



# EERC

Energy & Environmental Research Center

UNIVERSITY OF NORTH DAKOTA

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April 30, 2007

AAD Document Control  
U.S. Department of Energy  
National Energy Technology Laboratory  
PO Box 10940, MS 921-107  
Pittsburgh, PA 15236-0940

Dear AAD Document Control:

Subject: Plains CO<sub>2</sub> Reduction Partnership Phase II Quarterly Technical Progress PowerPoint  
Presentation for the Period January 1 – March 31, 2007  
DOE Cooperative Agreement No. DE-FC26-05NT42592; EERC Fund 9179

Enclosed are hard copies of the Phase II Quarterly Technical Progress PowerPoint Presentation and the Request for Patent Clearance Form for the Plains CO<sub>2</sub> Reduction Partnership Program. Also enclosed is a disk containing the Quarterly Technical Progress PowerPoint Presentation. If you have any questions, please call me at (701) 777-5279 or e-mail at [esteadman@undeerc.org](mailto:esteadman@undeerc.org).

Sincerely,

Edward N. Steadman  
Senior Research Advisor

ENS/slw

Enclosures

c/enc: Darin Damiani, NETL  
John Litynski, NETL  
Sheryl Landis, EERC (Patent Clearance Form)

c: Tobe Larson, EERC

U.S. DEPARTMENT OF ENERGY  
**REQUEST FOR PATENT CLEARANCE FOR  
RELEASE OF CONTRACTED RESEARCH DOCUMENTS**

NETL F 510.1-5  
(02/2002) OPI=CC01  
(Previous Editions Obsolete)

TO: ■ For Technical Reports  
AAD Document Control  
MS 921-107  
U.S. Department of Energy - NETL  
P.O. Box 10940  
Pittsburgh, PA 15236-0940

◆ Award No.  
DE-FC26-05NT42592

Name & Phone No. of DOE COR  
Darin Damiani (304) 285-4398

□ For Technical Papers/Journal Articles/Presentations  
Mark P. Dvorscak  
U.S. Department of Energy  
9800 S. Cass Avenue  
Argonne, IL 60439  
FAX: (630) 252-2779

**A. AWARDEE ACTION (AWARDEE COMPLETES PART A. 1-5)**

1. Document Title: Plains CO<sub>2</sub> Reduction Partnership Phase II
2. Type of Document: ■ Technical Progress Report    □ Topical Report    □ Final Technical Report  
□ Abstract    □ Technical Paper    □ Journal Article    □ Conference Presentation  
Other (please specify) \_\_\_\_\_

3. Date Clearance Needed: \_\_\_\_\_

◆4. Results of Review for Possible Inventive Subject Matter:

a. ■ No Subject Invention is believed to be disclosed therein.

b. □ Describes a possible Subject Invention relating to \_\_\_\_\_

i. Awardee Docket No.: \_\_\_\_\_

ii. A disclosure of the invention was submitted on \_\_\_\_\_

iii. A disclosure of the invention will be submitted by the following date: \_\_\_\_\_

iv. A waiver of DOE's patent rights to the awardee: □ has been granted, □ has been applied for, or

□ will be applied for by the following date: \_\_\_\_\_

◆5. Signed Sheryl E. Landis  
(Awardee)

Date 4-25-07

Name & Phone No. Sheryl E. Landis (701) 777-5124

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

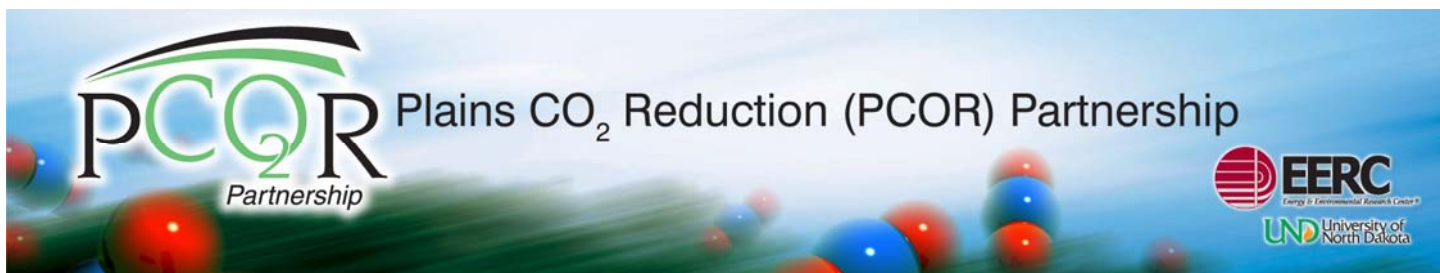
**B. DOE PATENT COUNSEL ACTION**

□ Patent clearance for release of the above-identified document is granted.

□ Other: \_\_\_\_\_

Signed \_\_\_\_\_  
(Patent Attorney)

Date \_\_\_\_\_



## PLAINS CO<sub>2</sub> REDUCTION PARTNERSHIP

Phase II Quarterly Technical Progress PowerPoint Presentation

*(for the period January 1 – March 31, 2007)*

*Prepared for:*

AAD Document Control

U.S. Department of Energy  
National Energy Technology Laboratory  
PO Box 10940, MS 921-107  
Pittsburgh, PA 15236-0940

Agreement No. DE-FC26-05NT42592; EERC Fund 9179  
Contracting Officer's Representative: Darin Damiani

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April 2007

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**University of North Dakota**  
**Energy & Environmental Research Center**  
*Plains CO<sub>2</sub> Reduction Partnership*



*Project Summary*

*DE-FC26-05NT42592*

*For the Period January 1 –  
March 31, 2007*



**National Energy Technology Laboratory**



# Partnership Objectives

The Plains CO<sub>2</sub> Reduction (PCOR) Partnership is a collaborative regional framework to support the testing and demonstration of CO<sub>2</sub> sequestration technologies in the central interior of North America.

The PCOR Partnership project includes ten performance tasks:

- Task 1 – Project Management and Reporting
- Task 2 – Field Validation Test – Beaver Lodge, North Dakota
- Task 3 – Field Validation Test – Zama, Alberta
- Task 4 – Field Validation Test – Lignite in North Dakota
- Task 5 – Terrestrial Validation Test
- Task 6 – Continued Characterization of Regional  
Sequestration Opportunities
- Task 7 – Research, Safety, Regulatory, and Permitting Issues
- Task 8 – Public Outreach and Education
- Task 9 – Identification of the Commercially Available Sequestration  
Technologies Ready for Large-Scale Deployment
- Task 10 – Regional Partnership Program Integration

