

## **PLAINS CO<sub>2</sub> REDUCTION PARTNERSHIP PHASE III**

### **Quarterly Technical Progress Report**

*(for the period January 1 – March 31, 2009)*

*Prepared for:*

Karlene Fine

Industrial Commission of North Dakota  
State Capitol, 14th Floor  
600 East Boulevard Avenue, Department 405  
Bismarck, ND 58505-0840

Agreement Nos. FY08-LX111-162 and G015-030  
EERC Funds 9821–9825

*Prepared by:*

Edward N. Steadman  
John A. Harju  
Lucia Romuld  
James A. Sorensen  
Daniel J. Daly  
Melanie D. Jensen  
Lisa S. Botnen  
Wesley D. Peck  
Steven A. Smith  
Charles D. Gorecki  
Tami Jo Votava  
Stephanie L. Wolfe  
Kim M. Dickman

Energy & Environmental Research Center  
University of North Dakota  
15 North 23rd Street, Stop 9018  
Grand Forks, ND 58202-9018

April 2009

## **NORTH DAKOTA INDUSTRIAL COMMISSION DISCLAIMER**

This report was prepared by the Energy & Environmental Research Center (EERC) pursuant to an agreement partially funded by the Industrial Commission of North Dakota, and neither the EERC nor any of its subcontractors nor the North Dakota Industrial Commission nor any person acting on behalf of either:

- (A) Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or
- (B) Assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method, or process disclosed in this report.

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the North Dakota Industrial Commission. The views and opinions of authors expressed herein do not necessarily state or reflect those of the North Dakota Industrial Commission

## **EERC DISCLAIMER**

**LEGAL NOTICE** This research report was prepared by the EERC, an agency of the University of North Dakota, as an account of work sponsored by the U.S. Department of Energy and the North Dakota Industrial Commission. Because of the research nature of the work performed, neither the EERC nor any of its employees makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement or recommendation by the EERC.

## TABLE OF CONTENTS

LIST OF FIGURES .....	iii
LIST OF TABLES .....	iii
INTRODUCTION .....	1
SUMMARY OF SIGNIFICANT PHASE III ACCOMPLISHMENTS .....	2
Task 1 – Regional Characterization .....	2
Task 2 – Public Outreach and Education .....	3
Task 3 – Permitting and NEPA Compliance .....	3
Task 4 – Site Characterization and Modeling .....	3
Task 5 – Well Drilling and Completion .....	3
Task 6 – Infrastructure Development .....	3
Task 7 – CO <sub>2</sub> Procurement .....	4
Task 8 – Transportation and Injection Operations .....	4
Task 9 – Operational Monitoring and Modeling .....	4
Task 10 – Site Closure .....	4
Task 11 – Postinjection Monitoring and Modeling .....	4
Task 12 – Project Assessment .....	4
Task 13 – Project Management .....	4
Task 14 – Regional Carbon Sequestration Partnership (RCSP) Water Working Group Coordination .....	5
PHASE III PROGRESS OF WORK .....	6
Task 1 – Regional Characterization .....	6
Task 2 – Public Outreach and Education .....	6
Task 3 – Permitting and NEPA Compliance .....	7
Task 4 – Site Characterization and Modeling .....	8
Task 5 – Well Drilling and Completion .....	8
Task 6 – Infrastructure Development .....	8
Task 7 – CO <sub>2</sub> Procurement .....	9
Task 8 – Transportation and Injection Operations .....	9
Task 9 – Operational Monitoring and Modeling .....	10
Task 10 – Site Closure .....	10
Task 11 – Postinjection Monitoring and Modeling .....	10
Task 12 – Project Assessment .....	10
Task 13 – Project Management .....	10
Task 14 – Regional Carbon Sequestration Partnership (RCSP) Water Working Group Coordination .....	11

Continued...

## TABLE OF CONTENTS (continued)

PHASE III COST STATUS.....	11
PHASE III SCHEDULE STATUS .....	11
ACTUAL OR ANTICIPATED PHASE III PROBLEMS OR DELAYS .....	12
Task 1 – Regional Characterization .....	12
Task 2 – Public Outreach and Education .....	12
Task 3 – Permitting and NEPA Compliance.....	12
Task 4 – Site Characterization and Modeling .....	28
Task 5 – Well Drilling and Completion .....	28
Task 6 – Infrastructure Development.....	28
Task 7 – CO <sub>2</sub> Procurement.....	28
Task 8 – Transportation and Injection Operations .....	28
Task 9 – Operational Monitoring and Modeling.....	28
Task 10 – Site Closure .....	28
Task 11 – Postinjection Monitoring and Modeling.....	28
Task 12 – Project Assessment .....	29
Task 13 – Project Management .....	29
Task 14 – Regional Carbon Sequestration Partnership (RCSP) Water Working Group Coordination.....	29
PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES.....	29
Task 1 – Regional Characterization .....	29
Task 2 – Public Outreach and Education .....	29
Task 3 – Permitting and NEPA Compliance.....	29
Task 4 – Site Characterization and Modeling .....	29
Task 5 – Well Drilling and Completion .....	29
Task 6 – Infrastructure Development.....	30
Task 7 – CO <sub>2</sub> Procurement.....	30
Task 8 – Transportation and Injection Operations .....	30
Task 9 – Operational Monitoring and Modeling.....	30
Task 10 – Site Closure .....	30
Task 11 – Postinjection Monitoring and Modeling.....	30
Task 12 – Project Assessment .....	30
Task 13 – Project Management .....	30
Task 14 – Regional Carbon Sequestration Partnership (RCSP) Water Working Group Coordination.....	30
MEETINGS/TRAVEL .....	31
REFERENCES .....	31

## **LIST OF FIGURES**

1	PCOR Partnership Phase III demonstration test sites .....	2
2	PCOR Partnership Phase III, BP3, funding.....	12

## **LIST OF TABLES**

1	Phase III Responsibility Matrix.....	1
2	PCOR Partnership Membership, Phase II/Phase III.....	5
3	Phase III Budget – BP3 .....	11
4	BP3 Spending Plan.....	13
5	Phase III Milestones and Deliverables .....	14
6	PCOR Partnership Phase III BP3 Milestones and Deliverables PCOR Partnership.....	25

**PLAINS CO<sub>2</sub> REDUCTION PARTNERSHIP PHASE III**  
**Quarterly Technical Progress Report**  
**January 1 – March 31, 2009**

**INTRODUCTION**

The Plains CO<sub>2</sub> Reduction (PCOR) Partnership has been established as a U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) Regional Carbon Sequestration Partnership (RCSP). The PCOR Partnership is managed by the Energy & Environmental Research Center (EERC) at the University of North Dakota (UND) in Grand Forks, North Dakota. The PCOR Partnership region includes all or part of nine states (Iowa, Minnesota, Missouri, Montana, Nebraska, North Dakota, South Dakota, Wisconsin, and Wyoming) and four Canadian provinces (Alberta, British Columbia, Manitoba, and Saskatchewan).

Phase III is a 10-year project, in three BPs, running from October 1, 2007, to September 30, 2017. This progress report summarizes the activities for the reporting period (January 1 – March 31, 2009) for Phase III.

The activities for Phase III of the PCOR Partnership include two large-volume sequestration demonstration tests (Figure 1) along with continued regional characterization and outreach. Fourteen tasks will be implemented; see Table 1 for the responsibility matrix.

**Table 1. Phase III Responsibility Matrix**

<b>Phase III Task Description</b>	<b>Responsible Party</b>
Task 1 – Regional Characterization	Wes Peck
Task 2 – Public Outreach and Education	Dan Daly
Task 3 – Permitting and National Environmental Policy Act (NEPA) Compliance	Lisa Botnen
Task 4 – Site Characterization and Modeling	Jim Sorensen
Task 5 – Well Drilling and Completion	Steve Smith
Task 6 – Infrastructure Development	Melanie Jensen
Task 7 – CO <sub>2</sub> Procurement	John Harju
Task 8 – Transportation and Injection Operations	TBA
Task 9 – Operational Monitoring and Modeling	TBA
Task 10 – Site Closure	TBA
Task 11 – Postinjection Monitoring and Modeling	TBA
Task 12 – Project Assessment	Stephanie Wolfe
Task 13 – Project Management	Ed Steadman
Task 14 – Regional Carbon Sequestration Partnership (RCSP) Water Group Coordination	Charles Gorecki



Figure 1. PCOR Partnership Phase III demonstration test sites.

