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Energy & Environmental Research Center

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October 31, 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_2 Reduction Partnership Semiannual Technical Progress Report
for the Period April 1 – September 30, 2007
DOE Cooperative Agreement No. DE-FC26-05NT42592; EERC Fund 9179

Enclosed are hard copies of the Semiannual Technical Progress Report, which includes the Request for Patent Clearance Form for the Plains CO_2 Reduction (PCOR) Partnership Program. Also enclosed is a disk containing the Semiannual Technical Progress Report. As required by the Cooperative Agreement, we have submitted the report to the FITS Web site.

If you have any questions, please call me at (701) 777-5279 or e-mail me at esteadman@undeerc.org.

Sincerely,

for Edward N. Steadman
PCOR Partnership Manager
EERC 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

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TO: ■ For Technical Reports
AAD Document Control
U.S. Department of Energy - NETL
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For Technical Papers/Journal Articles/Presentations
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♦Award No.
DE-FC26-05NT42592

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

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

1. Document Title: Plains CO_2 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 Landis (Awardee) Date 11-1-07

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

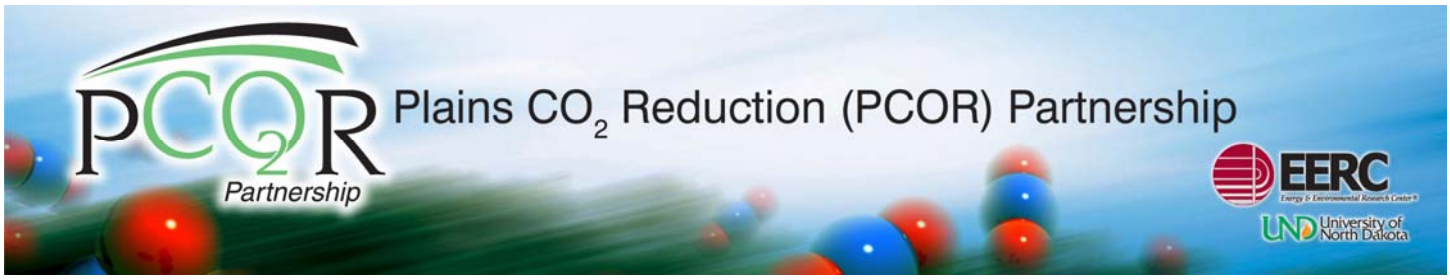
Address Energy & Environmental Research Center, 15 North 23rd Street, Stop 9018, Grand Forks, ND, 58202-9018

B. DOE PATENT COUNSEL ACTION

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

☐ Other: _____

Signed _____ Date _____
(Patent Attorney)



PLAINS CO_2 REDUCTION PARTNERSHIP (PHASE II)

Semiannual Technical Progress Report

(for the period April 1 – September 30, 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
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October 2007

DOE DISCLAIMER

EERC DISCLAIMER

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EXECUTIVE SUMMARY

The goals and objectives of the Plains CO_2 Reduction (PCOR) Partnership Phase II program are to validate technologies and develop opportunities for our partners to capture and sequester CO_2 and, ultimately, to market and monetize credits. The long-range goal is to support the U.S. Department of Energy (DOE) FutureGen Initiative and to mitigate risk to industries that rely on fossil fuels by taking a market- and incentive-based approach to carbon management. The PCOR Partnership will accomplish this by 1) continuing to assess regional sequestration opportunities; 2) performing field validation tests that provide the information needed to monetize carbon credits; 3) evaluating the feasibility of selected commercial-scale carbon sequestration technologies; 4) assessing the economics, risk, public acceptance, and societal and monetary cobenefits of CO_2 sequestration; 5) ongoing collaboration with the other six Regional Carbon Sequestration Partnership Program partnerships; and 6) providing outreach and education for CO_2 sequestration stakeholders and the general public.

This reporting period saw significant progress in both the field validation test tasks (Tasks 2–5) and in the supporting tasks (Tasks 1, 6–10).

Significant progress has been made at the Zama Field Validation Test site with the implementation of a solid monitoring, mitigation, and verification (MMV) program. The official start-up of the 100/01-13-116-6W6 acid gas injector on the Zama Keg River F Pool was December 17, 2006. Preparatory work for the Williston Basin Oil Field Validation Test is ongoing, and significant progress has been made gathering baseline information on Williston Basin oil fields to identify candidate fields to host the injection and MMV activities. Progress in the Lignite Field Validation Test includes procuring the necessary permits and developing commercial partners. This quarter, the Lignite Field Validation Test completed drilling a five-spot CO_2 injection and monitoring pattern. The preliminary logs and coring data are currently being review and analyzed. The drilling prognosis has been completed. Initial work on the carbon sequestration program brochure and the detailed fact sheet for investors is under way. Regional characterization continues, and the Decision Support System (DSS) continues to evolve and improve. The regulatory, outreach, and program integration tasks are continuing to meet program goals.

PLAINS CO_2 REDUCTION PARTNERSHIP
Semiannual Technical Progress Report
April 1 – September 30, 2007

APPROACH

As one of seven Regional Carbon Sequestration Partnerships (RCSPs), the Plains CO_2 Reduction (PCOR) Partnership is identifying practical CO_2 sequestration options for the PCOR Partnership region. The PCOR Partnership is characterizing the technical issues, enhancing the public's understanding of CO_2 sequestration, identifying the most promising opportunities for sequestration in the region, and detailing an action plan for the demonstration of regional CO_2 sequestration opportunities. As a result of Phase I efforts, several field validation tests have been selected to facilitate and manage the demonstration and deployment of CO_2 sequestration projects (Figure 1).

This report summarizes the activities for this reporting period. The activities are organized into ten tasks: 1) Task 1 – Management, Reporting, and Technical Outreach involves overall project management and development and distribution of required project reports; 2) Task 2 – Field Validation Test in a Williston Basin Oil Field, North Dakota, will evaluate the potential for geological sequestration of CO_2 in a deep carbonate reservoir in northwestern North Dakota for the dual purpose of CO_2 sequestration and enhanced oil recovery (EOR); 3) Task 3 – Field

Figure 1. PCOR Partnership Phase II sequestration field validation test sites.