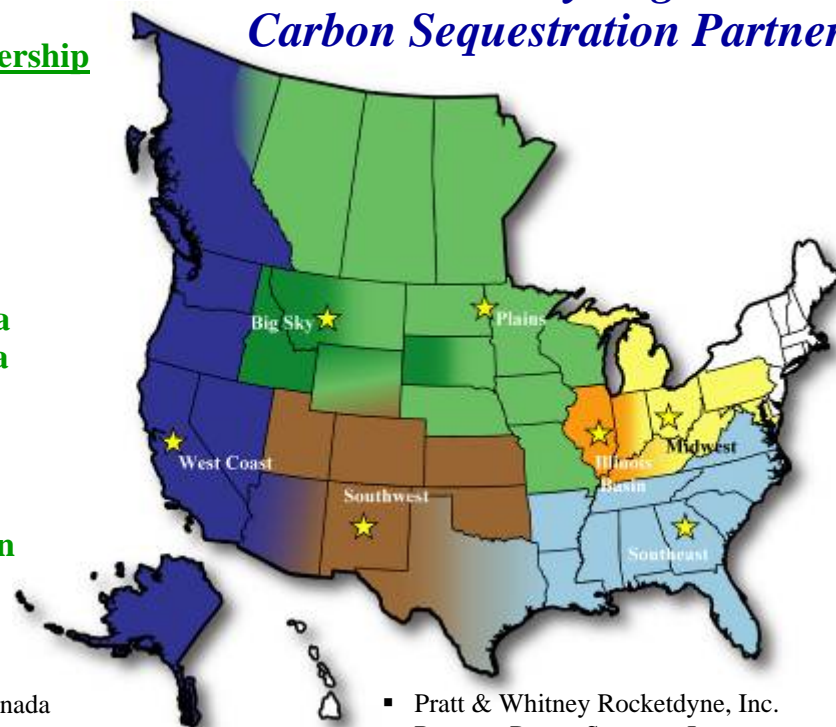


## PCOR Partnership Phase II Partners (66 including the EERC):

- ★ University of North Dakota Energy & Environmental Research Center (EERC)
  - Advanced Geotechnology, a Division of Hycal Energy Research Laboratories, Ltd.
  - Air Products and Chemicals
  - Alberta Department of Energy
  - Alberta Energy and Utilities Board
  - Alberta Geological Survey
  - Apache Canada Ltd.
  - Basin Electric Power Cooperative
  - Blue Source, LLC
  - British Columbia Ministry of Energy, Mines and Petroleum Resources
  - Carbozyme, Inc.
  - Center for Energy & Economic Development (CEED)
  - Dakota Gasification Company
  - Ducks Unlimited Canada
  - Ducks Unlimited, Inc.
  - Eagle Operating, Inc.
  - Eastern Iowa Community College District
  - Encore Acquisition Company
  - Environment Canada
  - Excelsior Energy, Inc.
  - Fischer Oil and Gas, Inc.
  - Great Northern Power Development, LP
  - Great River Energy
  - Hess Corporation
  - Interstate Oil and Gas Compact Commission
  - Iowa Department of Natural Resources – Geological Survey
  - Lignite Energy Council
  - MEG Energy Corporation
  - Melzer Consulting
  - Minnesota Power
  - Minnkota Power Cooperative, Inc.
  - Missouri Department of Natural Resources
  - Missouri River Energy Services
  - Montana–Dakota Utilities Co.
  - Montana Department of Environmental Quality
  - National Commission on Energy Policy

## PCOR Partnership Region:

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



- Natural Resources Canada
- Nexant, Inc.
- North Dakota Department of Commerce Division of Community Services
- North Dakota Department of Health
- North Dakota Geological Survey
- North Dakota Industrial Commission Department of Mineral Resources, Oil and Gas Division
- North Dakota Industrial Commission Lignite Research, Development and Marketing Program
- North Dakota Industrial Commission Oil and Gas Research Council
- North Dakota Natural Resources Trust
- North Dakota Petroleum Council
- North Dakota State University
- Otter Tail Power Company
- Petroleum Technology Transfer Council
- Prairie Public Television
- Pratt & Whitney Rocketdyne, Inc.
- Ramgen Power Systems, Inc.
- RPS Energy
- Saskatchewan Industry and Resources
- SaskPower
- Schlumberger
- Shell Canada Energy
- Spectra Energy
- Suncor Energy Inc.
- U.S. Department of Energy
- U.S. Geological Survey Northern Prairie Wildlife Research Center
- University of Alberta
- Westmoreland Coal Company
- Western Governors' Association
- Wisconsin Department of Agriculture, Trade and Consumer Protection
- Xcel Energy

## *National Energy Technology Laboratory Regional Carbon Sequestration Partnerships*



## Partnership Team

Partner Name	City	State	Congressional District
University of North Dakota Energy & Environmental Research Center (EERC)	Grand Forks	North Dakota	At large
Advanced Geotechnology, a Division of Hycal Energy Research Laboratories, Ltd.	Calgary, Alberta		
Air Products and Chemicals	Allentown	Pennsylvania	15
Alberta Department of Energy	Edmonton, Alberta		
Alberta Energy and Utilities Board	Edmonton, Alberta		
Alberta Geological Survey	Edmonton, Alberta		
Apache Canada Ltd.	Calgary, Alberta		
Basin Electric Power Cooperative	Bismarck	North Dakota	At large
Blue Source, LLC	Holladay	Utah	2
British Columbia Ministry of Energy, Mines and Petroleum Resources	Victoria, British Columbia		
Carbozyme, Inc.	Monmouth Junction	New Jersey	4
Center for Energy & Economic Development (CEED)	Alexandria	Virginia	8
Dakota Gasification Company	Bismarck	North Dakota	At large
Ducks Unlimited Canada	Stonewall, Manitoba		
Ducks Unlimited, Inc.	Memphis	Tennessee	9
Eagle Operating, Inc.	Kenmare	North Dakota	At large



## Partnership Team (cont.)

Partner Name	City	State	Congressional District
Eastern Iowa Community College District	Davenport	Iowa	1
Encore Acquisition Company	Fort Worth	Texas	12
Environment Canada	Manitoba and Saskatchewan Provinces		
Excelsior Energy, Inc.	Minnetonka	Minnesota	3
Fischer Oil and Gas, Inc.	Grand Forks	North Dakota	At large
Great Northern Power Development, LP	Townsend	Montana	At large
Great River Energy	Elk River	Minnesota	6
Hess Corporation	Williston	North Dakota	At large
Interstate Oil and Gas Compact Commission	Oklahoma City	Oklahoma	5
Iowa Department of Natural Resources – Geological Survey	Iowa City	Iowa	2
Lignite Energy Council	Bismarck	North Dakota	At large
MEG Energy Corporation	Calgary, Alberta		
Melzer Consulting	Midland	Texas	11
Minnesota Power	Duluth	Minnesota	8
Minnkota Power Cooperative, Inc.	Grand Forks	North Dakota	At large
Missouri Department of Natural Resources	Jefferson City	Missouri	4
Missouri River Energy Services	Sioux Falls	South Dakota	At large



## Partnership Team (cont.)

Partner Name	City	State	Congressional District
Montana–Dakota Utilities Co.	Bismarck	North Dakota	At large
Montana Department of Environmental Quality	Helena	Montana	At large
National Commission on Energy Policy	Washington	DC	1
Natural Resources Canada	Ottawa, Ontario		
Nexant, Inc.	San Francisco	California	8
North Dakota Department of Commerce Division of Community Services	Bismarck	North Dakota	At large
North Dakota Department of Health	Bismarck	North Dakota	At large
North Dakota Geological Survey	Bismarck	North Dakota	At large
North Dakota Industrial Commission Department of Mineral Resources, Oil and Gas Division	Bismarck	North Dakota	At large
North Dakota Industrial Commission Lignite Research, Development and Marketing Program	Bismarck	North Dakota	At large
North Dakota Industrial Commission Oil and Gas Research Council	Bismarck	North Dakota	At large
North Dakota Natural Resources Trust	Bismarck	North Dakota	At large
North Dakota Petroleum Council	Bismarck	North Dakota	At large
North Dakota State University	Fargo	North Dakota	At large
Otter Tail Power Company	Fergus Falls	Minnesota	7



## Partnership Team (cont.)

Partner Name	City	State	Congressional District
Petroleum Technology Transfer Council	Houston	Texas	7
Pratt & Whitney Rocketdyne, Inc.	Canoga Park	California	25
Prairie Public Television	Fargo	North Dakota	At large
Ramgen Power Systems, Inc.	Bellevue	Washington	8
RPS Energy	Calgary, Alberta		
Saskatchewan Industry and Resources	Regina, Saskatchewan		
SaskPower	Regina, Saskatchewan		
Schlumberger	Sugar Land	Texas	22
Shell Canada Energy	Calgary, Alberta		
Spectra Energy	Vancouver, British Columbia		
Suncor Energy Inc.	Calgary, Alberta		
U.S. Geological Survey Northern Prairie Wildlife Research Center	Jamestown	North Dakota	At large
University of Alberta	Edmonton, Alberta		
Westmoreland Coal Company	Colorado Springs	Colorado	5
Western Governors' Association	Denver	Colorado	1
Wisconsin Department of Agriculture, Trade and Consumer Protection	Madison	Wisconsin	2
Xcel Energy	Golden	Colorado	7