## SUMMARY OF SIGNIFICANT PHASE III ACCOMPLISHMENTS

### Task 1 – Regional Characterization

The Missouri Department of Natural Resources, Division of Geology (MDNR/DGLS) has incorporated National Coal Resources Data System (NCRDS) information for the Mulky, Summit, Lexington, and Mulberry coal seams to previously completed coal seams (Rowe, Drywood, Weir [including the Cainsville and Princeton], Tebo, Mineral, Robinson Branch, Fleming, Croweburg, Bevier, and Wheeler). DGLS data have been combined with NCRDS data to produce raster files depicting depth to coal and thickness of coal for the Rowe, Drywood, Weir (including the Cainsville and Princeton), Tebo, Mineral, Robinson Branch, Fleming, Croweburg, and Bevier coals.

The MDNR/DGLS ran quality control models on assembled U.S. Geological Survey (USGS) and U.S. Environmental Protection Agency (EPA) water quality data for Paleozoic saline formations in the northwestern half of the state. The results of these models pointed out

several outlier points that are being reviewed. In addition to these basic operations, the data have been plotted on Piper plots with some distinct grouping and dilution curves present. These Piper plots will be used to determine groundwater movement routes and where isolated groundwater facies are located.

## **Task 2 – Public Outreach and Education**

During this reporting period, work continued on the Outreach Information System (OIS); work continued on an update of the Web pages for the Phase III demonstrations; a general outreach poster (Deliverable D24) was completed and approved; work continued on materials for classroom use; and arrangements were initiated for an outside review of outreach materials.

## **Task 3 – Permitting and NEPA Compliance**

Since a Williston Basin site has not yet been selected, the permitting and NEPA compliance task for the Williston Basin has focused on collecting general background material. The PCOR Partnership staff has been acting in support of Spectra Energy's permitting efforts for the Fort Nelson demonstration.

Additionally, EERC staff testified at North Dakota legislative hearings regarding the merits of proposed carbon sequestration bills.

## **Task 4 – Site Characterization and Modeling**

During this quarter, work continued on the development of a Project Risk Assessment Plan for the Fort Nelson demonstration. Participants in the Fort Nelson risk assessment have included the EERC, Spectra Energy, and Oxand. Development of Williston Basin Field Validation Test Experimental Design Package (Deliverable D42) continued. Efforts were primarily focused on using well log data and field-based observations to characterize the general geological conditions of an area in southwestern North Dakota that includes several oil fields being considered for CO<sub>2</sub>-based EOR activities under Phase III. With respect to characterization of the Fort Nelson area, the collection and compilation of results from previous efforts to characterize the geology and hydrogeology of the area were initiated.

## **Task 5 – Well Drilling and Completion**

This task will be initiated in Quarter 3 – BP3, Year 2. Once activities are initiated, information pertaining to drilling and completion practices will be documented and communicated through quarterly reports. Much of the information obtained from this activity will be dependent on site-specific plans and communication with the field operator to ascertain the most effective techniques to be used.

## **Task 6 – Infrastructure Development**

Some of the work on this task has been delayed while the plans for CO<sub>2</sub> capture and geologic sequestration for the demonstration projects are finalized. Once the specific CCS strategy for the demonstration project has been finalized, planned task activities related to CO<sub>2</sub>

capture, compression, and pipeline design and routing can begin. In the interim, activities are being undertaken that support the planned effort.

#### **Task 7 – CO<sub>2</sub> Procurement**

Numerous discussions with potential CO<sub>2</sub> suppliers have taken place. Because of the sensitive nature of negotiations, specifics cannot be shared at the present time.

#### **Task 8 – Transportation and Injection Operations**

This task has not begun (begins Quarter 1 – BP4, Year 3). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

#### **Task 9 – Operational Monitoring and Modeling**

This task has not begun (begins Quarter 1 – BP4, Year 3). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

#### **Task 10 – Site Closure**

This task has not begun (begins Quarter 1 – BP5, Year 9). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

#### **Task 11 – Postinjection Monitoring and Modeling**

This task has not begun (begins Quarter 1 – BP5, Year 9). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

#### **Task 12 – Project Assessment**

Project assessment entails the communication and dissemination of all Phase III activities detailed in the quarterly and annual progress reports. The Project Assessment Annual Report (Deliverable D57) was submitted on December 31, 2008.

Work has begun on the PCOR Partnership Continuation Application that is contractually due to DOE on July 31, 2009.

#### **Task 13 – Project Management**

Phase III of the PCOR Partnership started October 1, 2007. Phase II members in good standing are automatically enrolled in Phase III for the first BP that overlaps with the last 2 years of Phase II (October 1, 2007 – September 30, 2009). The membership as of March 31, 2009, is listed in Table 2. Activities in this reporting period include the following:

**Table 2. PCOR Partnership Membership, Phase II/Phase III**

U.S. Department of Energy National Energy Technology Laboratory	Great Northern Power Development, LP	North Dakota Industrial Commission
UND EERC	Great River Energy	Lignite Research, Development and Marketing Program
Abengoa Bioenergy New Technologies	Hess Corporation	North Dakota Industrial Commission
Air Products and Chemicals	Huntsman Corporation	Oil and Gas Research Council
Alberta Department of Energy	Interstate Oil and Gas Compact Commission	North Dakota Natural Resources Trust
ALLETE	Iowa Department of Natural Resources	North Dakota Petroleum Council
Ameren Corporation	Lignite Energy Council	North Dakota State University
American Coalition for Clean Coal Electricity	Manitoba Geological Survey	Otter Tail Power Company
American Lignite Energy (ALE)	Marathon Oil Company	Petroleum Technology Transfer Council
Apache Canada Ltd.	MEG Energy Corporation	Prairie Public Broadcasting
Basin Electric Power Cooperative	Melzer Consulting	Pratt & Whitney Rocketdyne, Inc.
Biorecro AB	Minnesota Power	Ramgen Power Systems, Inc.
Blue Source, LLC	Minnkota Power Cooperative, Inc.	RPS Energy Canada Ltd. – APA
BNI Coal, Ltd.	Missouri Department of Natural Resources	Petroleum Engineering Inc.
British Columbia Ministry of Energy, Mines, and Petroleum Resources	Missouri River Energy Services	Saskatchewan Industry and Resources
Carbozyme, Inc.	Montana–Dakota Utilities Co.	SaskPower
Computer Modelling Group, Inc.	Montana Department of Environmental Quality	Schlumberger
Dakota Gasification Company	National Commission on Energy Policy	Shell Canada Energy
Ducks Unlimited Canada	Natural Resources Canada	Spectra Energy
Ducks Unlimited, Inc.	Nebraska Public Power District	Strategic West Energy Ltd.
Eagle Operating, Inc.	Nexant, Inc.	Suncor Energy Inc.
Eastern Iowa Community College District	North American Coal Corporation	TAQA NORTH, Ltd.
Enbridge Inc.	North Dakota Department of Commerce	TGS Geological Products and Services
Encore Acquisition Company	Division of Community Services	University of Alberta
Energy Resources Conservation Board/ Alberta Geological Survey	North Dakota Department of Health	U.S. Geological Survey Northern Prairie Wildlife Research Center
Environment Canada	North Dakota Geological Survey	Weatherford Advanced Geotechnology
Excelsior Energy Inc.	North Dakota Industrial Commission	Western Governors' Association
Fischer Oil and Gas, Inc.	Department of Mineral Resources, Oil and Gas Division	Westmoreland Coal Company
		Wisconsin Department of Agriculture, Trade and Consumer Protection
		Xcel Energy

- A Risk Management Plan (RMP) outline is due within BP3. An initial draft of the RMP has been started. The risk management database research has also begun; initial contact has been made with consulting services.
  - Work has begun on the risk management activities for the Fort Nelson field demonstration.
- All products required for submission during this reporting period were met.
- Current and pending CO<sub>2</sub>-related projects within the PCOR Partnership region are numerous and dynamic. To better inform our partners, a Web site is presently being developed to exhibit CO<sub>2</sub> projects by location, parties involved, and Web site links to learn more about them.
- Work is under way to provide our partners with a topical report on past, present, and future carbon market activities.

