PLAINS CO₂ REDUCTION PARTNERSHIP

Quarterly Technical Report

(for the period October 1–December 31, 2004)

Prepared for:

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PLAINS CO₂ REDUCTION PARTNERSHIP

ABSTRACT

The Plains CO₂ Reduction (PCOR) Partnership continues to make great progress. Task 2 (Technology Deployment) focused on developing information regarding deployment issues to support Task 5 (Modeling and Phase II Action Plans) by providing information to be used to assess CO₂ sequestration opportunities in the PCOR Partnership region. Task 3 (Public Outreach) focused on developing an informational video about CO₂ sequestration. Progress in Task 4 (Sources, Sinks, and Infrastructure) included the continued collection of data regarding CO₂ sources and sinks and data on the performance and costs for CO₂ separation, capture, treatment, and compression for pipeline transportation. Task 5 focused on screening and qualitatively assessing sequestration options. Task 5 activities also continue to be useful in structuring data collection and other activities in Tasks 2, 3, and 5.

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PLAINS CO₂ REDUCTION PARTNERSHIP

EXECUTIVE SUMMARY

The Plains CO₂ Reduction (PCOR) Partnership continues to make great progress. Task 2 (Technology Deployment) focused on developing information regarding deployment issues to support Task 5 (Modeling and Phase II Action Plans) by providing information to be used to assess CO₂ sequestration opportunities in the PCOR Partnership region. Task 3 (Public Outreach) focused on developing an informational video about CO₂ sequestration. Progress in Task 4 (Sources, Sinks, and Infrastructure) included the continued collection of data regarding CO₂ sources and sinks and data on the performance and costs for CO₂ separation, capture, treatment, and compression for pipeline transportation. Task 5 focused on screening and qualitatively assessing sequestration options. Task 5 activities also continue to be useful in structuring data collection and other activities in Tasks 2, 3, and 5.

PLAINS CO₂ REDUCTION PARTNERSHIP
Quarterly Technical Report
October 1–December 31, 2004

INTRODUCTION

As one of seven Regional Carbon Sequestration Partnerships (RCSPs), the Plains CO₂ Reduction (PCOR) Partnership is working to identify cost-effective CO₂ sequestration options for the PCOR Partnership region and, in future efforts, to facilitate and manage the demonstration and deployment of these technologies. In this phase of the project, the PCOR Partnership is characterizing the technical issues, enhancing the public's understanding of CO₂ sequestration, identifying the most promising opportunities for sequestration in the region, and detailing an action plan for the demonstration of regional CO₂ sequestration opportunities. This report summarizes the activities for this reporting period. The activities are organized into five tasks.

Task 1 is titled Management, Reporting, and Technical Outreach. Task 2, Technology Deployment, is designed to identify and evaluate technology deployment and regulatory issues, and to facilitate the preparation of Phase II Action Plans. Task 3, Public Outreach, is designed to raise public awareness regarding CO₂ sequestration and provide input for potential Phase II Action Plans. Task 4, Sources, Sinks, and Infrastructure, focuses on compiling and assessing information on sources, sinks, and options for CO₂ separation and transportation and developing relational and geographic information system (GIS) databases for housing these data. Task 5, Modeling and Phase II Action Plans, aims to systematically and objectively identify promising CO₂ sequestration options using screening tools and a model.

EXPERIMENTAL

Phase I of the PCOR Partnership project is designed to identify promising CO₂ sequestration options for our region. Until the sequestration options are identified, experimental activities will not take place. The experimental portion of this program is scheduled for the U.S. Department of Energy's (DOE's) Phase II RCSP program.

RESULTS AND DISCUSSION

Task 1 – Management, Reporting, and Technical Outreach

Task 1 activities for this reporting period focused on:

- Managing overall project activities.
- Informing stakeholders about DOE's Regional Partnership program and the PCOR Partnership.

- Adding new partners to the PCOR Partnership.
- Holding the October 2004 PCOR Partnership Advisory Board meeting, October 14–15, in Billings, Montana, following the Western Fuels Symposium. The meeting agenda is enclosed. Meeting material was given to the DOE Contracting Officers' Representatives at the meeting.

The PCOR Partnership program presented at the following meetings:

- Western Fuels Symposium, Billings, Montana, (October).
- Regional Carbon Sequestration Partnership Geologic Characterization Working Group Conference, Dallas, Texas, (October).
- Regional Carbon Sequestration Partnership Annual Program Review Meeting, Pittsburgh, Pennsylvania, (November).

Materials for these meetings were sent to the DOE Contracting Officer's Representative (COR) under separate notification.