# Partnership Principals

- *Principal Investigator: Ed Steadman, EERC*
- *Task Leaders*
  - Task 1 – Project Management and Reporting – **Ed Steadman** and **John Harju**
  - Task 2 – Field Validation Test – Beaver Lodge, North Dakota – **Jim Sorensen**
  - Task 3 – Field Validation Test – Zama, Alberta – **Steve Smith**
  - Task 4 – Field Validation Test – Lignite in North Dakota – **Lisa Botnen** and **Ed Steadman**
  - Task 5 – Terrestrial Validation Test – **Barry Botnen**
  - Task 6 – Continued Characterization of Regional Sequestration Opportunities – **Erin O’Leary**
  - Task 7 – Research, Safety, Regulatory, and Permitting Issues – **Lisa Botnen**
  - Task 8 – Public Outreach and Education – **Dan Daly**
  - Task 9 – Identification of the Commercially Available Sequestration Technologies Ready for Large-Scale Deployment – **Melanie Jensen**
  - Task 10 – Regional Partnership Program Integration – **Ed Steadman**
- *National Energy Technology Laboratory Project Manager: Darin Damiani*



# Budget

Start Date	End Date	Government Cost	Performer Cost	Total Cost	Cost Share
10/1/05	9/30/09	\$15,710,015	\$10,145,953	\$25,855,968	39%

- **U.S. Department of Energy (DOE) Costs to Date: \$3,481,460**
- **Cost Share to Date: \$942,278**



# Highlights of Progress to Date

## Task 1 – Management and Reporting

- Working on booth for 6th Annual Conference on Carbon Capture and Sequestration (May 7–10, 2007: Pittsburgh, Pennsylvania)
- Working on details for Air Quality VI: Mercury, Trace Elements, SO<sub>3</sub>, Particulate Matter, and Greenhouse Gases,” taking place September 24–27, 2007, in Arlington, Virginia. Ed Steadman, PCOR Partnership Project Manager, is the session chair for Session B6: CO<sub>2</sub> Sequestration and Monitoring, Mitigation, and Verification (MMV), taking place on Wednesday, September 26.

The following are new Phase II members:

- Spectra Energy
- Schlumberger
- Missouri River Energy Services
- Blue Source, LLC



# Highlights of Progress to Date (cont.)

## Task 2 – Field Validation Test – Beaver Lodge, North Dakota

- Continued the development of the National Environmental Policy Act (NEPA) document for the Beaver Lodge Field Validation Test.
- Continued the development of an Experimental Design Package (EDP) for the Beaver Lodge Field Validation Test.
- Obtained representative samples for laboratory work to examine mineralogical changes in reservoir and seal rocks after exposure to CO<sub>2</sub> under Beaver Lodge Duperow reservoir conditions.
- Conducted initial experiments to examine the effects of supercritical CO<sub>2</sub> on the mineralogy of rocks from the Duperow Formation. Experiments included the analysis of rock mineralogy before and after exposure to supercritical CO<sub>2</sub> using scanning electron microscopy and x-ray diffraction techniques.



# Highlights of Progress to Date (cont.)

## Task 3 – Field Validation Test – Zama, Alberta

- Injection of approximately 1 million ft<sup>3</sup>/day of 70% CO<sub>2</sub> and 30% H<sub>2</sub>S has continued at Zama. This is roughly equivalent to a cumulative total of 4500 tons of CO<sub>2</sub>.
- Project meeting in Calgary, March 8, 2007. Discussion of Carbon Sequestration Leadership Forum (CSLF) Meeting; core collection techniques, challenges, and project direction were discussed.
- Geomechanical and geological evaluations are ongoing. Results and reports from selected evaluations are expected to be complete this coming quarter.
- Collection of “fresh core” that includes the contact between the cap rock and reservoir was collected in March. This is currently being logged and tested for porosity and permeability. A complete suite of geological and geomechanical tests will be performed on this core, as well as any additional cores to be collected.
- The Zama project was recognized at the end of March as an official CSLF project. This will give additional exposure to the project and to the validation of geological storage of anthropogenic CO<sub>2</sub>.



# Highlights of Progress to Date (cont.)

## Task 4 – Field Validation Test – Lignite in North Dakota

- The EDP, Site Health and Safety Plan (SHSP), and Regulatory Permitting Action Plan (RPAP) have been completed and submitted.
- Work has begun on the Outreach Action Plan (OAP).
- Baseline characterization is continuing.
- The model for simulation of injection/production from lignite in Burke County is under development. Additional inputs for this model will come from logging that will be completed once the wells are drilled.
- The Eclipse model was having difficulty “understanding” low-pressure coals. It was sent back to Schlumberger for troubleshooting. Schlumberger responded regarding the model and gave recommendations. Those changes have been incorporated and the model has been run. The results look much better than before.
- A conference call and meeting were held with WellDog, Inc., regarding its Critical Gas Content tool. This may be another type of analysis that could possibly provide gas content and gas saturation of the lignites. Further discussions were held with WellDog upon receipt of its proposal. We are currently evaluating WellDog's involvement in this test.



# Highlights of Progress to Date (cont.)

## Task 4 – Field Validation Test – Lignite in North Dakota (cont.)

- An analysis of coal drilling procedures, including well construction and completion, was conducted for wells in North Dakota and New Mexico.
- A meeting was held with Eagle Operating, Inc., to finalize drilling plans. This resulted in some changes to our plans with Schlumberger; development of an alternative logging suite is in progress.
- The drilling prognosis has been completed.
- A meeting will be held in the next month or so with the State Land Department to go over the experimental design and drilling plans.
- Once we have finalized the drilling plans and logging package, we anticipate meeting with local officials in Burke County to provide them with more details regarding the research project.
- Discussions are being held with EERC personnel to design the pump test for the dewatering phase of this task.
- Drilling is anticipated for May or June as load restrictions are on local roads and the land needs to dry before pad setup and drilling can commence.
- A poster presentation of this field validation test will be given at the 6th Annual Conference on Carbon Capture and Sequestration to be held in May in Pittsburgh.



# Highlights of Progress to Date (cont.)

## Task 5 – Terrestrial Validation Test

- A second field coordination meeting was held at the EERC in March 2007. The meeting was attended by the EERC, DU (Ducks Unlimited, Inc.), USGS (U.S. Geological Survey Northern Prairie Wildlife Research Center), and North Dakota State University (NDSU) personnel to finalize plans for the 2007 field season. Study sites, landowner contacts, data collection, DU headquarters update, and a review of the 2006 field season were discussed.
- NDSU wetlands paper in draft form.
- USGS sampling work plan complete.
- DU has updated the PCOR Partnership Terrestrial Project Web site. A project update report and links to the fact sheets have been added to the PCOR “Partners-Only” Web site. The site will continue to address the options for sequestration practices, the carbon sequestration potential of the practices, and best management practices for retaining sequestered carbon. More information will be presented as reports and fact sheets are completed.
- DU and the PCOR Partnership partners have assembled information that will be used to assess socioeconomic drivers for land conversion, including past, current, and future (predicted) payments for government programs such as Conservation Reserve Program (CRP).
- DU has been organizing a Climate Change Workshop that will discuss the impacts of global warming on wetland and waterfowl habitats. The results of the workshop will provide input for the Fact Sheet on Climate Science for Policy.



# Highlights of Progress to Date (cont.)

## Task 5 – Terrestrial Validation Test (cont.)

### DU/NDSU Soil Sampling

- Soil sampling on Sheridan County, North Dakota, sites are complete. The samples have all been milled and are currently being analyzed by the NDSU Soil Science Laboratory for organic and inorganic carbon content.
- Three sampling areas have been selected for the 2007 field season. The sampling areas are located in north-central South Dakota, south-central South Dakota, and western Minnesota. Landowner contacts for access to sample pastures, CRP, and cropland are under way and nearly completed. Plans are being developed for grassland restorations on DU-owned properties in South Dakota. One 40-acre restoration will be a monoculture of switchgrass to evaluate its ability to sequester carbon when grown to produce biomass for ethanol production.