#### **Task 14 – Regional Carbon Sequestration Partnership (RCSP) Water Working Group Coordination**

The WWG is coming together; most of the participants to the WWG have been selected. The first of the monthly conference calls has not yet begun, but the first one will begin on schedule during the month of April. The first milestone for this task entitled “M21: Outline on

the Nexus of Carbon Capture and Storage and Water” was completed and turned into DOE and the WWG participants for comment. The first Annual WWG Meeting has been set for May 7, 2009, from 12:30 to 5:00 p.m. in the Waterfront Room at the Sheraton Square Hotel in Pittsburgh, Pennsylvania.

## **PHASE III PROGRESS OF WORK**

### **Task 1 – Regional Characterization**

The Regional Characterization task entails the review, characterization, and update of the PCOR Partnership region’s CO<sub>2</sub> sinks and sources for inclusion in the DSS. Activities in this reporting period include the following:

- During this quarter the MDNR/DGLS incorporated NCRDS information for the Mulky, Summit, Lexington, and Mulberry coal seams which were added to previously completed coal seams (Rowe, Drywood, Weir [including the Cainsville and Princeton], Tebo, Mineral, Robinson Branch, Fleming, Croweburg, Bevier, and Wheeler). DGLS data have been combined with NCRDS data to produce raster files depicting depth to coal and thickness of coal for the Rowe, Drywood, Weir (including the Cainsville and Princeton), Tebo, Mineral, Robinson Branch, Fleming, Croweburg, and Bevier coals. Progress will continue during the next quarter as the data that have been gathered are used to generate raster files depicting depth to and thickness of the remaining coal seams.
- The MDNR/DGLS ran quality control models on assembled USGS and EPA water quality data for Paleozoic saline formations in the northwestern half of the state. The results of these models pointed out several outlier points that are being reviewed. In addition to these basic operations, the data have been plotted on Piper plots with some distinct grouping and dilution curves present. These Piper plots will be used to determine groundwater movement routes and where isolated groundwater facies may be located.
- A major remodel of the PCOR Partnership DSS continues. This redesign incorporates the DPRS. The DPRS is a Web-based interface designed to provide structured access to data by all demonstration participants and other partners to facilitate communication and interpretation of these data and to allow for efficient replication of additional or related demonstration projects.
- Contacts are being established to put a subcontract into place with the Nebraska Geological Survey and/or the Nebraska Oil and Gas Commission to aid in the assessment of carbon sequestration opportunities in that state.

### **Task 2 – Public Outreach and Education**

Task 2 will provide stakeholders and the general public with information on sequestration methods, opportunities, and developments, including updates on the demonstration projects. Activities in this reporting period include the following:

- Efforts continued to populate the OIS, which will contain a record of outreach activities as well as provide a basis for assessing audience exposure to outreach activities. Demographic information was ordered for the Canadian portion of the region, and a draft map was created for public television coverage in the region.
- B-roll (footage of landscapes and facilities) and interviews with in-house personnel were obtained using the prosumer-grade videocamera obtained over the summer. The footage obtained is intended for Web applications.
- Work was continued on an education packet on sequestration in the region to be made available to teachers in spring 2009. In related activities, teachers were identified who would be willing to review the education packet; materials were initiated for presentations for the June 2009 Lignite Energy Council Teacher Seminar in Bismarck, North Dakota, and the Petroleum Research Council Teacher Seminar in Bismarck, North Dakota, and initial arrangements were made for the Keystone Center climate change curriculum teacher training workshop to be held in Omaha, Nebraska, in late July of 2009.
- Work was initiated on Web pages to house the more than 40 video clips (Deliverable D20) that are in review at NETL. The clips were submitted for review in December 2008.
- A general outreach poster featuring the PCOR Partnership sequestration sites in the region as well as general information on sequestration options was submitted to NETL on schedule and approved with minor modifications.
- Arrangements were initiated for an outside audit by The Goodman Group of the PCOR Partnership outreach materials.
- A draft of the Fort Nelson fact sheet (Deliverable D16) was initiated.
- In addition, members of the outreach team took part in the monthly conference calls and related activities of the Outreach Working Group.

### **Task 3 – Permitting and NEPA Compliance**

The goal of Task 3 is to obtain all the permits and approvals needed to comply with state, provincial, and federal requirements. Activities for the reporting period included the following:

- Various state, provincial, and regional GHG reduction and CCS initiatives are being tracked and analyzed.
- An update to the regulatory section of the DSS is under development.
- Legislative actions occurring in Congress continue to be followed and reviewed for any implications relating to carbon capture and storage.
- Recent publications relating to regulating CO<sub>2</sub> sequestration and MMV issues continue to be reviewed.
- Analysis of carbon market strategies continues.
- Frequent updates are provided to task leaders with regard to federal, state, and provincial actions.
- EERC staff testified at North Dakota Senate and House hearings regarding the merits of a proposed carbon sequestration bill.
- Actions by the province of British Columbia are continually monitored for the effect they may have on the Fort Nelson demonstration project.

#### **Task 4 – Site Characterization and Modeling**

Task 4 is focused on evaluating the effectiveness of large-scale CO<sub>2</sub> sequestration in geological formations at two different sites. The first site will examine CO<sub>2</sub> sequestration in conjunction with EOR operations in a deep carbonate reservoir in the Williston Basin. The second will examine CO<sub>2</sub> sequestration in a carbonate brine-saturated formation basin in northwestern Canada. Characterization activities for the reporting period included:

- Completion of a petrophysical model of hydrocarbon systems in the Dickinson study area of the Williston Basin.
- Updating the oil field data in the DSS continued. Information for the state of North Dakota has been completely updated. Work continues with relevant agencies in other states and provinces to facilitate the updating process.
- Estimates of storage capacity of several saline formation systems in the Williston Basin northeastern flank area of North Dakota, Manitoba, and Saskatchewan were finalized.
- Development of the MMV plan for the Fort Nelson demonstration continued. Efforts were focused on developing a risk management plan for the injection portion of the Fort Nelson CCS project. The results of the risk assessment which is conducted as part of the risk management plan will be used to determine the key MMV activities necessary to manage and mitigate risk and to finalize the MMV Plan for the Fort Nelson CCS project.

#### **Task 5 – Well Drilling and Completion**

Task 5 will develop the engineering designs for the installation of necessary injection, production, and monitoring wells. This task has not begun (begins Quarter 3 – BP3; Year 2). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

#### **Task 6 – Infrastructure Development**

During the course of Task 6 activities, the infrastructure associated with the capture, dehydration, compression, and pipeline transportation required for moving the CO<sub>2</sub> from the source to the oil field will be developed. Until the details of the demonstration project have been developed, ancillary activities are being performed in support of the infrastructure development efforts.

At the request of some PCOR Partnership members, Skyonic's SkyMine and Clean Energy Systems' power generation/CO<sub>2</sub> capture technology processes were evaluated, the role of potassium carbonate in CO<sub>2</sub> capture was summarized, and the additives used in the Econamine FG process were researched.

In response to another partner request, the cost, infrastructure, and permitting requirement for truck-loading CO<sub>2</sub> were summarized in a short document. A second document was prepared specifically dealing with truck-loading CO<sub>2</sub> captured from an ethanol plant.

A PowerPoint presentation was prepared on the topic of carbon capture during hydrogen production. The PCOR Partnership project manager presented the information at a hydrogen production conference.

New capture technologies are being researched and summarized for inclusion in the updated CO<sub>2</sub> capture technologies value-added topical report that will be prepared during the April–June quarter.