Validation Test at Zama, Alberta, is evaluating the potential for geological sequestration of CO_2 as part of an acid gas stream that also includes high concentrations of H_2S; 4) Task 4 – Field Validation Test of North Dakota Lignite is evaluating the effectiveness of lignite seams to act as sinks for CO_2 during simultaneous CO_2 sequestration and enhanced coalbed methane (ECBM) production in the Williston Basin; 5) Task 5 – Terrestrial Validation Test is developing a market-based carbon sequestration strategy to capitalize on the tremendous potential for carbon sequestration in the wetlands of our region; 6) Task 6 – Characterization of Regional Sequestration Opportunities is refining the characterization of the region with respect to CO_2 sinks and sources; 7) Task 7 – Research Safety, Regulatory, and Permitting Issues is developing and implementing action plans that satisfy local, state, and federal permitting requirements for demonstration projects conducted in the region; 8) Task 8 – Public Outreach and Education has been designed to ensure that the community is well informed about CO_2 sequestration and clearly understands its potential within the region; 9) Task 9 – Identification of the Commercially Available Sequestration Technologies Ready for Large-Scale Deployment is identifying technologies and approaches suitable for the region and estimate their economic viability; and 10) Task 10 – Regional Partnership Program Integration is ensuring that the PCOR Partnership activities are integrated with other U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) RCSPs.

Results for the reporting period of April 1 – September 30, 2007, in Phase II have focused on PCOR Partnership public Web site updates, an outreach action plan (OAP), a PCOR Partnership outreach booth, the Phase II continuation application (progress report), a new documentary on carbon markets and trading, version two of the PCOR Partnership Regional Atlas, a sampling protocol document, a number of fact sheets, PCOR Partnership 2007 Annual Meeting preparation, "Partners-Only" Web site additions, quarterly milestones, wrap-up of Budget Period Two, establishing subcontracts, and a continuation of the scheduled monthly and quarterly updates to DOE.

RESULTS AND DISCUSSION

Task 1 – Management, Reporting, and Technical Outreach

Task 1 includes all project management and reporting activities. This reporting period focused on the following activities: 1) managing overall project activities, 2) informing stakeholders about DOE's Regional Carbon Sequestration Partnership Program and the PCOR Partnership, 3) adding new partners to the PCOR Partnership (Table 1), and 4) discussing existing and potential demonstration activities with prospective Phase II participants.

Project Activities

Representatives from the PCOR Partnership participated in and/or presented at the following meetings:

- April 2–4, 2007: American Association of Petroleum Geologists Annual Conference, Long Beach, California.

- April 11–12, 2007: Discussion of Phase III activities with Headquarters and other RCSP Partnerships, Pittsburgh, Pennsylvania.
- April 29–May 1, 2007: Williston Basin Symposium, Regina, Saskatchewan, Canada.
- May 2, 2007: Participated in Western Canada Sedimentary Basin Working Group Meeting, Regina, Saskatchewan, Canada.
- May 6–8, 2007: Interstate Oil and Gas Compact Commission Conference, Point Clear, Alabama.
- May 7–10, 2007: Sixth Annual Conference on Carbon Capture & Sequestration, Pittsburgh, Pennsylvania.
- May 21–23, 2007: Carbon Finance and Investment Summit, New York, New York.
- May 22, 2007: Meeting with Lignite Energy Council and regional utility companies to discuss Phase III, Bismarck, North Dakota.
- June 5–8, 2007: Zama Quarterly Meeting, Calgary, Alberta, Canada.
- June 10–15, 2007: 32nd International Technical Conference on Coal Utilization & Fuel Systems, Clearwater, Florida.
- June 18–22, 2007: ESRI International Users Group Meeting, San Diego, California.
- June 18, 2007: Toured the Dakota Gasification Company's Great Plains Synfuels Plant, Beulah, North Dakota.
- June 19–20, 2007: Carbon Capture, Separation, and Transportation Working Group Workshop at the Energy & Environmental Research Center, Grand Forks, North Dakota.
- June 21, 2007: Capacity Working Group Meeting (subgroup to Capacity Working Group), Pittsburgh, Pennsylvania.
- June 25–26, 2007: Oil and Gas Research Council Meeting, Bismarck, North Dakota.
- July 10, 2007: Phase III discussions with Encore Acquisition Company, North Dakota Petroleum Council, Air Products, and Westmoreland Coal Company, Grand Forks, North Dakota.
- July 24, 2007: Meeting with NDIC and North Dakota Geological Survey to discuss the gas analysis project, Bismarck, North Dakota.
- August 2, 2007: Meeting with Hess Corporation to discuss Phases II and III, Williston, North Dakota.
- August 14, 2007: Office of Science Review, Washington, D.C.
- August 16–20, 2007: American Petroleum Institute meeting, Dickinson, North Dakota.
- August 23, 2007: Capacity Working Group Meeting, Houston, Texas.
- August 28, 2007: Missouri River Energy Meeting (Phase II membership discussion), EERC, Grand Forks, North Dakota.
- September 4–7, 2007: Zama Quarterly Meeting, Calgary, Alberta, Canada.
- September 10–14, 2007: 24th Pittsburgh Coal Conference, Johannesburg, South Africa.
- September 17–20, 2007: Peer Review of the CS Program, Pittsburgh, Pennsylvania.
- September 18–20, 2007: North Dakota Petroleum Council 26th Annual Meeting, Medora, North Dakota.
- September 24–26, 2007: Air Quality VI, Arlington, Virginia.
- September 27, 2007: North Dakota Association of Oil and Gas Counties Annual Meeting, Williston, North Dakota.
- September 28, 2007: Society of Exploration of Geophysicists Post Convention Workshop on "CO_2 Sequestration Monitoring," San Antonio, Texas.

Materials presented at these meetings were sent to the DOE Contracting Officer's Representative (COR) under separate cover.

PCOR Partnership Phase II Partners

Phase II of the PCOR Partnership grew from 66 partners in reporting period October 1, 2006 – March 31, 2007, to 70 partners in reporting period April 1 – September 30, 2007. The membership, as of September 30, 2007, is listed in Table 1.