# Highlights of Progress to Date (cont.)

## Task 5 – Terrestrial Validation Test (cont.)

### USGS/DU Wetland Catchment Sampling

- The final selection of 17 wetland catchments was completed during the second quarter of FY07. Wetland catchments selected for monitoring are located on DU Goebel Ranch and Ipswich Grasslands property and other privately owned properties in Edmunds County, South Dakota. To eliminate background variation among sites, wetland catchments selected were similar with respect to water regime, size, land-use history, and soils. Emissions of GHGs (i.e., CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O) will be measured biweekly throughout the growing season from wetland catchments following standard protocols developed by the USGS. Collection of gas emission samples will commence during the week of March 26, 2007.

### Outreach

Presentations on terrestrial carbon sequestration (DU):

- North Central Leadership Forum on Nutrient Management and Water Quality, Madison, Wisconsin, December 17–19, 2006, Sponsor: Sand County Foundation. This meeting includes conservation NGOs, state environmental agencies, policy makers, and agricultural producers.
- Electric Utilities Environmental Conference 2007, Tucson, Arizona, January 22–24, 2007.
- Lower Mississippi Valley field tour of terrestrial sequestration sites with Prairie Public Television, February 12–13, 2007.
- Two outreach brochures are currently in draft form.



# Highlights of Progress to Date (cont.)

## Task 5 – Terrestrial Validation Test (cont.)

### Fact Sheets

- **Best Management Practices.** DU has synthesized existing information on the impacts of grazing and other land-use management options on carbon sequestration and prepared a fact sheet for review. This information will provide the basis for management plans that will be incorporated into carbon sequestration easement documents. Guidelines for management of wetland hydrology and land management to enhance carbon sequestration potential have been developed.
- **Indirect Benefits.** Other economic and environmental incentives that may result from agricultural land restoration, such as water quality, erosion control, flood buffering, and recreational and wildlife benefits, have been identified. DU is closely following the emerging nutrient credit market (nitrogen, phosphorus, and turbidity) that would provide incremental environmental returns. Emerging markets associated with indirect benefits have been evaluated, and a fact sheet titled **Cobenefits of Terrestrial Carbon Sequestration in the PCOR Partnership Region** was completed and submitted during this reporting period.



# Highlights of Progress to Date (cont.)

## Task 5 – Terrestrial Validation Test (cont.)

### Fact Sheets (cont.)

- **Business Flow Processes.** In anticipation of market trading of offsets in the PCOR Partnership region, business flow processes are being defined to provide a transparent framework for transacting carbon credits resulting from wetland/grassland carbon sequestration under a variety of business scenarios. This information is necessary for correlating environmental benefits, carbon offsets, and financial returns associated with wide-scale deployment of terrestrial carbon sequestration. The outreach brochures that are currently in draft form describe the business processes from a landowner and an investor's perspective. Next, a fact sheet will be developed and incorporated into the Regional Technology Implementation Plan (RTIP). The following items have or will be submitted to DOE as stand-alone documents as part of a business processes package:
  - Prospectus for grassland carbon offset sale in the Prairie Pothole Region (PPR) (submitted).
  - General term sheet for grassland carbon offset sale with investor in the PPR (submitted).
  - DU carbon sequestration fact sheet for investors (submitted).
  - Evaluation of DOE guidelines for aggregators and terrestrial offset providers (review complete, and document in draft form).
  - Evaluation of other state and regional GHG or cap and trade programs – rules and policies (in process).
  - Private carbon/easement legal document (complete, will submit to DOE in next quarter).
  - Agreement with landowner and DU to market carbon on their behalf (draft).
  - Legal document to transfer carbon rights from landowner to DU for an aggregated transaction (draft).



# Highlights of Progress to Date (cont.)

## Task 5 – Terrestrial Validation Test (cont.)

- **First Draft of Business Requirements Document for Carbon-Tracking Database.** A business requirements document (BRD) to support the system design is nearly complete and will be submitted to DOE in the next quarter. The BRD defines all of the aspects of information tracking that are required for a carbon transaction, including financial agreements, habitat, carbon monitoring, third-party verification, risk management, insurance, etc. The carbon system will allow transacted carbon offsets to be tracked, and for portfolios of offsets available for sale to be queried and marketed to investors.
- **Review of DOE Technical Guidelines for the Voluntary Trading of GHG.** Presently, several protocols are being developed, including the 1605(b) Voluntary 14 Reporting Program, the Chicago Climate Exchange, the California Action Registry, the World Resources Institute, the World Business Council on Sustainable Development, and RGGI (Regional GHG Initiative). Each has established basic project requirements designed to create consistency in carbon sequestration projects with the registry or market trading system.



# Highlights of Progress to Date (cont.)

## Task 6 – Continued Characterization of Regional Sequestration Opportunities

### Characterization

- Held an internal planning meeting on updating source data in the Decision Support System (DSS) database. The current number of sources in the DSS is 1106. There is no lower limit to the CO<sub>2</sub> emission value in the database, except that it has to be >0. We will be reviewing the sources over the next year, as well as the categorization of sources. In addition, we will be preparing a capture document that contains a matrix of capture/separation technologies and source types that may be good technology matches and make this document available through the DSS.
- Replaced the Canadian source data set with a new set of data that had more accurate latitude/longitude. Also added the British Columbia sources to the database.
- The pipeline data have been received by PennWell and installed on the test server. We plan to make these data available on the production server in early April.



## Highlights of Progress to Date (cont.)

### Task 6 – Continued Characterization of Regional Sequestration Opportunities (cont.)

#### Characterization (cont.)

- Received the most recent geographic files for the delineation of unitized and nonunitized oil/gas fields in North Dakota from North Dakota Industrial Commission (NDIC). These files also contain the latest cumulative production data for the fields. These data will be incorporated into the DSS and will allow for updated capacity estimates for the fields.
- Identified gaps in readily available data with respect to Class II wells in states other than North Dakota. Contacted Montana, Nebraska, and South Dakota Oil and Gas Commissions with respect to Class II well data. South Dakota provided high-quality data; Montana provided a list of the data available from its database. Online databases for the other states were evaluated.



## Highlights of Progress to Date (cont.)

### Task 6 – Continued Characterization of Regional Sequestration Opportunities (cont.)

#### Characterization (cont.)

- Melzer Consulting followed up the enhanced oil recovery (EOR) Carbon Management Workshop (Houston, Texas, December 4–5, 2006, and Midland, Texas, December 6, 2006) with analysis of selected presentations to independently examine cost data for CO<sub>2</sub> separation and compression of various industrial CO<sub>2</sub> sources. Data were useful to identify key issues and in scoping possible incentive levels that might be needed to jumpstart CO<sub>2</sub> capture and storage for major industries.
- Tasks performed by Fischer Oil and Gas, Inc., included the completion of drafts for six topical reports (formation outlines) for review by coauthors; the investigation of deep (lower Ordovician) reservoir characteristics in Beaver Lodge field, Williams County, North Dakota; and work on lignite characterization for central North Dakota.



## Highlights of Progress to Date (cont.)

### Task 6 – Continued Characterization of Regional Sequestration Opportunities (cont.)

#### Characterization (cont.)

- The Iowa Geological Survey (IGS) began refinements and updates to the existing structure, lithofacies, and isopach maps digitized in the previous quarter, including the identification of data needs and “holes” to fill. The most significant changes have been made to maps of Ordovician units.
- In addition, IGS digitized and began the review of existing total dissolved solids (TDS) and potentiometric maps for the Mississippian, Silurian-Devonian, and Cambro-Ordovician Aquifers. These maps, while created 20–30 years ago, are useful starting points for the preparation of final products. Additional information on TDS, collected since they were originally created, has been added to these maps.