A gas scrubbing model was evaluated with respect to its applicability/usefulness to the PCOR Partnership program and members. It appears that it will be a useful tool for determining applicability of gas scrubbing to the CO<sub>2</sub> streams from the various PCOR Partnership sources and providing information that can be used to better estimate the cost of this type of process.

Argonne National Laboratory's GREET model was downloaded and an evaluation of the model begun. The model may be useful in determining the CO<sub>2</sub> footprint associated with the entire ethanol production process from field preparation and seeding to production at an ethanol plant and even to use as a transportation fuel.

Ramgen has begun work on the detailed planning and demonstration unit design in preparation for a demonstration at a power plant. In November 2008, Ramgen entered into a partnership with Dresser-Rand Group, Inc., a U.S.-based compressor manufacturer. This collaboration has resulted in two significant enhancements to the CO<sub>2</sub> Rampressor development plan. The first is an increase in the planned size of the demonstration unit by roughly fourfold. This will reduce the time to commercial introduction by an estimated 2 years. The second enhancement is the ability to test the CO<sub>2</sub> Rampressor at Dresser-Rand's test facility in Olean, New York. One of the most flexible and sophisticated in the world, this facility will permit testing to be performed with greater control, reduced risk, and more quickly than would otherwise be possible. During this quarter, Ramgen has focused on the conceptual design of the demonstration unit and has been working to identify any facility and interface issues that may impact the demonstration as well as the facility requirements for the installation of the demonstration unit.

### **Task 7 – CO<sub>2</sub> Procurement**

This task involves the documentation of the procedures to procure CO<sub>2</sub> for EOR activities. Numerous discussions with potential CO<sub>2</sub> suppliers have taken place. Because of the sensitive nature of negotiations, specifics cannot be shared at the present time.

### **Task 8 – Transportation and Injection Operations**

This task will consist of monitoring and documenting commercial partner activities related to the CO<sub>2</sub> pipeline for leaks and corrosion, as well as performing inspections and security checks. This task has not begun (begins Quarter 1 – BP4, Year 3). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

## **Task 9 – Operational Monitoring and Modeling**

Task 9 will develop site characterization, modeling, and monitoring for the Williston Basin and Fort Nelson test sites. This task has not begun (begins Quarter 1 – BP4, Year 3). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

## **Task 10 – Site Closure**

Task 10 will require research to be conducted with regard to those site closure practices and procedures that would be applicable for this type of operation. This task has not begun (begins Quarter 1 – BP5, Year 9). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

## **Task 11 – Postinjection Monitoring and Modeling**

Postinjection monitoring and modeling will use the data generated by the site characterization and monitoring activities to provide the technical basis for the formal establishment of carbon credits that are directly linked to the volume of CO<sub>2</sub> injected into the site and a third-party carbon-trading entity to validate and ultimately monetize the credits derived for the Phase III tests. This task has not begun (begins Quarter 1 – BP5, Year 9). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

## **Task 12 – Project Assessment**

Task 12 entails the evaluation of Phase III project progress, accomplishments, and goals. Project assessment was conducted for all 13 Phase III tasks for October 1, 2007 – September 30, 2008, and was illustrated in the project assessment annual report (Deliverable D57). The report was submitted on December 31, 2008. The next project assessment report is due December 31, 2009.

## **Task 13 – Project Management**

Project management involves the development and distribution of required project reports, as well as overall project management duties. The project manager (PM) and task leaders meet on a monthly basis to report the progress of their tasks and discuss any issues and corrective actions necessary. Task leaders are also responsible to communicate and keep track of any subcontractors they may have in their respective tasks. Task leaders are also responsible to provide the PM with written weekly updates. These updates include highlights (including trip reports), issues (i.e., budget, staffing, technical issues, etc.), opportunities, and travel plans. The monthly updates can be found on the PCOR Partnership DSS homepage. During the January – March 2009 quarter, the following activities were performed:

- The deliverable entitled “D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report” was submitted to DOE for approval on January 30, 2009.

- On December 5, 2008, a Phase III add-on proposal (EERC Proposal No. 2009-0121) was submitted to DOE. These activities include the addition of Task 14 – RCSP Water Working Group Coordination. The PCOR Partnership has been asked to lead this working group as an add-on to the Phase III funding. Please see Phase III, Task 14, in this report for more information.
- The North Dakota Oil and Gas Research Council held a meeting with the PCOR Partnership on February 4, 2009, in Bismarck, North Dakota, to discuss the Washburn study, the Phase II Lignite Field Validation Test, and the Phase II and III Williston Basin Test.

#### **Task 14 – Regional Carbon Sequestration Partnership (RCSP) Water Working Group Coordination**

Most of the participants to the WWG have been selected, with the exception of a participant from the Big Sky Carbon Sequestration Partnership and the Midwest Geological Sequestration Consortium.

- The first milestone for this task entitled “M21: Outline on the Nexus of Carbon Capture and Storage and Water” was completed and turned into DOE and the WWG participants for comment.
- The first annual WWG meeting has been set for May 7, 2009, from 12:30 to 5:00 p.m. in the Waterfront Room at the Sheraton Square Hotel in Pittsburgh, Pennsylvania.

### **PHASE III COST STATUS**

The approved BP3 budget along with actual costs incurred and in-kind cost share reported is shown in Table 3. An expected spending plan by quarter of cash funds for BP3 is provided in Figure 2 and Table 4.

### **PHASE III SCHEDULE STATUS**

Because negotiations are ongoing and still uncertain for our partners in the Williston Basin demonstration, various deliverables and milestones have been extended and approved by DOE. See Table 5 for a listing of all deliverables and milestones by quarter, with completion dates, for the duration of the project. See Table 6 for project milestones and deliverables (Gantt chart) for BP3.

**Table 3. Phase III Budget – BP3**

<b>Organization</b>	<b>Approved Budget</b>	<b>Actual Costs Incurred</b>
DOE Share – Cash	\$5,300,000	\$2,271,339
Nonfederal Share – Cash	\$2,808,847	\$814,785
Nonfederal Share – In-Kind	\$5,577,212	\$42,932
<b>Total</b>	<b>\$13,686,059</b>	<b>\$3,129,056</b>

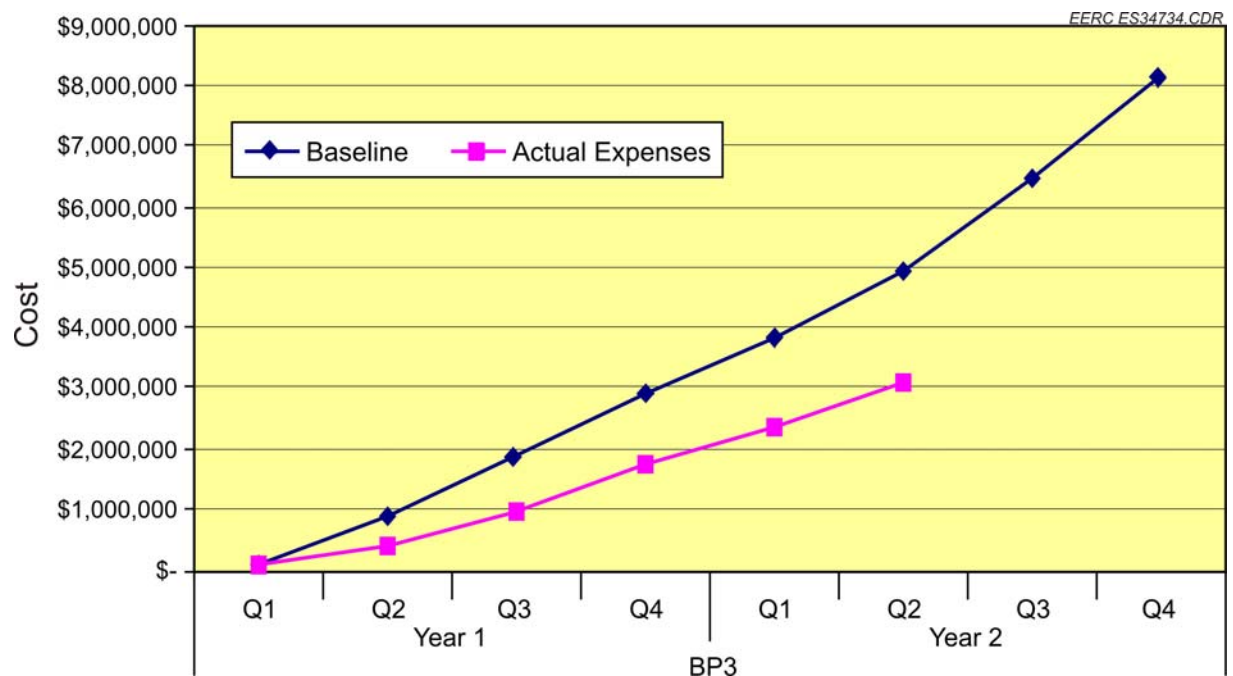


Figure 2. PCOR Partnership Phase III, BP3, funding (cash only).