Table 1. PCOR Phase II Partners (70, 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
American Lignite Energy (ALE)
Apache Canada Ltd.
Basin Electric Power Cooperative
Blue Source, LLC
British Columbia Ministry of Energy, Mines and Petroleum Resources
Carbozyme, Inc.
Center for Energy and Economic Development (CEED)
Dakota Gasification Company
Ducks Unlimited Canada
Ducks Unlimited, Inc.
Eagle Operating, Inc.
Eastern Iowa Community College District
Enbridge Inc.
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 Geological Survey – University of Minnesota
Minnesota Power

Continued…

Table 1. PCOR Phase II Partners (70, including the EERC), continued

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
Natural Resources Canada
Nexant, Inc.
North American Coal Corporation
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
Western Governors' Association
Westmoreland Coal Company
Wisconsin Department of Agriculture, Trade and Consumer Protection
Xcel Energy

During this reporting period, Hess Corporation informed the EERC that because of changing operational priorities, the injection of CO_2 into the Beaver Lodge oil field is no longer scheduled to begin during the performance period of Phase II. Task 2 efforts during the reporting period were therefore shifted from being primarily focused on the Beaver Lodge Field, to gathering readily available data sets for other oil fields in North Dakota that may be candidates for CO_2 injection activities during Phase II. Specifically, activities were conducted to develop baseline characterization data to support the planning of the CO_2 injection and monitoring, mitigation, and verification (MMV) activities that are scheduled to begin in late 2008. Basic information necessary to prepare the National Environmental Policy Act (NEPA), regulatory permitting action plan (RPAP), experimental design package (EDP), and a site health and safety plan (SHSP) documents for the Phase II Williston Basin Field validation project was also gathered. The due dates for these documents were reassigned (see Table 3 under Schedule Status section). Meetings with Encore Acquisition Company are currently being held to resolve details on preliminary information needed for completion of these documents in conjunction with their schedules. Some of the issues that will be discussed are 1) the volumes of CO_2, 2) the source of the CO_2, 3) the schedule and duration of the injection tests, and 4) specific well locations. The primary activity is developing well log data sets that can be used to create porosity-foot maps and cross sections. Identification of data gaps with respect to geochemical, geomechanical, and seismic data for the site was researched.

Task 3 – Field Validation Test at Zama, Alberta

The goal of Task 3, the field validation test in the Zama Field of Alberta, is to evaluate the potential for geological sequestration of CO_2 as part of a gas stream that also includes high concentrations of H_2S acid gas is being injected for the concurrent purposes of CO_2 sequestration, H_2S disposal, and EOR. Injection of acid gas into the Zama Keg River F Pool began on December 17, 2006. A cumulative volume of 160,000 mcf has been injected through September 2007 (Figure 2). The stream consists of approximately 70% CO_2 and 30% H_2S, which results in a volume of 110,000 mcf of CO_2 injected to date.

Geological Characterization

Geological characterization activities were completed during this reporting period. The information contained in these reports is being compiled into a topical report format that explains the significance of this body of work to the overall programmatic goal of validating the sequestration of a CO_2-rich acid gas stream. The following is a list of achievements accomplished in Year 2:

- Report on relative permeability measurements on Muskeg Formation: "Reservoir Condition CO_2–Brine Drainage and Imbibition Relative Permeability Displacement Characteristics in the Zama Area, Muskeg Anhydrite Formation (Caprock)."

- Completed a report on partitioning of CO_2 and H_2S in brine at in-situ conditions: "Experimental Study of CO_2 and H_2S partitioning in a brine-saturated porous medium" (under contract with Natural Resources Canada [NRCan]).

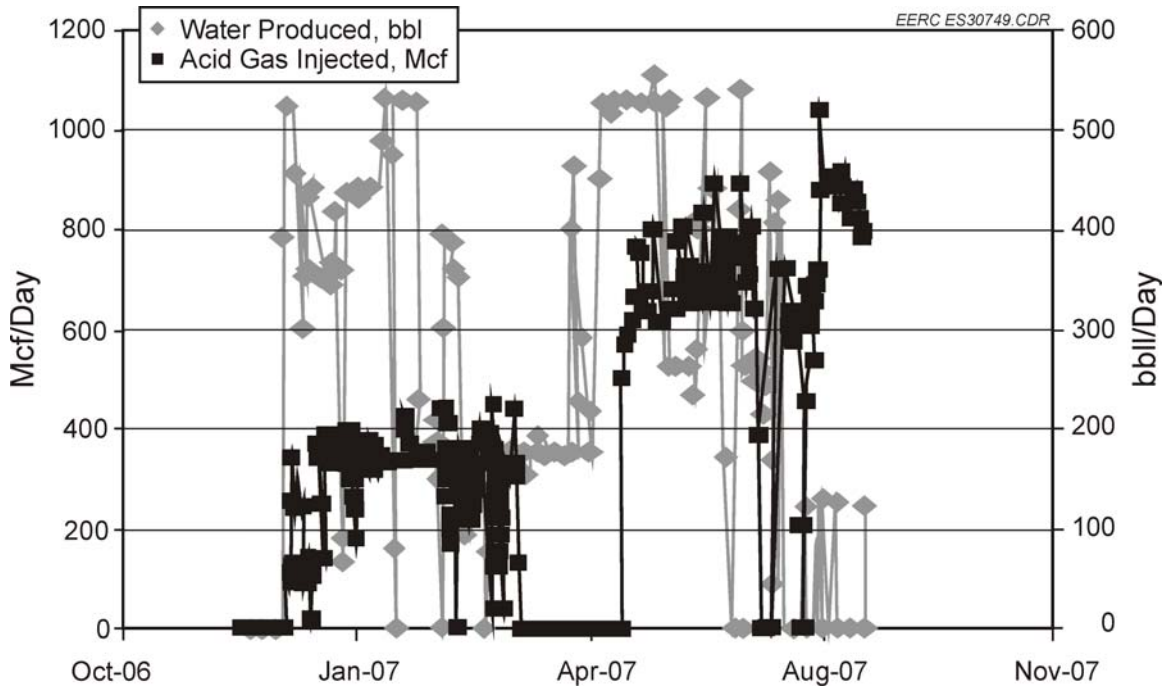


Figure 2. Injection and production profile of the Zama F Pool from December 2006 – August 2007.

- Completed two reports on the assessment of the potential for leakage in the Zama Field (under contract with NRCan).

- Completed a report on relative permeability measurements on Sulphur Point Formation: "A Study of the Reservoir Condition Drainage and Imbibition Permeability Displacement Characteristics of Supercritical Carbon Dioxide in the Zama Area, Sulphur Point Formation."