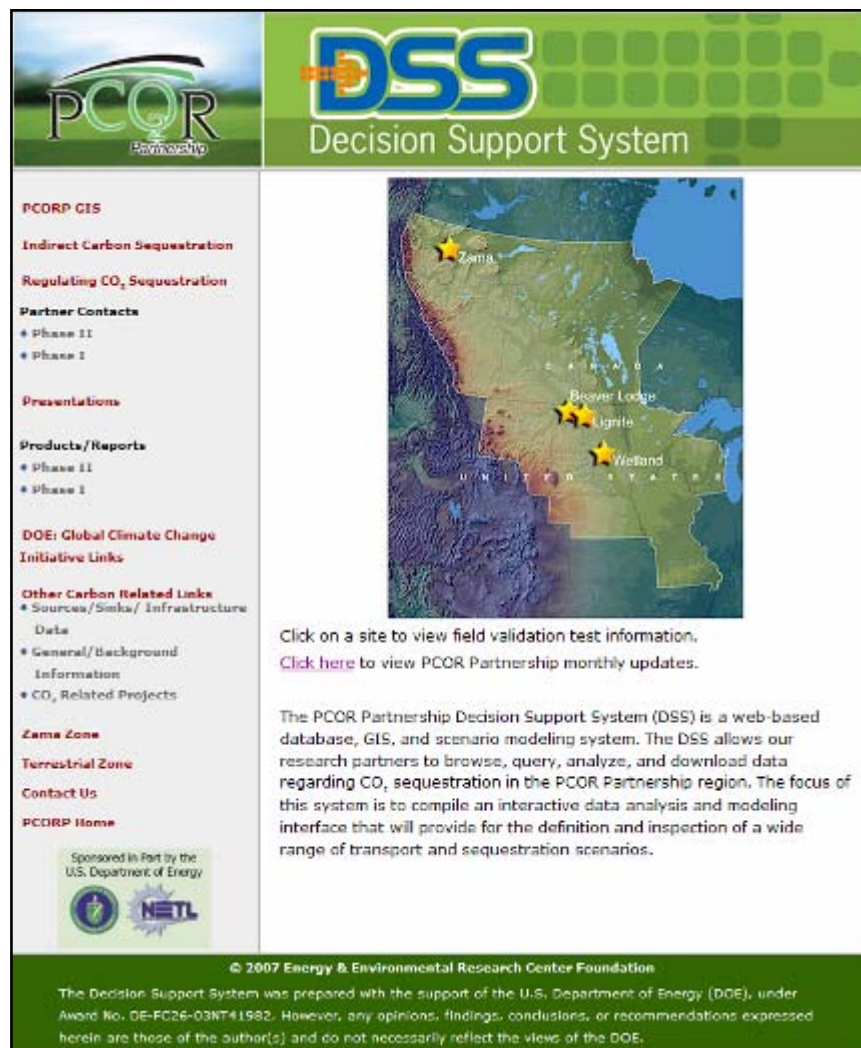


## Highlights of Progress to Date (cont.)

### Task 6 – Continued Characterization of Regional Sequestration Opportunities (cont.)

#### Decision Support System

- Revised the look of the DSS home page. Previously, the home page contained a description of the DSS. The new look displays a map of the region, with the field test sites highlighted. The user can click directly on the site to view a field update (PDF). In addition, the user can view monthly updates on general PCOR Partnership activities.
- Added monthly reports, project updates, and new partners to the DSS.
- Added a measuring tool to the DSS.



# Highlights of Progress to Date (cont.)

## Task 6 – Continued Characterization of Regional Sequestration Opportunities (cont.)

### Other Activities

- Continued work on the second edition of the PCOR Partnership Atlas.
- Reviewed and commented on the National Atlas.
- Participated in geologic information systems (GIS) working group conference calls.
- An article was published in ArcNews. ArcNews is a quarterly news magazine for ESRI users. A link to the article is below:

[www.esri.com/news/arcnews/winter0607articles/carbon-dioxide.html](http://www.esri.com/news/arcnews/winter0607articles/carbon-dioxide.html)



# Highlights of Progress to Date (cont.)

## Task 7 – Research, Safety, Regulatory, and Permitting Issues

### General

- Continued work to review pricing structure and market trends for carbon management plans.
- Continuing review of the PCOR Partnership carbon market video.
- Continued writing an analysis of carbon market strategies.
- Completed review of Draft 1605(b) forms and instructions.
- Completed review of EPA's final guidance to assist state and EPA regional UIC programs in processing permit applications for pilot- and small-scale CO<sub>2</sub> geologic sequestration projects.
- Continued development of a presentation on carbon markets.



# Highlights of Progress to Date (cont.)

## Task 7 – Research, Safety, Regulatory, and Permitting Issues (cont.)

### General (cont.)

- Continued to follow legislative actions occurring in Congress.
- Continued review of recent publications relating to regulating CO<sub>2</sub> sequestration and MMV issues.
- Completed review of American Petroleum Institute (API) carbon capture and sequestration (CCS) guidelines.
- Reviewed MOU (Western Regional Climate Action Initiative) signed by five western governors calling on their respective states to reduce greenhouse gases.

### Lignite Field Validation Test

- Completed and submitted the SHSP and RPAP for Lignite Field Validation Test.
- Completed the drilling permits.



# Highlights of Progress to Date (cont.)

## Task 8 – Public Outreach and Education

- Draft of public Web site to NETL submitted on schedule (August 31, 2006), and submitted for internal EERC review.
- Work under way on Phase II Documentary 1 – Carbon Market Trading (deadline extension to July 31, 2007, to accommodate change in scope under consideration).
  - Filming and interviews completed in Brazil (January 2006), Alexandria, Virginia (May 2006), Europe (June 2006), and Zama, Alberta, Canada (August 2006).
  - Interview and location footage reviewed (August – September 2006).
  - Draft video track (October 2006).
  - Additional interviews and location footage in Chicago, Illinois, and Washington, D.C. (November – December 2006).
  - Scope expanded to include private investment activities in geologic sequestration projects (December 2006).
- Outreach PowerPoint update submitted on schedule (February 28, 2007).
- Continued collaboration on Regional Carbon Sequestration Program (RCSP) Outreach Working Group activities.



# Highlights of Progress to Date (cont.)

## Task 9 – Identification of the Commercially Available Sequestration Technologies Ready for Large-Scale Deployment

- Responded to partner requests for CO<sub>2</sub> capture, compression, and/or pipeline information.
- Continued planning the RCSP Capture, Separation, and Transportation Working Group Workshop, which will be held at the EERC in June 2007. An optional tour of the Dakota Gasification Company synfuels facility (with an emphasis on the CO<sub>2</sub> capture and compression plants) will be scheduled for the day following the end of the workshop at the EERC.
- Wrote a section dealing with CO<sub>2</sub> capture and separation, compression, and transportation for the new version of the PCOR Partnership Atlas; provided photos for use as graphics for the section; reviewed the entire Atlas and provided comments.
- Attended the RCSP Capture, Separation, and Transportation Working Group models tutorial session held at NETL on March 7, 2007. Capture and pipeline routing/cost-calculation models were presented to the group.
- Assisted with updating the master sources spreadsheet used by the PCOR Partnership DSS and calculated more current regional CO<sub>2</sub> emission values for use in outreach documents.
- Participated in meetings with the Lignite Energy Council Director of Research and Development to construct a road map of advanced combustion technologies, gasification technologies, and carbon management technologies specific to lignite.



# Highlights of Progress to Date (cont.)

## Task 10 – Regional Partnership Program Integration

- Membership discussions continued with numerous organizations.
- Participation continued in geologic, outreach, capture and separation, and GIS working group conference calls.
- Continuing to collaborate with partners in preparation for Phase III.
- Mailed partner information on Regional Partnerships Phase III (January 5, 2006).
- Submitted an abstract on PCOR Partnership general overview /CO<sub>2</sub> markets to present at the 24th Pittsburgh Coal Conference, Johannesburg, South Africa, September 10–14, 2007.
- All completed fact sheets from Phases I and II are on public and private Web site (February 2007).
- Working on preparations for the PCOR Partnership 2007 Annual Meeting, October 18–19, 2007, Grand Forks, North Dakota.