## ACTUAL OR ANTICIPATED PHASE III PROBLEMS OR DELAYS

### Task 1 – Regional Characterization

Nothing to note at this time.

### Task 2 – Public Outreach and Education

As stated in the schedule status section of this report, the PCOR Partnership is still seeking a specific location for the Williston Basin demonstration site and is currently waiting for information from a participating partner. As a result, Deliverable D15 (Williston Basin test Fact sheet) and Deliverable D18 (Williston Basin test PowerPoint) will be conceptual in nature and will be revised as the demonstration develops.

### Task 3 – Permitting and NEPA Compliance

As stated in the schedule status section of this report, because negotiations are ongoing and still uncertain for PCOR Partnership partners in the Williston Basin demonstration, attendant deliverables and milestones were approved for extension by DOE.

**Table 4. BP3 Spending Plan**

Baseline Reporting Quarter	Year 1								Year 2							
	Q1		Q2		Q3		Q4		Q1		Q2		Q3		Q4	
	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total
<b>Baseline Cost Plan</b>																
Federal Share	\$ 88,728	\$ 88,728	\$ 318,976	\$ 407,704	\$ 510,620	\$ 918,324	\$ 600,000	\$ 1,518,324	\$ 567,251	\$ 2,085,575	\$ 756,335	\$ 2,841,911	\$ 1,134,503	\$ 3,976,413	\$ 1,323,587	\$ 5,300,000
Non-Federal Share	\$ -	\$ -	\$ 467,179	\$ 467,179	\$ 467,180	\$ 934,359	\$ 467,180	\$ 1,401,539	\$ 351,827	\$ 1,753,366	\$ 351,827	\$ 2,105,193	\$ 351,827	\$ 2,457,020	\$ 351,827	\$ 2,808,847
Total Planned	\$ 88,728	\$ 88,728	\$ 786,155	\$ 874,883	\$ 977,800	\$ 1,852,683	\$ 1,067,180	\$ 2,919,863	\$ 919,078	\$ 3,838,941	\$ 1,108,162	\$ 4,947,104	\$ 1,486,330	\$ 6,433,433	\$ 1,675,414	\$ 8,108,847
<b>Actual Incurred Cost</b>																
Federal Share	\$ 88,728	\$ 88,728	\$ 318,976	\$ 407,704	\$ 510,620	\$ 918,324	\$ 597,684	\$ 1,516,008	\$ 390,254	\$ 1,906,262	\$ 365,077	\$ 2,271,339				
Non-Federal Share	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 204,037	\$ 204,037	\$ 261,465	\$ 465,502	\$ 349,283	\$ 814,785				
Total Incurred Cost	\$ 88,728	\$ 88,728	\$ 318,976	\$ 407,704	\$ 510,620	\$ 918,324	\$ 801,721	\$ 1,720,045	\$ 651,719	\$ 2,371,764	\$ 714,360	\$ 3,086,124				
<b>Variance</b>																
Federal Share	\$ (0)	\$ (0)	\$ (0)	\$ (0)	\$ (0)	\$ (0)	\$ 2,316	\$ 2,316	\$ 176,997	\$ 179,313	\$ 391,258	\$ 570,572				
Non-Federal Share	\$ -	\$ -	\$ 467,179	\$ 467,179	\$ 467,180	\$ 934,359	\$ 263,143	\$ 1,197,502	\$ 90,362	\$ 1,287,864	\$ 2,544	\$ 1,290,408				
Total Variance	\$ (0)	\$ (0)	\$ 467,179	\$ 467,179	\$ 467,180	\$ 934,359	\$ 265,459	\$ 1,199,818	\$ 267,359	\$ 1,467,177	\$ 393,802	\$ 1,860,980				

**Table 5. Phase III Milestones and Deliverables**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 1 – Quarter 1 (October–December 2007)</b>		
M17: Task 4 – Fort Nelson Test Site Selected	12/31/07	12/28/07
D37: Task 4 – Fort Nelson Test Site – Site Geological Characterization Experimental Design Package	12/31/07	12/28/07
D63: Task 13 – Project Management Plan	12/31/07	12/28/07
<b>Year 1 – Quarter 2 (January–March 2008)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/08	1/31/08
D38: Task 4 – Fort Nelson Test Site – Geomechanical Experimental Design Package	1/31/08	1/31/08
M1: Task 1 – Three Target Areas Selected for Detailed Characterization	3/31/08	3/20/08
M18: Task 4 – Fort Nelson Test Site Geochemical Work Initiated	3/31/08	3/19/08
D11: Task 2 – Outreach Plan	3/31/08	3/31/08
D30: Task 4 – Williston Basin Test Site – Geomechanical Experimental Design Package	3/31/08	3/31/08
D27: Task 3 – Environmental Questionnaire – Fort Nelson Test Site	3/31/08	4/2/08
<b>Year 1 – Quarter 3 (April–June 2008)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/08	4/30/08
D14: Task 2 – General Phase III Fact Sheet	4/30/08	4/30/08
D17: Task 2 – General Phase III Information PowerPoint Presentation	5/30/08	5/30/08
M3: Task 3 – Start Environmental Questionnaire for Williston Basin Test Site	6/30/08	6/27/08
M6: Task 4 – Williston Basin Test Site Geochemical Work Initiated	6/30/08	6/30/08
M7: Task 4 – Williston Basin Test Site Geological Characterization Data Collection Initiated	6/30/08	6/30/08
<b>Year 1 – Quarter 4 (July–September 2008)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/08	7/31/08
D12: Task 2 – Demonstration Web Pages on the Public Site	7/31/08	7/31/08
M2: Task 1 – Demonstration Project Reporting System (DPRS) Prototype Completed	9/30/08	9/26/08
D1: Task 1 – Review of Source Attributes	9/30/08	9/26/08
<b>Year 2 – Quarter 1 (October–December 2008)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/08	10/31/08
D20: Task 2 – Documentary Support to PowerPoint and Web Site	12/31/08	12/31/08
D57: Task 12 – Project Assessment Annual Report	12/31/08	12/31/08

Continued...

**Table 5. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 2 – Quarter 2 (January–March 2009)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/09	1/30/09
M21: Task 14 – Outline of White Paper on Nexus of CO <sub>2</sub> Capture and Sequestration (CCS) and Water, Part Subtask 14.2 – White Paper on Nexus of CCS and Water	2/27/09	2/27/09
D24: Task 2 – PCOR Partnership Region Sequestration General Poster	3/31/09	3/31/09
<b>Year 2 – Quarter 3 (April–June 2009)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/09	
D2: Task 1 – First Target Area Completed	5/29/09	
D16: Task 2 – Fort Nelson Test Site Fact Sheet	5/29/09	
M4: Task 4 – Williston Basin Test Site Selected	6/30/09	
M5: Task 4 – Data Collection Initiated for Williston Basin Test Site	6/30/09	
<b>Year 2 – Quarter 4 (July–September 2009)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/09	
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation	7/31/09	
D28: Task 3 – Environmental Questionnaire – Williston Basin Test Site	7/31/09	
D67: Task 4 – Fort Nelson Test Site – Simulation Report	7/31/09	
D29: Task 3 – Permitting Action Plan	9/30/09	
M9: Task 4 – Williston Basin Test Site B – Version Geological Model Development Initiated	9/30/09	
D15: Task 2 – Williston Basin Test Site Fact Sheet	9/30/09	
D9: Task 1 – Updated DSS	9/30/09	
D1: Task 1 – Review of Source Attributes	9/30/09	
D3: Task 1 – Permitting Review – One State and One Province	9/30/09	
D40: Task 4 – Fort Nelson Test Site – Geomechanical Final Report	9/30/09	
D47: Task 6 – Topical Report on the Preliminary Design of Advanced Compression Technology	9/30/09	
D65: Task 4 – Fort Nelson Test Site – Site Characterization Report	9/30/09	
D77: Task 13 – Risk Management Plan Outline	9/30/09	

Continued...