New members added for this quarter include: Alberta Department of Environment, Alberta Energy & Utilities Board, Alberta Energy Research Institute, Encore Acquisition Company, Great Northern Power Development, Kiewit Mining Group, Manitoba Hydro, SaskPower, and Xcel Energy.

Task 2 – Technology Deployment

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 (MM&V) requirements. Activities conducted during this reporting period included 1) development of measurement, mitigation, and verification strategies for potential geologic and terrestrial carbon storage opportunities in the PCOR Partnership region; 2) participation in the Interstate Oil and Gas Compact Commission Geologic Sequestration Task Force; 3) addition of regulatory information to the PCOR Partnership Web site; 4) participation in the PCOR Partnership Advisory Board meeting in Billings, Montana; and 5) participation in monthly internal PCOR Partnership management and general meetings. Key meetings included the following:

- PCOR Partnership Advisory Board Meeting, Billings, Montana, October 14–15, 2004.

Future activities include continued development of measurement, mitigation and verification strategies for potential sequestration options in the PCOR Partnership region and finalization of the topical and final report(s) for Task 2 activities.

Task 3 – Public Outreach

Public education and outreach for this reporting period included 1) involvement in PCOR Partnership and RCSP program meetings and conference calls as appropriate; 2) the continued review of critical background documents, particularly those focused on gauging public opinion regarding sequestration and communicating risk; 3) updating the public Web site (www.undeerc.org/pcor) as appropriate; 4) development of fact sheets; 5) continued progress on the 30-minute general audience information video; 7) continued progress on outreach research activities; and 8) activities that support DOE's partnership program effort.

Task 3 personnel took part in activities to support RCSP outreach and the program. These activities included taking part in monthly RCSP program outreach conference calls (chaired by Sarah Forbes, National Energy Technology Laboratory [NETL]); reviewing materials; and completing exercises focused on developing a consistent approach to risk communications, including providing a review of the RCSP outreach Q&As.

Activities on Other activities included the following:

- Completed Fact Sheet No. 2 (sequestration background) and No. 3 (Weyburn project).
- Updates were made as needed to the public Web site.
- The Public Opinion activities were revised in response to DOE's request. The PCOR Partnership's outreach work plan originally called for the development of materials to support a public survey that would be undertaken to measure public opinion before and after a public education campaign (i.e., airing of the Prairie Public Television video and publication of a series of newspaper pieces on sequestration in regional newspapers). In early October, the first of two public survey instruments (questionnaires) was sent to DOE for review after having been reviewed internally by EERC personnel. In response to DOE's request, the EERC agreed to do focus groups instead of a public survey. Planning for the focus groups in early spring 2005 is under way.
- Draft newspaper articles of about 750 words regarding general sequestration, terrestrial sequestration, and geologic sequestration were prepared and submitted for internal EERC review. These articles will be ready for DOE review in the next quarter and are intended to be run in regional newspapers at the same time that the video is being aired in early spring 2005.
- Work on the education materials was suspended until the video and public opinion pieces were completed.
- The continued development of a 30-minute, general audience video that would be ready for DOE review in January 2005 and would be aired in early spring 2005. Details include the following:

- Filming for interviews was completed in October, additional filming and film clips were assembled in November and early December, and animation was completed in mid-December.
- Four editing sessions involving EERC and Prairie Public Television (PPTV) personnel were held at the PPTV studios, Fargo, North Dakota.
- EERC reviewed the video on December 21 and recommended final edits which will be completed and ready for EERC final approval in early January, 2005.

Task 4 – Sources, Sinks, and Infrastructure

Subtask 4.1 – Task Management

Activities under Subtask 4.1 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 into the reference-manager system continued. Key meetings with partners that required travel included the following:

- Gave presentation on sequestration opportunities in North Dakota oil fields at CO₂ Sequestration Workshop as part of Western Fuels Symposium in Billings, Montana, October 11, 2004.
- Participated in PCOR Partnership Advisory Board Meeting in Billings, Montana, October 14 and 15, 2004.
- Attended RCSP Geologic Working Group Meeting in Houston, Texas, October 20, 2004.

Subtask 4.2 – Characterization of PCOR Partnership Regional CO₂ Sources

Subtask 4.2 primarily focused on refining the collection of readily available CO₂ source data for the states and provinces in the PCOR Partnership region. Most data were obtained or mathematically derived from the e-GRID and TTN databases.