# Project Tasks and Status

Task 1 – Management and Reporting		
Activity	Description	Status
1	Design project management and reporting plan	Completed (December 30, 2005)
2	Perform project management	Ongoing
3	Develop PCOR Partnership Phase II final report	Future activity (due September 30, 2009)



# Project Tasks and Status (cont.)

Task 2 – Field Validation Test at Beaver Lodge, North Dakota		
Activity	Description	Status
1	Project design	Ongoing
2	Project implementation	Limited laboratory activities have been initiated.
3	Project operations	Future activity
4	Closeout and reporting	Future activity



# Project Tasks and Status (cont.)

Task 3 – Field Validation Test at Zama, Alberta		
Activity	Description	Status
1	Project design	Completed
2	Project implementation	Completed
3	Project operations	Ongoing
4	Closeout and reporting	Future activity



# Project Tasks and Status (cont.)

Task 4 – Field Validation Test of North Dakota Lignite		
Activity	Description	Status
1	Project design	Ongoing
2	Project implementation	Initiating
3	Project operations	Future activity
4	Closeout and reporting	Future activity



# Project Tasks and Status (cont.)

Task 5 – Terrestrial Validation Test		
Activity	Description	Status
1	Project design	Ongoing
2	Project implementation	Ongoing
3	Project operations	Initiating
4	Closeout and reporting	Ongoing



# Project Tasks and Status (cont.)

Task 6 – Characterization of Regional Characterization Opportunities		
Activity	Description	Status
1	Regional characterization gap assessment (RCGA)	First assessment completed (February 28, 2006) (second assessment due third budget period)
2	Data collection	Ongoing
3	Improvements to the PCOR Partnership DSS	Ongoing. New site released on 7/14/06. Updated site releases: December 2006, February 2007.
4	Reporting	Ongoing



# Project Tasks and Status (cont.)

Task 7 – Research, Safety, Regulatory, and Permitting Issues		
Activity	Description	Status
1	Existing regulations related to the sequestration of CO <sub>2</sub> identified and tracked	Ongoing
2	New regulatory guidelines collated for projects implemented and commercially ready future sequestration projects	Ongoing
3	Reporting	Ongoing



# Project Tasks and Status (cont.)

Task 8 – Public Outreach and Education		
Activity	Description	Status
1	Outreach planning	Task 2 OAP – in progress (due June 30, 2007) Task 3 OAP – completed Task 4 OAP – in progress (due April 30, 2007) Task 5 OAP – completed Task 8 OAP – completed
2	Web site	Phase II update complete (August 31, 2006), undergoing internal review and finalization Annual updates planned
3	Outreach booth	In progress (due April 30, 2007)
4	Outreach PowerPoint	Completed (May 31, 2006) 2007 update submitted (February 28, 2007) Annual updates planned



# Project Tasks and Status (cont.)

Task 8 – Public Outreach and Education		
Activity	Description	Status
5	Fact sheets	<p>Fact Sheet 6 – completed</p> <p>Fact Sheet 7 – completed</p> <p>Fact Sheet 8 – completed</p> <p>Fact Sheet 9 – in progress (due May 31, 2007)</p> <p>Fact Sheet 10 – future activity (due October 31, 2007)</p>
6	Documentaries	<p>Documentary 1 – in progress (due July 31, 2007)</p> <p>Documentary 2 – in progress (due January 31, 2008)</p> <p>Documentary 3 – future activity (due September 30, 2008)</p> <p>Documentary 4 – future activity (due June 30, 2009)</p>
7	Reporting	Ongoing



# Project Tasks and Status (cont.)

Task 9 – Identification of the Commercially Available Sequestration Technologies Ready for Large-Scale Deployment		
Activity	Description	Status
1	Economic assessment of regional sequestration opportunities	Ongoing
2	New sequestration approaches	Ongoing
3	Reporting	Ongoing



# Project Tasks and Status (cont.)

Task 10 – Regional Partnership Program Integration		
Activity	Description	Status
1	Development of regional partnership program integration plan (RPPIP)	Completed
2	Integration of partnership program activities	Ongoing
3	Reporting	Ongoing



# Project Milestones

Milestone	Description	Status
<b>Task 1 – Management and Reporting</b>		
1	Design project management and reporting plan	Completed (December 30, 2005)
2	Manage writing of progress report	Ongoing
3	Provide overall project management	Ongoing
4	Provide quarterly and semiannual reports	Ongoing
5	PCOR Partnership Phase I wrap-up/Phase II kickoff meeting	Completed (November 1–2, 2005)
<b>Task 2 – Field Validation Test at Beaver Lodge, North Dakota</b>		
1	Finalization of site-specific MMV plan	Ongoing
2	Initiation of baseline characterization activities	Ongoing
3	Historical data collection	Ongoing
4	Identification of data gaps	Ongoing
5	Analytical activities on reservoir and caprock core samples	Initiated



# Project Milestones (cont.)

Milestone	Description	Status
<b>Task 2 – Field Validation Test at Beaver Lodge, North Dakota (cont.)</b>		
6	Identification of specific well locations within the Beaver Lodge field	Ongoing
7	Facilitate the development of a site-specific plan for the installation and/or application of selected MMV technologies	Ongoing
8	Facilitate the identification of infrastructure requirements	Future activity
9	Finalization of Hess Corporation CO <sub>2</sub> flood design	Future activity
10	Installation of CO <sub>2</sub> delivery system by Hess Corporation	Future activity
11	Collection of site-specific baseline surface and subsurface data	Ongoing
12	Installation of CO <sub>2</sub> injection wells by Hess Corporation	Future activity
13	Progress reports 60 days prior to conclusion of Budget Period 1	Future activity (due July 31, 2007)
14	RTIP detailing MMV activities at an ongoing oil-producing facility	Future activity (due July 31, 2009)



# Project Milestones (cont.)

Milestone	Description	Status
<b>Task 3 – Field Validation Test at Zama, Alberta</b>		
1	H <sub>2</sub> S/CO <sub>2</sub> injection commences	Injection was initiated in December
2	Reservoir modeling	Planning for model modification under way
3	Data acquisition and design	Ongoing
4	Geologic characterization of the region (northwestern Alberta/northeastern British Columbia)	Ongoing
5	Establish hydrogeology of the study area	Ongoing
6	Conduct geomechanical tests of reservoir and caprock core samples to determine the mechanical integrity of those formations; results will be used to predict pressure that can be applied to the pinnacle before the sealing formation will be fractured.	Ongoing
7	Significant achievements/MMV updates	Future activity
8	Stress regimes of the injection zone	Ongoing
9	Assessment of influence of underlying aquifers	Ongoing
10	Progress report 60 days prior to conclusion of Budget Period 1	Future activity (due July 31, 2007)
11	Geochemistry of the surface to subsurface	Future activity
12	Assessment of leakage potential as a result of injection	Ongoing
13	RTIP detailing MMV activities at an ongoing oil-producing facility	Future activity (due July 31, 2009)



# Project Milestones (cont.)

Milestone	Description	Status
<b>Task 4 – Field Validation Test of North Dakota Lignite</b>		
1	Initiation of baseline characterization activities	Completed (December 30, 2005)
2	Identification of specific well locations within the North Dakota lignite CBM test	Completed
3	Finalization of CO <sub>2</sub> flood design	Future activity
4	Collection of site-specific baseline surface and subsurface data	Ongoing
5	Installation of selected MMV technologies	Future activity
6	Progress report 60 days prior to conclusion of Budget Period 1	Future activity (due July 31, 2007)
7	Finalization of site-specific MMV plan	Ongoing
8	Installation of CO <sub>2</sub> delivery system	Future activity
9	Installation of CO <sub>2</sub> injection wells	Future activity
10	Initial injection of CO <sub>2</sub> into subsurface	Future activity
11	Initial collection of MMV data	Future activity
12	Review and analysis of results of first year of operation	Future activity
13	Review and analysis of results of second year of operation	Future activity
14	RTIP detailing MMV activities at an ongoing oil-producing facility	Future activity



