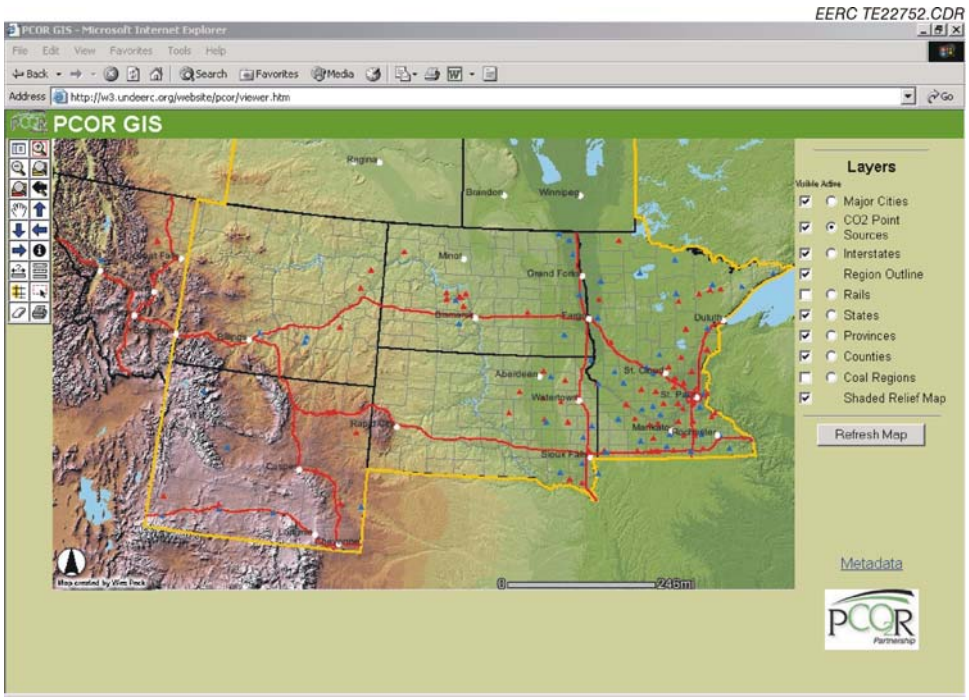

Figure 2. Beta version of the PCOR Partnership GIS System.

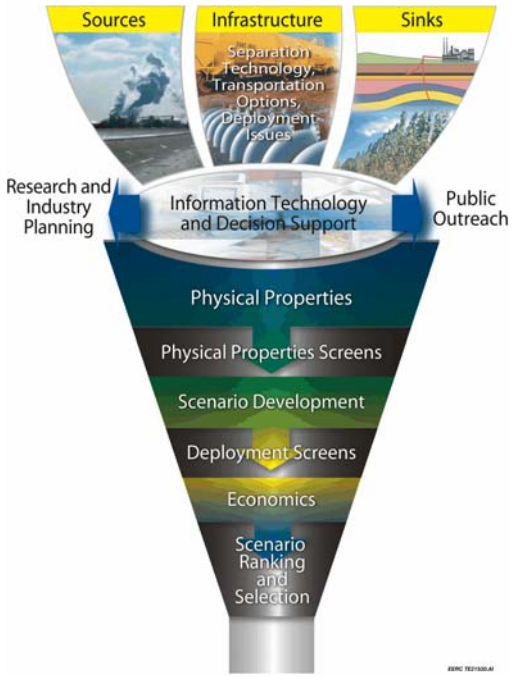

Figure 3. PCOR partnership scenario screening visualization model.

and apply criteria to screen scenarios on the basis of deployment issues. For example, if a scenario involves disturbance of a national park or would result in unacceptable health or environmental risks, it will be screened out. The final step will be to develop ranking criteria and apply a simple model to rank the remaining scenarios. The highest-ranked scenarios will then be proposed as Phase II demonstration activities.

Beyond the conceptual model development, efforts in Task 5 during this reporting period also included interacting with the other task leaders to ensure familiarity with the conceptual model and that those activities would ultimately support the model. This proved to be useful in terms of experimental design and will be an ongoing activity for Task 5.

CONCLUSIONS

During the first 3 months of the PCOR Partnership, the overall program has taken shape and all activities are well underway. The primary focus of the first 3 months was the organization of the program, sponsors, and advisory board; initiation of data gathering; and generation of the initial model variables. The next 3 months will involve a significant amount of data gathering, processing, and presentation, which will initiate the screening of future opportunities/scenarios for carbon sequestration in the region.

REFERENCES

There are no references.