Subtask 4.3 – Characterization of PCOR Partnership Regional CO₂ Sinks

Subtask 4.3 continued with the acquisition, evaluation, and refinement of data on the geological sinks in the PCOR Partnership region. Significant accomplishments were made toward the development and implementation of a method to quantify the CO₂ storage capacity of carbon sequestration units in the region. Reconnaissance-level estimates of CO₂ storage capacity were generated for selected oil fields in Nebraska and Wyoming. Data sets and maps were compiled to develop sequestration capacity estimates for the Newcastle Formation and the Inyan Kara Group, which are Cretaceous Age sandstone formations that constitute major saline aquifers in the northern Great Plains.

With respect to characterization of the potential for terrestrial sequestration in the PCOR Partnership region, several maps and attendant data sets were integrated into the PCOR Partnership Web site. These maps include land cover and use, land management practices, soil properties, and climate.

Subtask 4.3.1 – Evaluation of Alternative Agricultural and Management Practices

At the Hettinger Research Extension Center (HREC) research plots, the major activities were completed in the third quarter. As the yearly cycle of planting, grazing, harvest, and soil sampling has been completed, plot work has settled into the winter mode.

Most recently, the emphasis has been on the soil science tasks, with a focus on analyzing the soil samples taken last summer, both at the HREC plots and in the broader regional soil survey. A high percentage of the HREC samples have been analyzed. The soils lab staff is working through the samples from the regional survey.

With reference to the agricultural component, a draft topical report analyzing the economic potential for soil carbon sequestration in southwestern North Dakota has been completed. The paper has been reviewed by the North Dakota State University (NDSU) team and delivered to the EERC. A second paper that could be suitable as a topical report is being completed. This document represents an extensive review of literature addressing the economic potential for terrestrial sequestration based on agriculture, forestry, and related land use changes. The scope of the review is nationwide, but with special emphasis on the PCOR Partnership region. A draft of this paper was also delivered to EERC in December.

Subtask 4.3.2 – Carbon Sequestration in Wetlands

U.S. Geological Survey (USGS) and Ducks Unlimited Canada (DUC) partners continued development of the PCOR Partnership prairie wetland carbon sequestration database for estimating the potential of prairie wetlands to sequester atmospheric carbon. To this end, a research planning meeting was held October 18–20, 2004, by the aforementioned partners to discuss data needs for development of this database. As part of this meeting, Robert Gleason, USGS, visited with Rhonda McDougal, DUC, and toured DUC's carbon sequestration study sites. Robert Gleason also gave a presentation on the potential of prairie wetlands to sequester atmospheric carbon.

Preliminary information on the potential of wetlands to sequester atmospheric carbon was summarized in an (EERC) fact sheet and was also presented during the PCOR Partnership advisory meeting held October 14, 2004, in Billings, Montana. Furthermore, Robert Gleason, USGS, and Sharon Clancy, North Dakota Natural Resources Trust, gave a presentation titled “Carbon Sequestration Facts or Fiction,” at the Wells County Winter Show, December 9, 2004, Fessenden, North Dakota. As part of this presentation, Robert Gleason mentioned various carbon related research efforts, including the PCOR Partnership.

Subtask 4.4 – Characterization of PCOR Partnership Infrastructure

Subtask 4.4 focused on identifying data needs and sources and the review of performance and costs for CO₂ separation, capture, treatment, and compression for pipeline transportation. Literature related to CO₂ separation, capture, and transportation continued to be obtained and evaluated.

Subtask 4.5 – Input for Task 5

Subtask 4.5 continued with participation in the development and refinement of an in-house GIS database to manage and utilize the source and sink characterization data obtained under Task 4 and the dissemination of basic source and sink information to the Task 5 working group through a series of internal meetings.

Subtask 4.6 – PCOR Partnership Information Systems

There are significant enhancements to the PCOR Partnership Decision Support System (DSS) this quarter, listed below. In addition, the EERC participated in conference calls with the GIS working group.

Oil and Gas Data

The PCOR Partnership GIS site now has source data for the entire PCOR Partnership region. Reservoir data are available for North Dakota, Montana, Wyoming, Nebraska, South Dakota, Manitoba, and Saskatchewan. Several new thematic maps have been added for oil and gas data. The GIS Help document is now available from the GIS site.

CO₂ Sequestration Calculations

Estimated sequestration capacities are available for oil and gas fields, as well as two new layers: the Wyodak-Anderson Coal Zone and the Madison Saline Aquifer. Users can view the estimation in the data grid, as well as in the detailed report. The basis for the CO₂ sequestration calculations is in a reference document that can also be viewed from the report. Thematic maps based on sequestration estimations have been created.

Regulating CO₂ Sequestration

Documents regarding the current regulatory framework and federal legislation that could affect CO₂ sequestration projects can be viewed through a link from the home page. In addition, links to regulatory agency Web sites within the PCOR Partnership region are available.