- Completed a report on the regional-scale geology and hydrogeology: "Regional-Scale Geology and Hydrogeology of Acid Gas Enhanced Oil Recovery in the Zama Oil Field in Northwestern Alberta, Canada."

- Completed a report on the petrography and mineralogy of core samples from the Keg River, Muskeg, and Slave Point Formations in the Zama project area.

MMV

Monitoring of the system is ongoing. A program review is scheduled for November 2007, during which new techniques and technologies will be evaluated to determine the potential for application at the site. The potential to access a new well which could be drilled into the pinnacle exists, which presents the opportunity to expand the monitoring activities of the reservoir.

- Monitoring of reservoir dynamics is ongoing.

- Reservoir dynamics data (pressure and fluid analyses) have shown no evidence of acid gas migration from the pinnacle.

- The monitoring well in the overlying Slave Point Formation has been sampled four times since injection and shows no evidence of acid gas.

Additional Activities

Geomechanics, geochemistry, and engineering aspects of the project are ongoing. Much of the work completed in Year 2 of this project will supplement the creation of geomechanical and geochemical models to be completed in Year 3.

Task 4 – Field Validation Test of North Dakota Lignite

In Task 4, the effectiveness of lignite seams to act as sinks for CO_2 during simultaneous CO_2 sequestration and ECBM production will be evaluated in the Williston Basin. In this reporting period, efforts were focused on drilling the wells and collecting field data (Figure 3). These activities were closely coordinated with PCOR Partnership partners Fischer Oil and Gas, Inc., as well as Eagle Operating, Inc.

Several deliverables were completed during this reporting period. They include the following:

- The OAP.

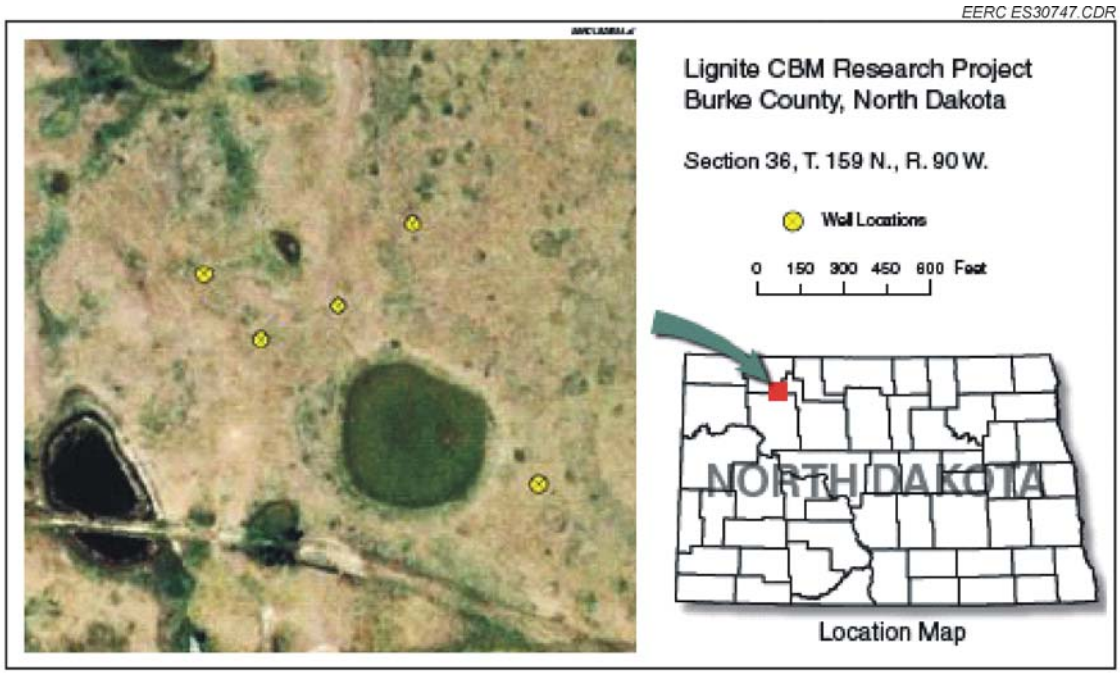


Figure 3. Aerial photograph showing approximate location of well for the lignite test.

- The sampling protocols were submitted the end of June. They will be updated once drilling commences and more is known about the subsurface.

- The progress report, quarterly report, and peer review document.

- An initial draft of a CO_2 flood design. It will be revised as more data become available.

Also, a poster on the lignite task was presented at the Sixth Annual Carbon Capture and Sequestration Conference in Pittsburgh, Pennsylvania.

Numerous meetings were held on-site with the State Land Department to go over the experimental design and drilling plans as well as to observe pad construction. Frequent discussions were also conducted with local officials in Burke County, North Dakota, to provide them with more details regarding the research project. A public meeting was held in Bowbells, North Dakota, in early August (Figure 4). The meeting was held at the request of the Burke County Commission. The commissioners, other local officials, and approximately four people from the general public were in attendance. The meeting went well, and an update meeting will be held once preliminary results of the testing are available, most likely this winter.

Several discussions were held with Penkota Wireline Services to discuss the cement bond logging that will be required on the lignite task. A call was conducted with Competition Wireline Services to discuss their pulse neutron log and its usefulness for the lignite task. It was decided to run the cased-hole pulse neutron log on the center well.

Figure 4. Public meeting in Burke County, North Dakota.

Several planning meetings were held with Schlumberger with regard to the logging suite that was used on the lignite task. Acoustical logging techniques were implemented as well as the traditional suite of geophysical logs. The suite of logs was chosen to address critical questions of the project. Porosity and resistivity are important for understanding hydrological characteristics. For example, fluid flow within a formation strongly depends on porosity and water salinity, which can be estimated using resistivity log. Natural radiation helps in understanding lithology which is important for the building of the geological model and has implications for fluid flow. Caliper log measuring borehole dimensions comes in the chosen package and can be helpful in geomechanical studies.

After logging was complete, a meeting was conducted with Schlumberger to go over processing techniques and initial data analysis. Log interpretation by EERC and Schlumberger is continuing.

Approximately 30 feet of core, 10 of which was the primary coal seam of interest, was taken from the center well (Figure 5) and is being analyzed by Terratek for the following parameters:

- Gas content
- Gas-specific gravity
- CH_4 and CO_2 isotherms
- Diffusion coefficient
- Gas desorption time
- Coal ash and moisture contents
- Coal density and compressibility
- Rock porosity and permeability

Figure 5. Core collection and preparation.