# Project Milestones (cont.)

Milestone	Description	Status
<b>Task 5 – Terrestrial Validation Test</b>		
1	Develop an experimental design package	Completed (February 28, 2006)
2	Safety, regulatory, and permitting	Completed (March 31, 2006)
3	GIS modeling to extrapolate survey site information to region	Ongoing
4	Progress report 60 days prior to conclusion of Budget Period 1	Future activity (due July 31, 2007)
5	Preparation and distribution of materials to solicit participation	Initiating
6	Indirect benefits	Completed (March 2007)
7	Regional partnerships for CO <sub>2</sub> sequestration	Future activity
8	Land use management practices that increase SOC	Complete in draft form
9	Business flow process for carbon credit trading	Ongoing
10	Economic feasibility of CO <sub>2</sub> sequestration	Ongoing
11	RTIP	Future activity
12	Compiling design criteria	Ongoing
13	Develop Web-based landowner outreach strategy	Ongoing
14	Data compilation and analysis	Ongoing



# Project Milestones (cont.)

Milestone	Description	Status
<b>Task 6 – Characterization of Regional Characterization Opportunities</b>		
1	Conduct DSS data gap assessment (Budget Period 1)	Completed (February 28, 2006)
2	Place updated DSS into production	Updates sites released: July 2006, December 2006, February 2007.
3	Progress report 60 days prior to conclusion of Budget Period 1	Future activity (due July 31, 2007)
4	Conduct data gap assessment (Budget Period 3)	Future activity
5	Create field project data warehouse and put into production	Zama site completed (June 30, 2006) Terrestrial site completed (November 2006)
<b>Task 7 – Research, Safety, Regulatory, and Permitting Issues</b>		
1	Provide regulatory support to Tasks 3 and 5 field validation testing	Ongoing
2	Provide summary of regulations related to four Phase II validation tests	Ongoing
3	Provide regulatory input to progress report	Future activity
4	Provide regulatory support to Tasks 2 and 4	Ongoing
5	Progress report 60 days prior to conclusion of Budget Period 1	Future activity (due July 31, 2007)
6	Road map document produced	Future activity



# Project Milestones (cont.)

Milestone	Description	Status
<b>Task 8 – Public Outreach and Education</b>		
1	Fact sheet production	<p>Fact Sheet 6 – completed (December 31, 2005)</p> <p>Fact Sheet 7 – completed (July 31, 2006)</p> <p>Fact Sheet 8 – completed (December 31, 2006)</p> <p>Fact Sheet 9 – in progress (due May 31, 2007)</p> <p>Fact Sheet 10 – future activity (due October 31, 2007)</p>
2	OAP	<p>Task 2 OAP – future activity (due June 30, 2007)</p> <p>Task 3 OAP – completed (April 30, 2006)</p> <p>Task 4 OAP – in progress (due April 30, 2007)</p> <p>Task 5 OAP – completed (April 30, 2006)</p> <p>Task 8 OAP – completed (February 28, 2006)</p>
3	PowerPoint presentation	Completed (May 31, 2006), 2007 update submitted (February 28, 2007)
4	Update to PCOR Partnership Web site	Phase II update complete (August 31, 2006), undergoing internal review and finalization, annual updates planned



# Project Milestones (cont.)

Milestone	Description	Status
<b>Task 8 – Public Outreach and Education, cont.</b>		
5	First Phase II video produced with Prairie Public Television (PPTV) (carbon credit trading)	In progress (due July 31, 2007)
6	Outreach booth	In progress (due April 30, 2007)
7	Progress report 60 days prior to conclusion of Budget Period 1	Future activity (due July 31, 2007)
8	Second Phase II video produced with PPTV (terrestrial)	Future activity (due January 30, 2008)
9	Third Phase II video produced with PPTV (geologic)	Future activity (due September 30, 2008)
10	Fourth Phase II video produced with PPTV (CO <sub>2</sub> sequestration overview)	Future activity (due June 30, 2009)
11	BPM detailing outreach activities	Future activity
12	Balancing the regional and general outreach with needs at the specific field validation test locations	Ongoing
13	Keeping regional outreach activity in tune with the national RCSP program message and goals	Ongoing



# Project Milestones (cont.)

Milestone	Description	Status
<b>Task 8 – Public Outreach and Education (cont.)</b>		
14	Ensuring appropriate feedback opportunities for input and review by partners in the outreach process	Ongoing
15	Documentation of impact of outreach activities	Future activity
<b>Task 9 – Identification of the Commercially Available Sequestration Technologies Ready for Large-Scale Deployment</b>		
1	Economic assessment of regional sequestration opportunities	Ongoing
2	New sequestration approaches – wind power	Draft submitted on December 1, 2006
3	New sequestration approaches – Excelsior Energy	Draft white paper submitted to Excelsior (December 31, 2006)
5	Progress report 60 days prior to conclusion of Budget Period 1	Future activity (due July 31, 2007)
<b>Task 10 – Regional Partnership Program Integration</b>		
1	Development of RPPIP	Completed (July 18, 2006)
2	PCOR Partnership annual meeting	2006 completed (September 14, 2006 Calgary, Alberta)
3	Progress report 60 days prior to conclusion of Budget Period 1	Future activity (due July 31, 2007)
4	Participation in DOE Regional Partnership Working Groups	Ongoing



# Project Recognition

## **Presented at and/or participated in the following meetings/conferences:**

- North American Carbon Markets, Washington, D.C. (January).
- Electric Utilities Environmental Conference (EUEC), Tucson, Arizona (January).
- Ground Water Protection Council Regulatory Workshop on Geologic Sequestration of CO<sub>2</sub>, San Antonio, Texas (January).
- Meeting with Ducks Unlimited, Inc., to discuss terrestrial field demonstration, Bismarck, North Dakota (January).
- Meeting to discuss terrestrial field demonstration, Goebel Ranch, South Dakota (February).
- Environmental Systems Research Institute (ESRI) Petroleum Users Group Annual Meeting, Houston, Texas (February).
- Public Service Commission Talk about sequestration, Bismarck, North Dakota (February).
- Zama Field Validation Demonstration Meeting, Calgary, Alberta (March).
- The Capture and Transportation Model Seminar, Pittsburgh, Pennsylvania (March).
- Meeting with Minnesota Geological Survey and Excelsior Energy to discuss Phase III, St. Paul, Minnesota (March).
- Meeting to discuss terrestrial field demonstration, Grand Forks, North Dakota (March).
- Carbon Sequestration Leadership Forum Meeting (CSLF), Paris, France (March).
- American Association of Petroleum Geologist Conference, Long Beach, California (March–April).
- Point Carbon North American Carbon Markets Conference, Washington, D.C. (March).



# Project Deliverables

Deliverable	Description	Status
<b>Task 1 – Management and Reporting</b>		
1	Project management plan	Completed (December 30, 2005)
2	Quarterly reports	Ongoing
3	Continuation application for Budget Period 2	Ongoing (due July 31, 2007)
4	Attendance/presentations at technical meetings	Ongoing
5	PCOR Partnership meetings/workshops	Ongoing
6	PCOR Partnership Phase II final report	Future activity (due September 30, 2009)
<b>Task 2 – Field Validation Test at Beaver Lodge, North Dakota</b>		
1	EDP and NEPA compliance document	Ongoing (due June 30, 2007)
2	SHSP	Future activity (due June 30, 2007)
3	OAP	Future activity (due June 30, 2007)
4	RPAP	Future activity (due June 30, 2007)
5	Sampling protocols	Future activity (due June 30, 2007)
6	Progress report	Future activity (due July 31, 2007)
7	RTIP	Future activity (due July 31, 2009)



## Project Deliverables (cont.)

Deliverable	Description	Status
<b>Task 3 – Field Validation Test at Zama, Alberta</b>		
1	EDP and NEPA compliance document	Completed (February 28, 2006)
2	SHSP	Completed (March 31, 2006)
3	OAP	Completed (April 28, 2006)
4	RPAP	Completed (March 27, 2006)
5	Sampling protocols	Completed (June 30, 2006)
6	Progress report	Future activity (due July 31, 2007)
7	RTIP	Future activity (due July 31, 2009)
<b>Task 4 – Field Validation Test of North Dakota Lignite</b>		
1	EDP and NEPA compliance document	Completed NEPA, November 2006. Completed EDP February 2007.
2	SHSP	Completed (March 31, 2007)
3	OAP	Future activity (due April 30, 2007)
4	RPAP	Completed (March 31, 2007)
5	Sampling protocols	Future activity (due June 30, 2007)
6	Progress report	Future activity (due July 31, 2007)
7	RTIP	Future activity (due July 31, 2009)