Figure 1. CO₂ Sequestration Capacity Estimates can be viewed in the GIS site.

Terrestrial Information

Maps and information related to land use, land resources, climate, and temperature have been added through the Indirect Carbon Sequestration link from the home page.

Products and Presentations

Products that are completed or in the final-draft-to-partners stage can be viewed directly from the Products link on the home page. Advisory Board Meeting presentations and other PCOR Partnership presentations are also available.

Task 5 – Modeling and Phase II Action Plans

During the October–December 2004 quarter, major regional CO₂ sources were matched with geologic sinks to identify the major regional geologic sequestration opportunities. As described in previous quarterly reports, data were gathered regarding more than 1000 CO₂ sources in the region; geologic sinks contained in the PCOR Partnership area; terrestrial sinks, including modified farming practices and wetlands; CO₂ capture and separation technologies, including those in use as well as those under development; transportation options; and deployment issues, including permitting and MM&V. These data were imported into several

Excel spreadsheets. One spreadsheet contains the data for the entire PCOR Partnership region, while the other spreadsheets contain the information specific to a particular state or Canadian province.

The PCOR Partnership region's CO₂ sources were sorted in descending order with respect to the total quantity of CO₂ produced. Sources producing at least 500,000 tons of CO₂/yr contribute 86.2% of the total regional CO₂. More than half of these major sources are coal-fired power plants, which produce 69.22% of the region's CO₂. Other significant sources of CO₂ include wood and paper products factories, ethanol production facilities, cement/clinker production plants, and natural gas processing and transmission sites.

The PCOR Partnership GIS Web site was accessed to view maps showing the sites of the various sources. Whenever several similar source types were located near each other, their proximity to geologic sinks was noted. The sequestration capacity of any nearby sink was compared to the CO₂ output of the group of sources; the target capacity was at least 20 years' worth of the total CO₂ produced by the source(s). In the event that multiple sinks could be utilized for a single group of sources, it was determined that preference would ultimately be given to those sinks producing economic benefit, such as enhanced oil recovery (EOR). The various pairs of geologic sinks and groups of similar CO₂ sources (called scenarios) were compared and similar ones combined to form the following preliminary strategies:

- CO₂ from coal-fired electric power plants (following separation and capture using amine scrubbing) used for EOR, injected into the Madison Saline Aquifer, or injected into the Mission Canyon formation.
- CO₂ produced from natural gas processing and transmission sites in northeastern Wyoming injected into the Wyodak-Anderson coal bed for coal-bed methane production.
- CO₂ produced during ethanol production used for EOR, injected into the Madison Saline Aquifer, or injected into the Mission Canyon Formation.
- CO₂ from paper and wood products factories used for EOR, injected into the Madison Saline Aquifer, or injected into the Mission Canyon Formation.
- CO₂ from cement/clinker production (following separation and capture by amine scrubbing) used for EOR, injected into the Madison Saline Aquifer, or injected into the Mission Canyon Formation.

The strategies that merit demonstration during Phase II will be identified during the next quarter when their preliminary economics are compared.

Close communication with the other PCOR Partnership task leaders continued during update meetings. These discussions ensured that the activities performed in the other tasks support the model and strategy selection.

Task 5 personnel participated in the PCOR Partnership Annual Meeting held in Billings, Montana, October 14 and 15, 2004.

Future Task 5 activities include:

- Preliminary economics will be determined for these regional strategies to rank them relative to each other and to identify the specific strategies that should be demonstrated during Phase II activities.
- A topical report describing the matching and screening protocol, the results of the beta check, and the final regional results will be prepared.

CONCLUSIONS

The PCOR Partnership has made significant progress in all activities. Information gathering for sources and sinks is progressing in tandem with deployment issues and final data modeling. Task 5 activities are now using information from Tasks 2 and 4 to begin the objective evaluation of CO₂ sequestration opportunities.

REFERENCES

There are no references.

POWERPOINT PROJECT SUMMARY

APPENDIX A

University of North Dakota
Energy & Environmental Research Center
Plains CO₂ Reduction Partnership

Project Summary

DE-PS26-O3NT41982

Last Updated: December 31, 2004

National Energy Technology Laboratory

Partnership Objectives

The Plains CO₂ Reduction (PCOR) Partnership is a collaborative regional framework to support the testing and demonstration of CO₂ sequestration technologies in the northern Great Plains of North America.