In accordance with federal and state regulations, the following items have been submitted to the North Dakota Industrial Commission (NDIC) Oil and Gas Division.

- Drilling permits that included the casing and cementing plans for the wells.
- Sundry notices for variations in sample collecting intervals in three of the observation wells.
- Sundry notices informing the state of the status of pit reclamation.
- Sundry notice to waive open-hole logs on Well No. 36-16.
- Form 6 Completion Notices were submitted the NDIC Oil and Gas Division for all five wells. Supplemental completion forms will be submitted when appropriate.

All five wells have been drilled, cemented, and logged. On Well No. 36-16, open-hole logs were not run because of a severe bridging problem at 117 feet. After multiple attempts to complete the logging, it was concluded that obtaining open-hole logs would not be possible. The State of North Dakota was contacted, and an open-hole log waiver was requested and received. A cased-hole neutron log as well as a cement bond log were run on this well. A cement bond log was also run on the other four wells. The zones of interest in all five wells have been perforated, and initial swabbing has occurred.

As data from the field tests become available, the geologic model will be updated with new inputs. Once this model is validated, it will be used to further create the CO_2 simulation model. This will help to finalize the CO_2 flood design. Additionally, a lignite structure map has been created and baseline characterization of the area is continuing.

Detailed discussions have been conducted with Pinnacle Technologies with regard to their MMV technologies and potential application to the lignite task. The applicability of various other MMV technologies (tiltmeter survey, gravity survey, tracer study, and seismic survey) relevant to the lignite test continues to be researched and evaluated. Additionally, a meeting was held with Apogee Scientific to discuss their sensing equipment which could possibly be used as a leak detector at the surface. MMV plans will be finalized after analysis of collected field data. As previously mentioned, analysis of all data collected in the field is ongoing. Once the results from this analysis have been thoughtfully interpreted, field-scale experiments will be conducted. CO_2 sources for injection have been contacted, and various delivery methods are being evaluated.

Task 5 – Terrestrial Validation Test

The objective of the terrestrial field validation, Task 5, is to develop the technical capacity to systematically identify, develop, and apply alternate land-use management practices to the prairie pothole ecosystem (at both a local and regional scale) that will result in greenhouse gas (GHG) reductions.

During this reporting period, field study sites for the 2007 sample event were geographically expanded, examining new management practices and land use histories and characteristics. Results from the 2006 field season have been analyzed and are included in this report.

Grassland Sampling

Study sites for the 2007 grassland sampling event were selected by North Dakota State University (NDSU). This process was initiated by obtaining permission from landowners and the U.S. Fish and Wildlife Service for sampling on Waterfowl Production Areas in Minnesota. Sampling began the third week of June 2007 in Minnesota with sampling in South Dakota beginning in July. Ducks Unlimited, Inc. (DU), and NDSU worked with a new partner (Ceres) to plant 40 acres of switchgrass on the Hoffman property owned by DU in South Dakota. Ceres is a national network of investors, environmental groups, and other public interest groups working with companies and investors to address sustainability challenges. Seeding was completed on June 22, 2007.

2006 Grassland Sampling

The data from the 2006 sampling has been analyzed by Dr. Larry Cihacek at NDSU. The results show a positive relationship between age of grass stand and soil carbon (Figure 6).

The results indicated that significant losses of soil carbon occur in cropland after conversion from grassland and from subsequent years of tillage from cropping practices. The average loss of soil organic carbon from native grassland after it is converted to cropland

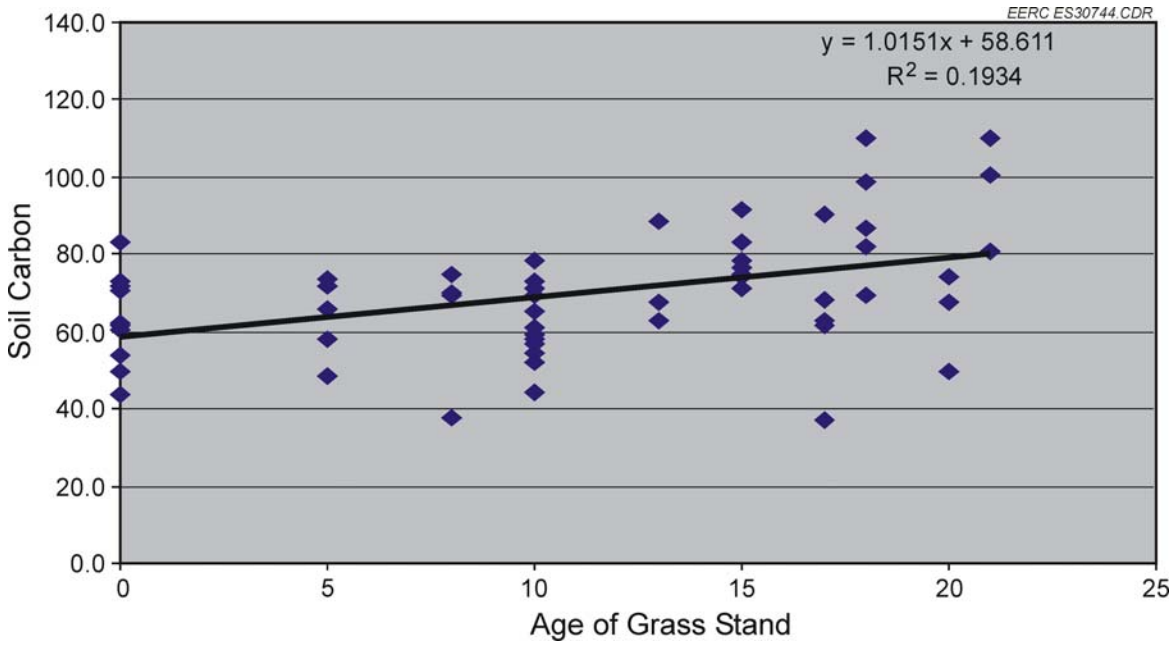


Figure 6. Results of 2006 grassland sampling.

averaged 43.4 Mg SOC/ha (see Tables 2 and 3). The soil carbon is lost to the atmosphere as the soil is tilled and the carbon combines with oxygen to produce CO_2.