## Project Deliverables (cont.)

Deliverable	Description	Status
<b>Task 5 – Terrestrial Validation Test</b>		
1	EDP and NEPA compliance document	Completed (February 28, 2006)
2	SHSP	Completed (February 28, 2006)
3	OAP	Completed (April 28, 2006)
4	RPAP	Completed (March 31, 2006)
5	Sampling protocols	Completed (June 21, 2006)
6	Progress report	Future activity (due July 31, 2007)
7	RTIP	Future activity (due July 31, 2009)
<b>Task 6 – Characterization of Regional Characterization Opportunities</b>		
1	RCGA – Budget Period 1	Completed (February 28, 2006)
2	Progress report	Future activity (due July 31, 2007)
3	RCGA – Budget Period 2	Future activity (due October 31, 2007)
4	Regional atlas	Future activity (due June 30, 2009)
<b>Task 7 – Research, Safety, Regulatory, and Permitting Issues</b>		
1	Progress report	Future activity (due July 31, 2007)
2	Road map document	Future activity (due June 30, 2009)



## Project Deliverables (cont.)

Deliverable	Description	Status
<b>Task 8 – Public Outreach and Education</b>		
1	Fact sheets	<p>Fact Sheet 6 – completed (December 31, 2005)</p> <p>Fact Sheet 7 – completed (July 31, 2006)</p> <p>Fact Sheet 8 – completed (December 31, 2006)</p> <p>Fact Sheet 9 – future activity (due May 31, 2007)</p> <p>Fact Sheet 10 – future activity (due October 31, 2007)</p>
2	OAP	<p>Task 2 OAP – future activity (due June 30, 2007)</p> <p>Task 3 OAP – completed (April 30, 2006)</p> <p>Task 4 OAP – in progress (due April 30, 2007)</p> <p>Task 5 OAP – completed (April 30, 2006)</p> <p>Task 8 OAP – completed (February 28, 2006)</p>
4	PowerPoint presentations	Completed (May 31, 2006), 2007 update submitted (February 28, 2007), annual updates planned



## Project Deliverables (cont.)

Deliverable	Description	Status
<b>Task 8 – Public Outreach and Education, cont.</b>		
5	Videos	<p>Documentary 1 – Carbon Market Trading, in progress (due July 31, 2007)</p> <p>Documentary 2 – in progress (due January 2008)</p> <p>Documentary 3 – future activity (due September 30, 2008)</p> <p>Documentary 4 – future activity (due June 30, 2009)</p>
6	Web site update	<p>Phase II update complete (August 31, 2006), undergoing internal review and finalization</p> <p>Annual updates planned</p>
7	Outreach booth	In progress (due April 30, 2007)
8	Progress report	Future activity (due July 31, 2007)



## Project Deliverables (cont.)

Deliverable	Description	Status
<b>Task 9 – Identification of the Commercially Available Sequestration Technologies Ready for Large-Scale Deployment</b>		
1	BPM – regional sequestration opportunities	Future activity (due July 31, 2008)
2	BPM – Excelsior Energy, Inc.	Future activity (due November 30, 2007)
3	BPM – wind energy	Draft submitted, currently in final internal review
4	Progress report	Future activity (due July 31, 2007)
<b>Task 10 – Regional Partnership Program Integration</b>		
1	RPPIP	Completed (July 18, 2006)
2	Progress report	Future activity (due July 31, 2007)



# Next Steps

## **Task 1 – Management and Reporting**

- Continue to ensure timely production of deliverables and overall project management.

## **Task 2 – Field Validation Test – Beaver Lodge, North Dakota**

- Finalization of NEPA document.
- Finalization of EDP.
- Finalization of OAP.
- Finalization of SHSP.
- Identification of potential subcontractors for selected MMV activities.

## **Task 3 – Field Validation Test – Zama, Alberta**

- Project meetings in June 2007.
- Continue efforts to collect and analyze “new” core samples exposed to acid gas in the reservoir.



# Next Steps (cont.)

## Task 4 – Field Validation Test – North Dakota Lignite

- Complete the OAP.
- Finalize drilling prognosis and submit drilling permit applications to NDIC.
- Finalize logging plans with Schlumberger.
- Meet with State Land Department to discuss final drilling plans.
- Meet with Burke County officials to discuss project.
- Continue baseline characterization and model development.
- Prepare to drill in May or June.
- Continue to work on securing CO<sub>2</sub> for injection.

## Task 5 – Terrestrial Validation Test

- Publish NDSU wetlands paper.
- Initiate field sampling (April 2007).
- Implement sampling protocols.
- Continue to produce business flow documents.
- Continue to produce fact sheets.
- Continue to evaluate terrestrial carbon markets.



## Next Steps (cont.)

### **Task 6 – Characterization of Regional Sequestration Opportunities**

- Continue to update the DSS with regional characterization information.
- Revise the static pages in the DSS Web site.

### **Task 7 – Research, Safety, Regulatory, and Permitting Issues**

- Provide guidance with regard to regulatory issues to other task leaders.
- Continue to analyze the development and activity of carbon markets.
- Continue to assess regulatory developments.
- Continue to pursue regulatory partners.



# Next Steps (cont.)

## Task 8 – Public Outreach and Education

- Complete Web update (NETL comments received, internal review continues).
- Continue preparation of Documentary 1 (scope change and extension to July 2007).
- Finalize Year 2 update of PowerPoint (due February 2007).
- Submit outreach booth for review (due April 2007).
- Submit lignite verification project OAP for review (due April 2007).
- Submit Fact Sheet 9 for review (due May 2007).
- Submit Beaver Lodge OAP for review (due June 2007).
- Continue preparation of Documentary 2 (due January 2008).

## Task 9 – Identification of the Commercially Available Sequestration Technologies Ready for Large-Scale Deployment

- Check CO<sub>2</sub> emission values for all sources in the DSS GIS data set to ensure that the most current data are included; update the data set with additional sources as they are identified.
- Fill DSS infrastructure data gaps.
- Finalize the BPM for wind power to provide energy required for pipeline compression of CO<sub>2</sub>.
- Prepare a Task 9 progress report covering the first two years of Phase II.
- Review and prepare a new budget for Task 9, Years 3 and 4, of Phase II.



## Next Steps (cont.)

### **Task 9 – Identification of the Commercially Available Sequestration Technologies Ready for Large-Scale Deployment, cont.**

- Prepare the final Excelsior Energy carbon management plan.
- Prepare a BPM for development of carbon management plans.
- Complete the planning of the regional partnerships' capture and transportation working group meeting to be held at the EERC in June 2007.
- Implement the use of appropriate pipeline and capture cost models into the Task 9 work.
- Begin calculation of replacement power needed if capture is employed to reduce regional emissions.
- Prepare a module explaining capture and separation for inclusion on the PCOR Partnership Web site.

### **Task 10 – Regional Partnership Integration**

- Increase development to integrate all RCSPs.
- Also increase the involvement of all PCOR Partnership partners.



# Upcoming Issues

## **Task 1 – Management and Reporting**

- None anticipated at this time.

## **Task 2 – Field Validation Test – Beaver Lodge, North Dakota**

- Possible adjustments to the 2007 field work schedule (to accommodate industrial partners schedules).

## **Task 3 – Field Validation Test – Zama, Alberta**

- None anticipated at this time.

## **Task 4 – Field Validation Test – North Dakota Lignite**

- None anticipated at this time.

## **Task 5 – Terrestrial Validation Test**

- None anticipated at this time.

## **Task 6 – Characterization of Regional Sequestration Opportunities**

- None anticipated at this time.

## **Task 7 – Research, Safety, Regulatory, and Permitting Issues**

- None anticipated at this time.

## **Task 8 – Public Outreach and Education**

- Finalize interviews and locations for Video 2.

## **Task 9 – Identification of the Commercially Available Sequestration Technologies Ready for Large-Scale Deployment**

- None anticipated at this time.

## **Task 10 – Regional Partnership Integration**

- None anticipated at this time.