The PCOR Partnership project incorporates a management task and five performance tasks:

- 1) Project Management, Reporting, and Technical Outreach
- 2) Identification and Resolution of Technology Deployment Issues
- 3) Public Perception and Outreach
- 4) Characterization of Regional Opportunities
- 5) Technology Selection and Action Plans

Plains CO₂ Reduction Partnership

Partners:

- University of North Dakota – Energy & Environmental Research Center (EERC)
- ★ Alberta Department of Environment
- ★ Alberta Energy & Utilities Board
- ★ Alberta Energy Research Institute
- ★ Amerada Hess Corporation
- ★ Basin Electric Power Cooperative
- ★ Bechtel Corporation
- ★ Center for Energy & Economic Development
- ★ Chicago Climate Exchange
- ★ Dakota Gasification Company
- ★ Ducks Unlimited Canada
- ★ Eagle Operating, Inc.
- ★ Encore Acquisition Company
- ★ Environment Canada
- ★ Fischer Oil and Gas, Inc.
- ★ Great Northern Power Development
- ★ Great River Energy
- ★ Interstate Oil and Gas Compact Commission
- ★ Kiewit Mining Group
- ★ Lignite Energy Council
- ★ Manitoba Hydro
- ★ Minnesota Pollution Control Agency
- ★ Minnkota Power Cooperative, Inc.
- ★ Montana–Dakota Utilities Co.
- ★ Montana Department of Environmental Quality
- ★ Montana Public Service Commission
- ★ Natural Resources Trust
- ★ Nexant, Inc.
- ★ North Dakota Department of Health
- ★ North Dakota Geological Survey
- ★ NDIC Oil and Gas Division
- ★ North Dakota Petroleum Council
- ★ North Dakota State University
- ★ Otter Tail Power Company
- ★ Petroleum Technology Research Centre
- ★ Petroleum Technology Transfer Council
- ★ Prairie Public Television
- ★ SaskPower
- ★ Saskatchewan Industry and Resources
- ★ Tesoro Refinery
- ★ University of Regina
- ★ U.S. Geological Survey – Northern Prairie
- ★ Wildlife Research Center
- ★ Western Governors’ Association
- ★ Xcel Energy

Region Covered:

Iowa
Minnesota
Missouri
Montana
Nebraska
North Dakota
South Dakota
Wisconsin
Wyoming
Manitoba
Saskatchewan
Alberta

Partnership Team

Partner Name	City	State	Cong. Dist.
Univ. of North Dakota—Energy & Environmental Research Center (EERC)	Grand Forks	ND	At Large
Amerada Hess Corporation	Williston	ND	At Large
Alberta Department of Environment	Edmonton, Alberta		
Alberta Energy & Utilities Board	Edmonton, Alberta		
Alberta Energy Research Institute	Edmonton, Alberta		
Basin Electric Power Cooperative	Bismarck	ND	At Large
Bechtel Corporation	San Francisco	CA	8
Center for Energy & Economic Development	Alexandria	VA	8
Chicago Climate Exchange	Chicago	IL	7
Dakota Gasification Company	Bismarck	ND	At Large
Ducks Unlimited Canada	Stonewall, Manitoba		
Eagle Operating, Inc.	Kenmare	ND	At Large
Encore Acquisition Company	Fort Worth	TX	12,24
Environment Canada	Manitoba and Saskatchewan Provinces		
Fischer Oil and Gas, Inc.	Grand Forks	ND	At Large
Great Northern Power Development	Townsend	MT	At Large
Great River Energy	Elk River	MN	6
Interstate Oil and Gas Compact Commission (IOGCC)	Oklahoma City	OK	5
Kiewit Mining Group	Decker	MT	At Large
Lignite Energy Council	Bismarck	ND	At Large
Manitoba Hydro	Winnipeg, Manitoba		
Minnesota Pollution Control Agency	St. Paul	MN	4

Partnership Team (cont.)

Partner Name	City	State	Cong. Dist.
Minnkota Power Cooperative, Inc.	Grand Forks	ND	At Large
Montana–Dakota Utilities Co.	Bismarck	ND	At Large
Montana Department of Environmental Quality	Helena	MT	At Large
Montana Public Service Commission	Helena	MT	At Large
Natural Resources Trust	Bismarck	ND	At Large
Nexant, Inc.	San Francisco	CA	8
North Dakota Department of Health	Bismarck	ND	At Large
North Dakota Geological Survey	Bismarck	ND	At Large
NDIC Oil and Gas Division	Bismarck	ND	At Large
North Dakota Petroleum Council	Bismarck	ND	At Large
North Dakota State Univ.	Fargo	ND	At Large
Otter Tail Power Company	Fergus Falls	MN	7
Petroleum Technology Research Centre	Regina, Saskatchewan		
Petroleum Technology Transfer Council	Houston	TX	7
Prairie Public Television	Fargo	ND	At Large
SaskPower	Regina, Saskatchewan		
Saskatchewan Industry and Resources	Regina, Saskatchewan		
Tesoro Refinery	Mandan	ND	At Large
University of Regina	Regina, Saskatchewan		
U.S. Geological Survey – Northern Prairie Wildlife Research Center	Jamestown	ND	At Large
Western Governors Assoc.	Denver	CO	1
Xcel Energy	Golden	CO	7