**Table 5. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 3 – Quarter 1 (October–December 2009)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/30/09	
D18: Task 2 – Williston Basin Test Site PowerPoint Presentation	10/30/09	
M14: Task 4 – Williston Basin Test Site Geological Characterization Data Collection Completed	12/31/09	
M13: Task 4 – Williston Basin Test Site B – Version Geological Model Development Completed	12/31/09	
M15: Task 4 – Williston Basin Test Site Baseline Hydro B – Model Completed	12/31/09	
D31: Task 4 – Williston Basin Test Site – Geological Characterization Experimental Design Package	12/31/09	
D41: Task 4 – Fort Nelson Test Site – Geochemical Final Report	12/31/09	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	12/31/09	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	12/31/09	
D57: Task 12 – Project Assessment Annual Report	12/31/09	
<b>Year 3 – Quarter 2 (January–March 2010)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/10	
D11: Task 2 – Outreach Plan	3/31/10	
D32: Task 4 – Williston Basin Test Site – Geomechanical Final Report	3/31/10	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	3/31/10	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	3/31/10	
M8: Task 4 – Williston Basin Test Site Wellbore Leakage Data Collection Initiated	3/31/10	
<b>Year 3 – Quarter 3 (April–June 2010)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/10	
D13: Task 2 – Public Site Updates	6/30/10	
D17: Task 2 – General Phase III Information PowerPoint Presentation	6/30/10	
D18: Task 2 – Williston Basin Test Site PowerPoint Presentation	6/30/10	
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation	6/30/10	
D25: Task 2 – Williston Basin Test Site Poster	6/30/10	
D33: Task 4 – Williston Basin Test Site – Geochemical Final Report	6/30/10	
D34: Task 4 – Williston Basin Test Site – Baseline Hydrogeological Final Report	6/30/10	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	6/30/10	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	6/30/10	

Continued...

**Table 5. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 3 – Quarter 4 (July–September 2010)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/10	
D70: Task 4 – Fort Nelson Test Site – Best Practices Manual – Simulation Report	8/31/10	
M16: Task 4 – Williston Basin Test Site Final Geological Model Development Completed	9/30/10	
D1: Task 1 – Review of Source Attributes	9/30/10	
D10: Task 1 – Demonstration Project Reporting System Update	9/30/10	
D26: Task 2 – Fort Nelson Test Site Poster	9/30/10	
D35: Task 4 – Williston Basin Test Site – Best Practices Manual – Site Characterization	9/30/10	
D36: Task 4 – Williston Basin Test Site – Wellbore Leakage Final Report	9/30/10	
D48: Task 7 – Procurement Plan and Agreement Report	9/30/10	
D50: Task 9 – Williston Basin Test Site – Site Characterization, Modeling, and Monitoring Plan	9/30/10	
D52: Task 9 – Fort Nelson Test Site – Site Characterization, Modeling, and Monitoring Plan	9/30/10	
D68: Task 4 – Fort Nelson Test Site – Best Practices Manual – Site Characterization	9/30/10	
D69: Task 4 – Williston Basin Test Site – Best Practices Manual – Simulation Report	9/30/10	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	9/30/10	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	9/30/10	
<b>Year 4 – Quarter 1 (October–December 2010)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/10	
M20: Task 6 – Capture, Dehydration, and Compression Technology Design Completed	10/31/10	
M11: Task 4 – Williston Basin Test Site Baseline Hydro Data Collection Completed	11/30/10	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	12/31/10	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	12/31/10	
D57: Task 12 – Project Assessment Annual Report	12/31/10	
<b>Year 4 – Quarter 2 (January–March 2011)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/11	
M19: Task 6 – Capture, Dehydration, and Compression Technology Selected	2/28/11	
D61: Task 13 – Site Commercialization Plan	3/30/11	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	3/31/11	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	3/31/11	

Continued...

**Table 5. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 4 – Quarter 3 (April–June 2011)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/11	
D21: Task 2 – Williston Basin Test Site 15-minute Documentary	6/30/11	
D17: Task 2 – General Phase III Information PowerPoint Presentation	6/30/11	
D18: Task 2 – Williston Basin Test Site PowerPoint Presentation	6/30/11	
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation	6/30/11	
D60: Task 13 – Site Development, Operations, and Closure Plan	6/30/11	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	6/30/11	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	6/30/11	
<b>Year 4 – Quarter 4 (July–September 2011)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/11	
D1: Task 1 – Review of Source Attributes	9/30/11	
D4: Task 1 – Permitting Review – Two Additional States	9/30/11	
D9: Task 1 – Updated DSS	9/30/11	
D45: Task 6 – Topical Report on the Integrated Capture Plant and Its Shakedown	9/30/11	
D46: Task 6 – Topical Report on Pipeline Route Selection, Design, and Construction	9/30/11	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	9/30/11	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	9/30/11	
<b>Year 5 – Quarter 1 (October–December 2011)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/11	
M12: Task 4 – Williston Basin Test Site Geochemical Work Completed	11/30/11	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	12/31/11	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	12/31/11	
D57: Task 12 – Project Assessment Annual Report	12/31/11	
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/12	
D5: Task 1 – Second Target Area Completed	3/31/12	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	3/31/12	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	3/31/12	
M10: Task 4 – Williston Basin Test Site Wellbore Leakage Data Collection Completed	3/30/12	

Continued...

**Table 5. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 5 – Quarter 3 (April–June 2012)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/12	
D13: Task 2 – Public Site Updates	6/30/12	
D22: Task 2 – Fort Nelson Test Site 15-minute Documentary	6/30/12	
D17: Task 2 – General Phase III Information PowerPoint Presentation	6/30/12	
D18: Task 2 – Williston Basin Test Site PowerPoint Presentation	6/30/12	
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation	6/30/12	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	6/30/12	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	6/30/12	
<b>Year 5 – Quarter 4 (July–September 2012)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/12	
D1: Task 1 – Review of Source Attributes	9/30/12	
D10: Task 1 – DPRS Update	9/30/12	
D44: Task 5 – Williston Basin Test Site – Drilling and Completion Activities Final Report	9/30/12	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	9/30/12	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	9/30/12	
<b>Year 6 – Quarter 1 (October–December 2012)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/12	
D14: Task 2 – General Phase III Fact Sheet	12/31/12	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	12/31/12	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	12/31/12	
D57: Task 12 – Project Assessment Annual Report	12/31/12	

Continued...

**Table 5. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 6 – Quarter 2 (January–March 2013)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/13	
D64: Task 4 – Williston Basin Test Site – Site Characterization Report	1/31/13	
D15: Task 2 – Williston Basin Test Site Fact Sheet	3/31/13	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	3/31/13	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	3/31/13	
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/13	
D66: Task 4 – Williston Basin Test Site – Simulation Report	5/31/13	
D16: Task 2 – Fort Nelson Test Site Fact Sheet	6/30/13	
D17: Task 2 – General Phase III Information PowerPoint Presentation	6/30/13	
D18: Task 2 – Williston Basin Test Site PowerPoint Presentation	6/30/13	
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation	6/30/13	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	6/30/13	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	6/30/13	
<b>Year 6 – Quarter 4 (July–September 2013)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/30/13	
D42: Task 5 – Williston Basin Test Site – Injection Experimental Design Package	8/31/13	
D1: Task 1 – Review of Source Attributes	9/30/13	
D6: Task 1 – Permitting Review – Three States and Two Provinces	9/30/13	
D9: Task 1 – Updated DSS	9/30/13	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	9/30/13	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	9/30/13	
<b>Year 7 – Quarter 1 (October–December 2013)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/13	
D43: Task 5 – Williston Basin Test Site – Monitoring Experimental Design Package	10/31/13	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	12/31/13	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	12/31/13	
D57: Task 12 – Project Assessment Annual Report	12/31/13	

Continued...