2007 Grassland Sampling

The sampling for 2007 has been completed. Samples were collected in north-central South Dakota, south-central South Dakota and western Minnesota (see Figure 7). The sampling began in June 2007 in north-central South Dakota. A total of 191 points representing 1910 acres were sampled, generating 382 soil samples. All of the samples have been processed and are in the lab being analyzed. A total of 257 points were sampled on 2570 acres in south-central South Dakota generating 524 samples. These samples are currently being processed and will be analyzed this fall and winter. The western Minnesota sampling has just been completed and 221 points were sampled on 2210 acres generating 442 samples to be processed and analyzed.

A landcover classification on SPOT (Satellite Pour 1' Observation de la Terre) imagery is being developed using eCognition software to analyze the distribution of native and planted cover in portions of the PCOR Partnership region. The product will be used in a grassland loss model and coupled with field test results to estimate the potential of terrestrial sequestration from grasslands in the PCOR Partnership region. The results of this modeling will help identify field locations for the 2008 sampling season.

Table 2. Soil Organic Carbon (SOC) Stocks in Native Grasslands

Site	County	Mg SOC/ha
Site 1	Sheridan County	85.1
Site 2	Sheridan County	125.7
Site 3	Stutsman County	106.5
Average from All Sites		105.8

Table 3. Average Carbon Remaining Sequestered in the Grasslands After Cultivation

Site	County	Mg SOC/ha
Site 1	Sheridan County	59.0
Site 2	Sheridan County	66.5
Site 3	Sheridan County	61.7
Average from All Sites		62.4

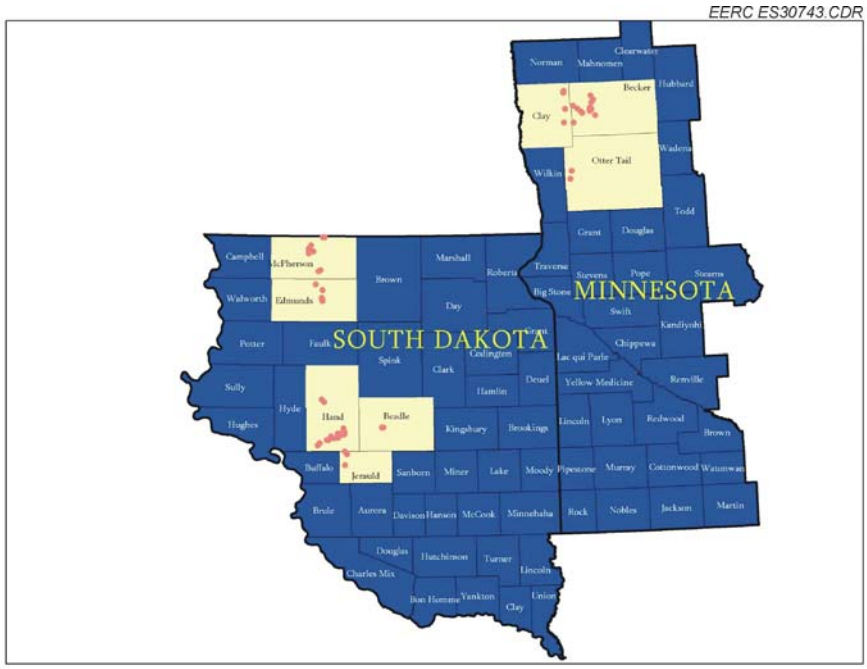


Figure 7. 2007 soil-sampling sites.

Wetland Catchment Sampling

Restoration activities on the Hoffman Property, McPherson County, South Dakota, were performed, and additional sites for restoration are being considered for 2008. Restored, native, and cropland wetlands selected for monitoring are representative of wetland types most commonly targeted for restoration. To reduce background variation among wetland replicates (a minimum of three restored, three native, and three cropland wetlands), sites were targeted that are similar with respect to water regime, size, cropping and restoration history, and soil type. Wetland sites were instrumented to monitor fluxes of GHG emissions (i.e., CO_2, CH_4, N_2O) from wetlands and surrounding uplands following standard protocols developed by the United States Geological Survey (USGS) Northern Prairie Wildlife Research Center (NPWRC).

Researchers from the USGS collected GHG emissions (carbon dioxide, methane, nitrous oxide) flux data from 17 wetland catchments located on DU's Goebel Ranch and Ipswich Grasslands property, and other privately owned properties in Edmunds County, South Dakota. This sample of wetlands included restored (idled and hayed), native (idled and grazed), and cropland catchments. Gas emissions have been collected biweekly along 39 transects established in the 17 wetlands. Wetlands were sampled bimonthly from April–October 2007.

During this period, more than 7000 individual gas flux samples were collected in conjunction with measurements of variables that influence gas emissions, such as soil moisture, temperature, rainfall, and water depth. Other activities completed include the conduction of vegetation and topographic surveys, installation of vegetative enclosures and temperature

loggers, establishment of photostations, and collection of soil samples for determination of physical and chemical properties.

Outreach Action Plan

DU participated in the first survey of the voluntary carbon market, conducted by the Ecosystem Marketplace. Results were published in *State of the Voluntary Carbon Markets 2007: Picking Up Steam,* available at www.ecosystemmarketplace.com. The survey is notable for being the first quantitative overview of market participants, buyer motivations, composition of supply and price and volume information. DU was listed as a project developer in the appendix, providing further exposure to potential investors interested in PCOR Partnership regional terrestrial offsets.

As part of DU's ongoing research and interaction with business opportunities for PCOR Partnership regional terrestrial offsets, several documents have been developed to answer potential investors' questions on grassland carbon sequestration issues such as leakage and, additionally, biotic values of the Prairie Pothole Region (PPR), emission offsets due to tillage practices, and sequestration rates. The support materials provide a transparent and objective overview of carbon accounting methodologies and are intended as follow-up material for investors interested in the intricacies of a terrestrial carbon transaction.

During this reporting period, DU held a Climate Change Workshop on the impacts of global warming on wetland and waterfowl habitats. A group of approximately 15 scientists, managers, and policy specialists with an interest in climate change, carbon sequestration, climate policy, and wetland and waterfowl management convened. The main purpose of the workshop was to draw on the experience of the participants to define possible management and policy options for wetland ecosystems and related habitats under pressure from climate variability. The results of the workshop will provide input for the fact sheet on climate science for policy to be delivered in 2008.