Partnership Principals

- ***Principal Investigator: Ed Steadman, Energy & Environmental Research Center***
- ***Task Leaders***
 - *Task 1 Management and Reporting – Ed Steadman*
 - *Task 2 Technology Deployment – John Harju*
 - *Task 3 Public Outreach – Dan Daly*
 - *Task 4 Sources, Sinks, and Infrastructure – Jim Sorensen*
 - *Task 5 Modeling – Ed Steadman*
 - *Information Management System – Erin O’Leary*
- ***NETL Project Manager: John Litynski***

Budget

Start Date	End Date	Government Cost	Performer Cost	Total Cost	Cost Share
9/30/03	9/30/05	\$2,266,614	\$803,063	\$3,069,677	26.2%

- DOE Costs to Date: **\$1,443,408**
- Cost Share to Date: **\$370,050**

Highlights of Progress to Date

- **Task 1 Management and Reporting**
 - *The October 2004 PCOR Partnership Advisory Board meeting was held October 14–15 in Billings, Montana, following the Western Fuels Symposium. The meeting was well attended, with 39 representatives, including those from the Energy & Environmental Research Center and 20 partnering companies.*
 - *Presented at and/or participated in the following meetings:*
 - *Western Fuels Symposium, Billings, MT (October)*
 - *Regional Carbon Sequestration Partnership Geologic Characterization Working Group Conference, Dallas, TX (October)*
 - *Regional Carbon Sequestration Partnership Annual Program Review Meeting, Pittsburgh, PA (November)*

Highlights of Progress to Date (cont.)

- **Task 2 – Technology Deployment**
 - *Development of measurement, mitigation, and verification strategies for potential geologic and terrestrial sequestration opportunities in the PCOR Partnership region.*
 - *Addition of regulatory information to the PCOR Partnership Web site.*
 - *Participation in the Interstate Oil and Gas Compact Commission's (IOGCC's) Geological Sequestration Task Force, focused on state regulatory policy.*

Highlights of Progress to Date (cont.)

• Task 3 – Public Outreach

- Fact Sheet No. 2 (sequestration background) and Fact Sheet No. 3 (Weyburn project) finalized
- Updated the public Web site
- Changed from public survey to focus group approach for public opinion work in response to DOE request
- Draft final of sequestration video ready for final internal EERC review
- Drafts of sequestration newspaper articles ready for initial internal EERC review

Highlights of Progress to Date (cont.)

- **Task 4 – Sources, Sinks, and Infrastructure**

- Source data for all states and provinces in the region have been collected and compiled into the GIS database.
- Reconnaissance-level estimates of CO₂ storage capacity of selected oil fields in all states and provinces have been developed. CO₂ capacity has been estimated for over 1500 oil fields in the PCOR Partnership region.
- Reconnaissance-level estimates of CO₂ storage capacity have been developed for the Anderson–Wyodak coal seam of the Wyoming portion of the Powder River Basin.
- Reconnaissance-level estimates of CO₂ storage capacity for the Madison Group saline aquifer have been developed.

Highlights of Progress to Date (cont.)

- **Task 4 – Sources, Sinks, and Infrastructure (cont.)**
 - *Status of source characterization data*

Highlights of Progress to Date (cont.)

- **Task 4 – Sources, Sinks, and Infrastructure (cont.)**
 - *Status of terrestrial sink characterization data*

EERC ES24491.CDR

Highlights of Progress to Date (cont.)

- **Task 4 – Sources, Sinks, and Infrastructure (cont.)**
 - *Status of geological sink characterization data*

EERC ES24490.CDR

Highlights of Progress to Date (cont.)

- **Information Management System**
 - Completed data collection for processed oil and gas reservoir data for the partnership region
 - Created preliminary sequestration capacity estimates
 - Added several new layers, including the Madison Saline Aquifer and the Wyodak–Anderson Coal Bed
 - Developed Web pages for regulatory information
 - Developed thematic maps based on sequestration capacity estimations

Highlights of Progress to Date (cont.)