**Table 5. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 7 – Quarter 2 (January–March 2014)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/14	
D24: Task 2 – PCOR Partnership Region Sequestration General Poster	3/31/14	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	3/31/14	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	3/31/14	
<b>Year 7 – Quarter 3 (April–June 2014)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/14	
D13: Task 2 – Public Site Updates	6/30/14	
D17: Task 2 – General Phase III Information PowerPoint Presentation	6/30/14	
D18: Task 2 – Williston Basin Test Site PowerPoint Presentation	6/30/14	
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation	6/30/14	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	6/30/14	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	6/30/14	
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/14	
D1: Task 1 – Review of Source Attributes	9/30/14	
D7: Task 1 – Third Target Area Completed	9/30/14	
<b>Year 7 – Quarter 4 (July–September 2014)</b>		
D10: Task 1 – Demonstration Project Reporting System Update	9/30/14	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	9/30/14	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	9/30/14	
<b>Year 8 – Quarter 1 (October–December 2014)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/14	
D75: Task 3 – Updated Permitting Action Plan	10/30/14	
D25: Task 2 – Williston Basin Test Site Poster	12/31/14	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	12/31/14	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	12/31/14	
D57: Task 12 – Project Assessment Annual Report	12/31/14	
<b>Year 8 – Quarter 2 (January–March 2015)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/15	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	3/31/15	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	3/31/15	

Continued...

**Table 5. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 8 – Quarter 3 (April–June 2015)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/15	
D17: Task 2 – General Phase III Information PowerPoint Presentation	6/30/15	
D18: Task 2 – Williston Basin Test Site PowerPoint Presentation	6/30/15	
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation	6/30/15	
D26: Task 2 – Fort Nelson Test Site Poster	6/30/15	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	6/30/15	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	6/30/15	
<b>Year 8 – Quarter 4 (July–September 2015)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/15	
D1: Task 1 – Review of Source Attributes	9/30/15	
D8: Task 1 – Permitting Review – Three States and One Province	9/30/15	
D9: Task 1 – Updated DSS	9/30/15	
D49: Task 8 – Transportation and Injection Operations Final Report	9/30/15	
D51: Task 9 – Williston Basin Test Site – Monitoring for CO <sub>2</sub> , EOR, and Sequestration Best Practices Manual	9/30/15	
D53: Task 9 – Fort Nelson Test Site – Monitoring for CO <sub>2</sub> Sequestration in a Brine Formation Best Practices Manual	9/30/15	
D71: Task 9 – Williston Basin Test Site – Quarterly Summary of Operations	9/30/15	
D72: Task 9 – Fort Nelson Test Site – Quarterly Summary of Operations	9/30/15	
<b>Year 9 – Quarter 1 (October–December 2015)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/15	
D14: Task 2 – General Phase III Fact Sheet	12/31/15	
D23: Task 2 – Sequestration in Carbon Management – 30-minute Documentary	12/31/15	
D57: Task 12 – Project Assessment Annual Report	12/31/15	

Continued...

**Table 5. Phase III Milestones and Deliverables (continued)**

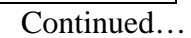
<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 9 – Quarter 2 (January–March 2016)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/16	
D11: Task 2 – Outreach Plan	3/31/16	
D15: Task 2 – Williston Basin Test Site Fact Sheet	3/31/16	
D55: Task 11 – Report on Cost-Effective Long-Term Monitoring Strategies for the Williston Basin Test Site	3/31/16	
D56: Task 11 – Report on Cost-Effective Long-Term Monitoring Strategies for the Fort Nelson Test Site	3/31/16	
<b>Year 9 – Quarter 3 (April–June 2016)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/16	
D13: Task 2 – Public Site Updates	6/30/16	
D16: Task 2 – Fort Nelson Test Site Fact Sheet	6/30/16	
D17: Task 2 – General Phase III Information PowerPoint Presentation	6/30/16	
D18: Task 2 – Williston Basin Test Site PowerPoint Presentation	6/30/16	
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation	6/30/16	
<b>Year 9 – Quarter 4 (July–September 2016)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/16	
D1: Task 1 – Review of Source Attributes	9/30/16	
D10: Task 1 – Demonstration Project Reporting System Update	9/30/16	
D73: Task 11 – Williston Basin Test Site – Progress Report on Monitoring and Modeling Fate of CO <sub>2</sub>	9/30/16	
D74: Task 11 – Fort Nelson Test Site – Progress Report on Monitoring and Modeling Fate of CO <sub>2</sub>	9/30/16	
<b>Year 10 – Quarter 1 (October–December 2016)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/16	
D57: Task 12 – Project Assessment Annual Report	12/31/16	
<b>Year 10 – Quarter 3 (January–March 2017)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/17	

Continued...

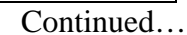
**Table 5. Phase III Milestones and Deliverables (continued)**

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 10 – Quarter 3 (April–June 2017)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/17	
D17: Task 2 – General Phase III Information PowerPoint Presentation	6/30/17	
D18: Task 2 – Williston Basin Test Site PowerPoint Presentation	6/30/17	
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation	6/30/17	
<b>Year 10 – Quarter 4 (July–September 2017)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/17	
D54: Task 10 – Site Closure Report	9/30/17	
D73: Task 11 – Williston Basin Test Site – Progress Report on Monitoring and Modeling Fate of CO <sub>2</sub>	9/30/17	
D74: Task 11 – Fort Nelson Test Site – Progress Report on Monitoring and Modeling Fate of CO <sub>2</sub>	9/30/16	
D76: Task 3 – Best Practices Manual – Permitting	9/30/17	
D62: Task 13 – Final Report	9/30/17	
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/17	