Two outreach brochures were also completed during this reporting period. Electronic versions are available at www.ducks.org/EcoAssets, and print copies are now available. The glossy brochures can be distributed as a stand-alone resource for landowners or investors interested in terrestrial carbon offset opportunities and will also be distributed as appropriate for the PCOR Partnership regional and national OAP. Links to the outreach brochure are part of a general update of the DU PCOR Partnership and carbon program Web pages. A project update report has been added for September covering PCOR Partnership developments since January 2007. A link to the cobenefits fact sheet, submitted during the previous reporting period, was also included. Additional PCOR Partnership products will be posted as they are completed.

Business Processes – Topical Report: Market Development for Terrestrial Offsets

As many of the aspects pertaining to business development are interrelated and require greater discussion than that available by a several-page, stand-alone document, a topical report on aspects of the business flow processes of a carbon project was completed and is now under

review by DU staff. The report provides a primer on carbon market basics and an overview of the business flow process for terrestrial offsets from private lands. Topics covered include an evaluation of DOE Guidelines for Aggregators and terrestrial offset providers, evaluation of other state and regional GHG or cap and trade programs – rules and policies, and an overview of voluntary carbon market, active players, certification standards, market activity, etc.

Fact Sheet – Best Management Practices

Fact Sheet 8, "CO_2 Sequestration through Habitat Restoration – Defining Best Terrestrial Sequestration Practices for Landowners," was submitted during this reporting period. The fact sheet is a survey of current literature on the best practices available for terrestrial carbon sequestration on private lands. An expanded version of the fact sheet that incorporates the results from the DU and PCOR Partnership partner research conducted on the field test sites will be submitted after field tests have been completed and results analyzed.

Business Flow Processes Documents

The following items have also been submitted to DOE during the last reporting period as stand-alone documents:

- Prospectus for grassland carbon offset sale in the PPR (submitted)
- General term sheet for grassland carbon offset sale with investor in the PPR (submitted)
- DU carbon sequestration fact sheet for investors (submitted)
- Legal document to transfer carbon rights from landowner to DU for an aggregated transaction (submitted)

Carbon Tracking

The final version of the Business Requirements Document (BRD) to support the design of the Oracle database carbon-tracking module was submitted during this reporting period on June 30, 2007. The BRD defines all of the aspects of information tracking that are required for a carbon transaction including financial, agreements, invoicing, habitat, carbon tonnage, monitoring, third-party verification, risk management, insurance, etc. A development server and license was purchased and configured for the system during this quarter. The long-term production server and software environment was already in place for this database task. After the submission of the BRD, several meetings were held with IT staff, and the prototype form was updated several times. Coding based on the current design will begin in October 2007.

Business Opportunities

DU continues to refine the requirements for high-quality terrestrial carbon offset projects in the prairies that will qualify for either a voluntary registry or a trading system, while at the same time balancing the need for transparency and competitive cost. Premium offsets will also

stimulate interest from investors such as hedge funds and financial groups that are speculating on the carbon market in the United States.

Several public Requests for Proposals (RFPs), soliciting offers for carbon offset projects were held during the last reporting period. During April 2007, DU submitted two separate business tenders for nearly 2.5 million $MTCO_2e$ of PCOR Partnership regional grassland offsets. One proposal, to deliver 1,000,000 short tons, was submitted to the Climate Trust, soliciting bids on behalf of utility companies in the northeast, soon to be regulated by the Regional Greenhouse Gas Initiative (RGGI). The other bid was held by ICF International, soliciting offers for an unnamed investor and a large Internet company. DU submitted two separate grassland offset proposals for this bid, totaling 1,500,000 metric tons.

Negotiations continued through this reporting period for the sale of CO_2 offsets from protecting approximately 30,000 acres of grassland in the prairies. The potential buyer is a for-profit investor that specializes in the generation and management of high-quality carbon credits derived from reforestation, forest conservation, and sustainable land management. The PCOR Partnership Phase II Field Validation Project will provide accurate baseline carbon determination and accumulation rates for expiring CRP as well as native prairie grasslands. A purchase agreement was reached in early October. The next stage will be the development of marketing and outreach strategy. Outreach materials submitted during the last reporting period will play an important role in this task.

Task 6 – Characterization of Regional Sequestration Opportunities

The goal of Task 6 is to characterize the PCOR Partnership regions with respect to regional sequestration opportunities and to provide this information to our partners through our Web-based Decision Support System (DSS, © 2007 EERC Foundation). Accomplishments during this reporting period include the following.

DSS

Updated versions of the DSS were released several times during this reporting period. Modifications included the following:

- Revised the text in the terrestrial section for readability, organization, and navigation. Added a link to the terrestrial pages to display a list of relevant studies regarding terrestrial sequestration.

- Added a new geographic information system (GIS) layer for the pipeline dataset leased from PennWell (Figure 8.)

- Reorganized the coal layer into two layers. The new layers are coal basins and evaluated coalfields. The evaluated coalfields include the Ardley, Harmon–Hanson, and the Wyodak–Anderson.

- Replaced the Alberta Basin with the Western Canadian Sedimentary Basin.