- **Task 5 – Modeling**

- *Matched source and sink data to identify 13 strategies that offer the best opportunities for geologic sequestration in the PCOR Partnership region. Sources included in these strategies run the gamut from coal-fired power plants to ethanol production to paper and wood product factories. Sinks include oil and gas fields for EOR, injection into saline aquifers for coalbed methane production, and deep injection.*

Project Tasks and Status

Task 1 – Management and Reporting		
Activity	Description	Status
1	Negotiations and contract award	Completed
2	Informational monthly meetings of the task leaders	Ongoing
3	Informational monthly meetings of the “whole” (to include an informal presentation)	Ongoing
4	U.S. Department of Energy quarterly reports and PowerPoint update (quarterly)	Ongoing
5	Technical fact sheets on regional sources, sinks, and candidate sequestration projects	As-needed basis
6	Annual carbon sequestration conference	Completed
7	Advisory committee meeting	Meeting held October 14–15, 2004
8	Advisory meeting comments/statements (to be sent approximately one month after meetings)	Ongoing
9	All meeting and publicly presented materials	As-needed basis
10	DOE Regional Carbon Sequestration Partnership meetings	Future activity

Project Tasks and Status

Task 2 – Technology Development		
Activity	Description	Status
1	Establish working group	Completed
2	Obtain relevant regulations and permitting requirements	Completed
3	Review ecosystem studies; assess environmental impacts	Completed
4	Identify monitoring technologies and existing verification plans	Completed
5	Develop verification strategy	In progress
6	Develop preliminary input for action plan for Phase II	Completed
7	Facilitate preparation of draft Phase II action plan	Future activity

Project Tasks and Status

Task 3 – Public Outreach		
Activity	Description	Status
Working Group		
1	Working group contact list	Completed
2	Outreach/education plan DRAFT	Completed
3	Meeting/conference call (outreach working group)	See 5
4	Outreach/education plan FINAL	In progress
5	Meeting (coincident with fall PCOR Partnership meeting)	Informal discussions at the PCOR Partnership meeting and provided materials to select partners for review
Web Site		
1	Initial	Completed
2	Expanded	Future activity
Fact Sheets		
1	PCOR Partnership description	Completed
2	Weyburn project	Draft final (ready for NETL review)
3	Sequestration basics	Draft final (ready for NETL review)
4	PCOR Partnership sources/sinks indirect	Replaced by other products
5	PCOR Partnership sources/sinks direct	Replaced by other products

Project Tasks and Status

Task 3 – Public Outreach (cont.)		
Activity	Description	Status
Middle School Education Activities		
1	Inventory available curriculum and regional training sessions	In progress
2	Obtain middle school curricula	In progress
3	Curricula outreach	In progress
4	Decisions on other school outreach opportunities	In progress
Public Information Campaign		
1	30-minute Prairie Public Television (PPTV) video	In progress (draft final video ready for final EERC internal review; public release set for early spring 2005)
2	Five-article series on sequestration in major regional newspapers	In progress (Changed to three article set to match with video; public release set for early spring 2005)
3	Assessment of public knowledge	In progress (Changed to focus group approach in response to DOE request; focus groups set for early spring 2005)

Project Tasks and Status

Task 4 – Sources, Sinks, and Infrastructure		
Activity	Description	Status
Task Management and Support		
1	Literature reviews	In progress
Source Characterization		
1	Acquire existing databases	All states and Canadian provinces complete
2	Data collection and reduction	In progress
3	Data entry into PCOR Partnership databases	In progress
Infrastructure Characterization		
1	Acquire existing databases	In progress
2	Data collection and entry	In progress
Sink Characterization		
1	Acquire existing databases	All states complete and Canadian provinces complete
2	Data evaluation and reduction	In progress
3	Data entry into PCOR Partnership databases	In progress
4	Field experiments at Hettinger Research Extension Center	In progress
5	Soil carbon testing	In progress
6	Farm economic simulation model	In progress
7	Carbon sequestration in wetlands	In progress

Project Tasks and Status

Information Management System		
Task	Description	Status
1	Create foundation for geographic information system (GIS) application and database storage	Completed
2	Create and populate databases – Define fields and data types	In progress
3	Refine GIS Web site – Ability to view detailed characterization information – Interactive features for analysis	In progress

Project Tasks and Status

Task 5 – Modeling		
Task	Description	Status
1	Draft of model variables (sources, sinks, and infrastructure)	Completed
2	Second draft of model	Completed
3	Development of preliminary dataset for testing	Completed
4	Alpha version of model	Completed
5	Completion of model assessment of primary action plans/alpha	Completed
6	Beta version of model	Completed
7	Completion of model assessment of primary action plans/beta	Completed
8	Final model results for DOE action plans	In progress