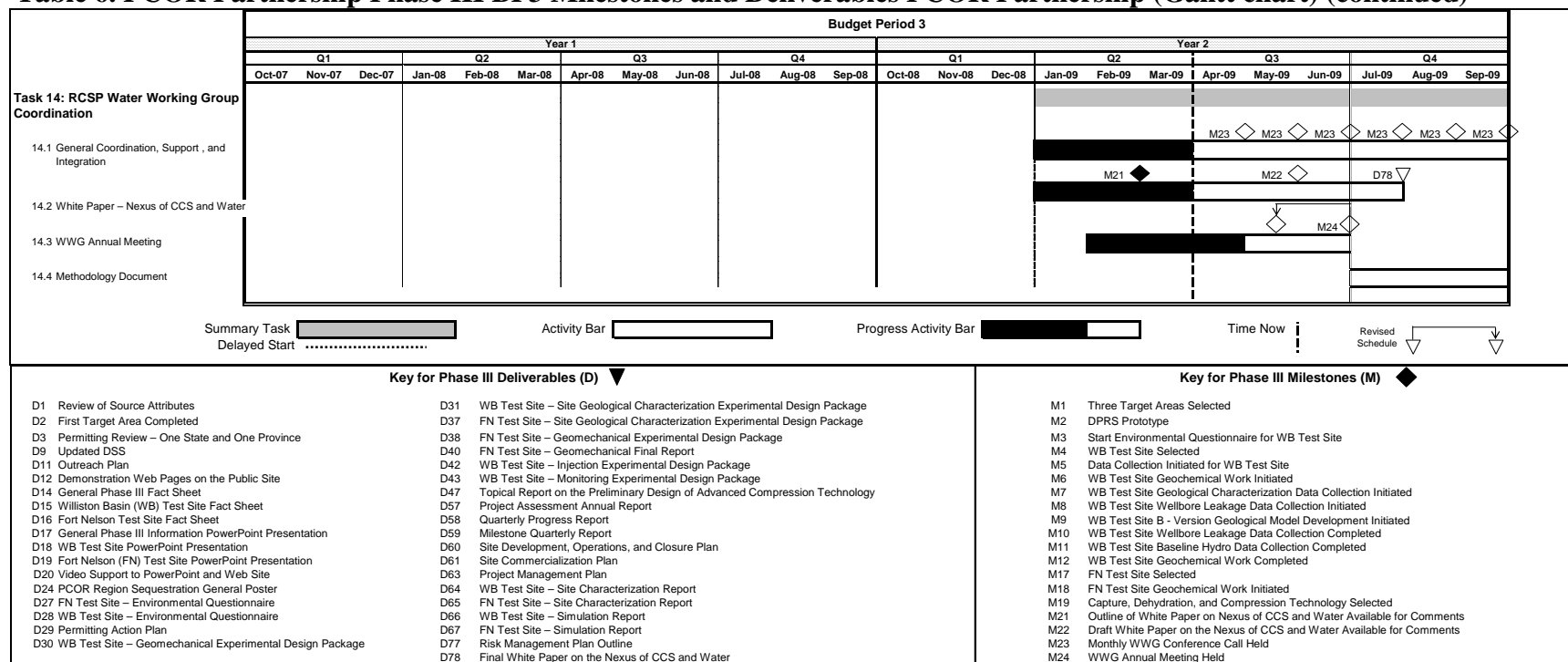
25



26



**Table 6. PCOR Partnership Phase III BP3 Milestones and Deliverables PCOR Partnership (Gantt chart) (continued)**



#### **Task 4 – Site Characterization and Modeling**

The selection of a site for the Williston Basin Phase III demonstration has been delayed for two quarters. This will also cause delays in other site-specific activities, such as the development of a NEPA document, site-specific characterization activities, site-specific MMV planning, and site-specific public outreach activities.

Negotiations between Basin Electric Power Cooperative (the company providing the CO<sub>2</sub> for the Williston Basin project) and the oil companies are ongoing. No deals have been completed; therefore, no site has been formally accepted or schedule of activities set.

#### **Task 5 – Well Drilling and Completion**

As stated in the schedule status section of this report, because of delays in the Williston Basin demonstration, Task 5 activities will be initiated April 1, 2009 (original start date was October 1, 2008).

#### **Task 6 – Infrastructure Development**

Some of the work on this task has been delayed while the plans for the CO<sub>2</sub> capture and geologic sequestration for the demonstration projects are finalized. Once the specific CCS strategy for the demonstration project has been finalized, planned task activities related to CO<sub>2</sub> capture, compression, and pipeline design and routing can begin. In the interim, activities are being undertaken in support of the planned actions.

#### **Task 7 – CO<sub>2</sub> Procurement**

Numerous discussions with potential CO<sub>2</sub> suppliers have taken place. Because of the sensitive nature of negotiations, specifics cannot be shared at the present time.

#### **Task 8 – Transportation and Injection Operations**

Nothing to note at this time.

#### **Task 9 – Operational Monitoring and Modeling**

Nothing to note at this time.

#### **Task 10 – Site Closure**

Nothing to note at this time.

#### **Task 11 – Postinjection Monitoring and Modeling**

Nothing to note at this time.

### **Task 12 – Project Assessment**

Nothing to note at this time.

### **Task 13 – Project Management**

There is concern about the delays to the Phase III project in the Williston Basin. Options for alternative ways to proceed and an estimate of the impacts of each option to the costs and schedule are being researched.

### **Task 14 – Regional Carbon Sequestration Partnership (RCSP) Water Working Group Coordination**

The only delay or problem at this time is there are currently no representatives to the WWG from the Big Sky Carbon Sequestration Partnership (BSCSP) and the Midwest Geological Sequestration Consortium (MGSC). This could delay some milestones and deliverables that are due next quarter. Both partnerships will be contacted again to determine whether or not they will be participating.

## **PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES**

### **Task 1 – Regional Characterization**

Nothing for this reporting period.

### **Task 2 – Public Outreach and Education**

A general poster (Deliverable D24) was prepared and submitted on schedule to NETL for review.

### **Task 3 – Permitting and NEPA Compliance**

EERC staff testified at North Dakota Senate and House hearings regarding the merits of a proposed carbon sequestration bill.

### **Task 4 – Site Characterization and Modeling**

No deliverables were due for Task 4 during this quarter.

### **Task 5 – Well Drilling and Completion**

This task has not begun (begins Quarter 3 – BP3, Year 2). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

### **Task 6 – Infrastructure Development**

The infrastructure, cost, and permitting requirements associated with truck-loading CO<sub>2</sub> were gathered and summarized in a value-added document at the request of a PCOR Partnership member. A second summary document was prepared that specifically targeted truck-loading of CO<sub>2</sub> produced at an ethanol plant.

### **Task 7 – CO<sub>2</sub> Procurement**

Numerous discussions with potential CO<sub>2</sub> suppliers have taken place. Because of the sensitive nature of negotiations, specifics cannot be shared at the present time.

### **Task 8 – Transportation and Injection Operations**

This task has not begun (begins Quarter 1 – BP4, Year 3). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

### **Task 9 – Operational Monitoring and Modeling**

This task has not begun (begins Quarter 1 – BP4, Year 3). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

### **Task 10 – Site Closure**

This task has not begun (begins Quarter 1 – BP5, Year 9). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

### **Task 11 – Postinjection Monitoring and Modeling**

This task has not begun (begins Quarter 1 – BP5, Year 9). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

### **Task 12 – Project Assessment**

The project assessment annual report (Deliverable D57) was submitted for approval on December 31, 2008.

### **Task 13 – Project Management**

The deliverable entitled “D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report” was submitted to DOE for approval on January 30, 2009.

### **Task 14 – Regional Carbon Sequestration Partnership (RCSP) Water Working Group Coordination**

The milestone entitled “M21: Outline of White Paper on Nexus of CO<sub>2</sub> Capture and Sequestration (CCS) and Water” was submitted to DOE for approval on February 27, 2009.

## MEETINGS/TRAVEL

Representatives from the PCOR Partnership participated in and/or presented at the following meetings and conferences in this reporting period:

- January 6–9, 2009: Meeting with Spectra Energy regarding the progress of the Fort Nelson project in Calgary, Alberta
- January 30 – February 5, 2009: SPE Reservoir Simulation Symposium in The Woodlands, Texas
- February 2–4, 2009: Carbon and Climate Change Conference in Austin, Texas
- February 3, 2009: North Dakota Petroleum Council Board Room Meeting & Legislative Reception in Bismarck, North Dakota
- February 4, 2009: Oil and Gas Research Council Meeting in Bismarck, North Dakota
- February 7–13, 2009: CO<sub>2</sub> Geological Storage Modeling Workshop in Orleans, France
- February 8–11, 2009: Intro to Win Prop Training Course in Calgary, Alberta
- February 10, 2009: Meeting with Cargill in Minneapolis, Minnesota
- February 11, 2009: Meeting with DOE in Pittsburgh, Pennsylvania
- February 18, 2009: Met with PPB for Geologic Documentary in Fargo, North Dakota.
- February 19, 2009: Presented to faculty and students at the University of Minnesota in Crookston, Minnesota
- February 23–26, 2009: CO<sub>2</sub> & Capture Storage Conference in Calgary, Alberta
- February 23–27, 2009: Meeting with Spectra Energy in Calgary, Alberta
- February 25–28, 2009: Rock Works Geological Modeling Conference in Denver, Colorado
- March 9, 2009: Documentary editing in Fargo, North Dakota
- March 16–18, 2009: EPRI CO<sub>2</sub> Transportation Workshop in Menlo Park, California
- March 22–26, 2009: 1st International Gas Symposium in San Francisco, California
- March 23–26, 2009: Annual NETL CO<sub>2</sub> Capture Technology for Existing Plants R&D Meeting in Pittsburgh, Pennsylvania
- March 25, 2009: Documentary editing in Fargo, North Dakota

Materials presented at these meetings are available to partners on the PCOR Partnership DSS Web site (<http://gis.undeerc.org/website/pcorp/>).

## REFERENCES

None.