Project Milestones

Milestone	Description	Status
Management, Reporting, and Technical Outreach		
1	Negotiate and award contract	Completed
2	Final report	Future activity
Technology Deployment Issues		
1	Detailed work plan	Completed
2	Final task report	Future activity
3	Input for scenario selection/action plans	In progress
Public Outreach		
1	Detailed work plan	Completed
2	Middle school education materials	In progress
3	30-minute general video	In progress
4	10-minute technology videos	Future activity
Regional Characterization		
1	Detailed work plan	Completed
2	Final task report	In Progress
Data Management, Scenario Selection, and Action Plans		
1	Detailed work plan	Completed
2	Scenario screening	Completed
3	Scenario modeling	Completed
4	Scenario action plans	In progress

Project Recognition

Meetings

- *Western Fuels Symposium, Billings, MT (October)*
- *Regional Carbon Sequestration Partnership Geologic Characterization Working Group Conference, Dallas, TX (October)*
- *Meeting with Prairie Public Television (November)*
- *Regional Carbon Sequestration Partnership Annual Program Review Meeting, Pittsburgh, PA (November)*
- *Meeting with Dakota Gasification Company (December)*
- *Meeting with Ducks Unlimited, Inc. (December)*

Project Deliverables

Deliverable	Description	Status
Management, Reporting, and Technical Outreach		
1	DOE management/PCOR Partnership Project Review Meeting	Ongoing
2	Advisory group meetings	Ongoing
3	PCOR Partnership Web site	In progress
4	Attendance/presentations at technical meetings	Ongoing
5	Technical outreach Web pages	In progress
6	PCOR Partnership meetings/workshops	Ongoing
7	Quarterly reports	Ongoing
Technology Deployment Issues		
1	Workshop background/products	In progress
Public Outreach		
1	Workshop materials	In progress
2	Public survey/assessment	In progress
3	Public outreach Web pages	Completed
Regional Characterization		
1	Workshop materials	In progress
2	Information assessment	In progress
3	Criteria and inputs for scenario selection/action plans	In progress
Data Management, Scenario, Selection and Action Plans		
1	Workshop materials	Ongoing
2	Populated relational/GIS database	In progress

Next Steps

Task 1 Management and Reporting

- *Continue overall project management and reporting.*
- *Seek additional partnership opportunities where appropriate.*

Task 2 Technology Deployment

- *Complete development of MM&V strategies for potential geologic and terrestrial sequestration options in the PCOR Partnership region.*
- *Continue to participate in IOGCC CO₂ Geological Sequestration Task Force.*
- *Continue preparation of final report.*

Next Steps (cont.)

Task 3 Public Outreach

- *Continue participation in RCSP Outreach Working Group conference calls.*
- *Final internal EERC review of draft final video, final changes if needed, provide to DOE for review (plan to air on regional public television in early spring 2005).*
- *Complete education contact list, education forum list, curriculum packet, list of candidate outreach opportunities.*
- *Hold focus group meetings using outreach materials in early spring 2005.*
- *Finalize newspaper articles and contact newspapers with target of early spring 2005.*

Next Steps (cont.)

Task 4 Sources, Sinks, and Infrastructure

- *Incorporate sink-related databases into GIS Web site.*
- *Refine calculation of CO₂ storage capacity for key selected geological sinks in the region.*
- *Obtain or calculate source-related data for gas-processing plants in the region.*
- *Obtain infrastructure databases and map files.*
- *Incorporate information regarding capture and separation technologies into a format compatible with final report.*
- *Summarize baseline data from HREC plots.*
- *Prepare conceptual design of economic analysis model for terrestrial sequestration.*

Next Steps (cont.)

Task 5 Modeling

- *Preliminary economics will be determined for the selected regional strategies to rank them relative to each other.*
- *A report describing the matching/screening protocol, the results of the beta check, and the final regional results will be prepared.*

Information Management Systems

- *Refine CO₂ sequestration estimations*
- *Create data dictionary.*

Upcoming Issues

Task 1 Management and Reporting

- *None*

Task 2 Technology Deployment

- *Ensuring that Advisory Board members are actively engaged in Task 2 discussions, particularly those pertaining to regulatory and permitting issues.*

Task 3 Public Outreach

- *Ensuring scheduling and coordination among public opinion focus groups, newspaper article publication, and video air times on public television.*

Upcoming Issues (cont.)

Task 4 Sources, Sinks, and Infrastructure

- *Sources of pipeline data and maps – commercial vendors and government agencies have different restrictions that must be dealt with – data from government agencies would be best, but may need formal request to come from DOE.*

Task 5 Modeling

- *None*

Information Management Systems

- *None*