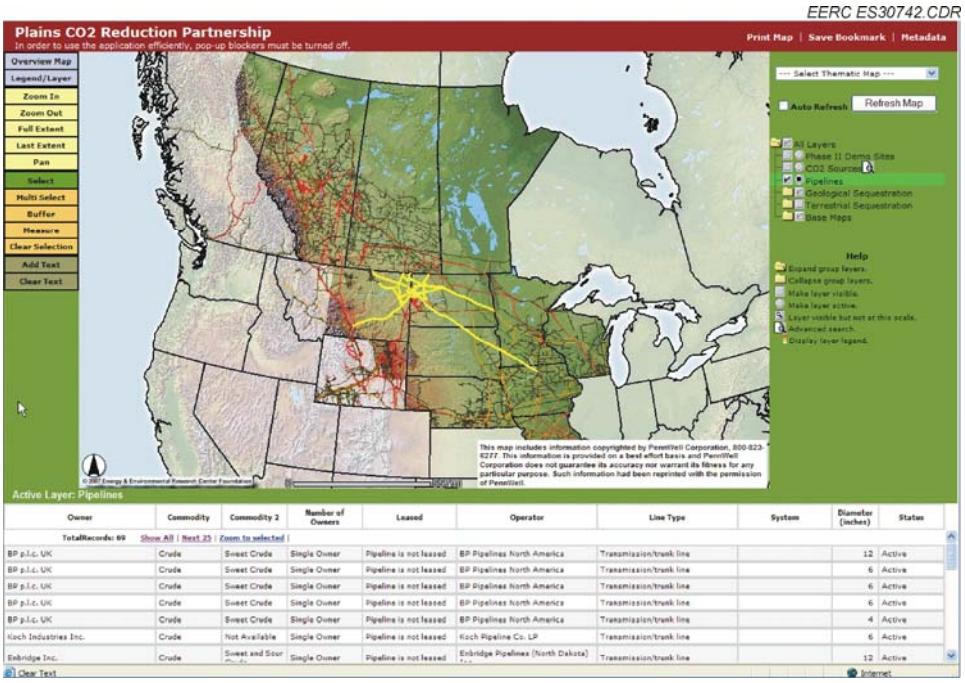


Figure 8. A pipeline layer is now visible in the DSS.

- Added the total estimated capacities to the saline legends.

- Added new sources (mainly ethanol) that have come online during this reporting period.

- Updated reference documents, reports, presentations, field validation tests, and partner contact information.

- Added functionality to print the displayed map as a PDF document at 300 dpi. The option is available from the top menu by clicking on “Print Map.”

- Created a script to determine whether or not a person has the pop-up blocker turned on. If the blocker is turned on, the user will receive a message informing them that they should turn it off for this site so that they can use all of the functionality in the DSS. This is important for accepting the PennWell license agreement and also for using the advanced search functions.

- Increased the “dot” size for displaying sources so that they are more visible on the screen.

- New ideas for improving the DSS were provided by several users. These improvements are current being developed in the test site and include the following:

  – Displaying only a subset of a particular layer
  – The ability to rearrange the layer order
  – Improvements to color selection and depiction of various layers

  - Graphing tools
  - Display of a matrix of capture technology information

- Configured the new PCOR Partnership ArcGIS Server 9.2 to run existing ArcIMS projects. This allows developers to maintain and host existing 9.1 projects, while using the new development capabilities of the Microsoft .Net Framework found in Version 9.2.

- Resolved license manager issues with Neuralog and Eclipse applications.

Characterization

Characterization activities include the following:

- The source team is working on a complete quality assurance/quality control (QA/QC) of the source database, including resolving overlap issues with Big Sky and Southwest partnerships. The Southwest partnership has decided that the sources for the northeast portion of Wyoming will be covered by the PCOR Partnership. We are working with Big Sky so that any overlapping sources will display the exact same information so that NATCARB will not have any issues with duplicate data. There is a November deadline to have these issues resolved.

- The Iowa Geological Survey (IGS) continued refinements and updates to the structure, lithofacies, isopach, and total dissolved solids maps for stratigraphic units identified as Year One deliverable products. Their activities included:

  - Completed draft coverages and metadata for isopach, and total dissolved solids maps for stratigraphic units identified as Year One deliverable products. Effort focused on the 16 SW-most counties of Iowa, where initial reviews indicate the greatest thickness of confining beds, aquifer depths, and salinities, and therefore sequestration potentials, are present.

  - Continued an inventory of IGS records of oil and gas exploration wells, and wells drilled as part of natural gas storage exploration and operations. Approximately 135 oil and gas tests in IGS archives have been inventoried. IGS essentially completed the inventory of the gas storage related wells. The inventory describes each file and highlights particularly relevant materials in the files, such as stratigraphic and geophysical logs, porosity and permeability tests, water quality analyses, drill stem test data, cored intervals, etc.

  - Discussed geologic sequestration in internal meetings regarding water supply issues and with staff working in support of new state initiatives. These include the formation of a state Climate Council, and a state office of Energy Independence. IGS also discussed the work with the new Director of the Iowa Department of Natural

Resources. IGS noted that geological sequestration has become less of a foreign term.

– Provided the EERC with Year One GIS-related Year One deliverables.

- We have revised our approach to assessing the CO_2 sequestration potential of the Washburn Study Area, a 6000-square-mile area in west-central North Dakota. The following activities have been completed or are near completion for the Washburn Study Area:

  – Neuralog was purchased and is being used to generate data from well logs in the Williston Basin of North Dakota. Well log files which currently exist as image (raster) files are converted to the Log ASCII Standard (LAS) format (vector) using Neurolog. These logs are then imported into Schlumberger's Petrel software package which is used to develop detailed reservoir simulation models of the potential storage site. The results of the Petrel model are imported into Schlumberger's ECLIPSE software to further model to evaluate the movement of CO_2 in the subsurface.

- Began creating a stratigraphic and well log database for the next potential target zones, the Deadwood and Winnipeg Formations.

- Fischer Oil and Gas, Inc., activities included the following:

  – Finishing the drafts for 6 topical reports (formation outlines)
  – Continued lignite characterization for central North Dakota.

  – Worked with PCOR Partnership staff on detailed model for Broom Creek in the Washburn project area.

  – Continued work on a log data base for AQ1 aquifer layer (Ordovician Red River, Winnipeg and Deadwood Formations) Washburn project area, central North Dakota.

- The data sets for Class II wells were received and evaluated from agencies controlling the oil and gas industry for the states of Iowa, Missouri, Montana, Nebraska, North Dakota, South Dakota, and Wyoming. Of these states, Iowa, Missouri, and South Dakota have only a few wells disposing of brine into deep saline formation. Several approaches to calculate storage capacity were investigated. A final report is being prepared.

- Held internal meetings with the geologic, terrestrial, regulatory, and source task leaders to develop plans for regional characterization for Phase II and Phase III.

- The PCOR Partnership held a meeting with Lynn Helms, Dave Hvinden, Ed Murphy, and Steve Nordeng at NDIC to discuss the gas analysis Web site. NDIC will review the Web site and provide feedback for graphing capabilities. Several items for development were identified:

  - Create a thematic map that displays a bar chart of the earliest or latest analytical result of a chosen component over all formations for each well.

  - Simplify the graphing options by identifying two or three standard graphs.

  - Add a gas plant layer to the site.

- Created and populated a database of references regarding terrestrial sequestration activities in the PCOR Partnership region.

- Worked with the British Columbia (BC) Ministry of Energy, Mines, and Petroleum Resources regarding oil pool information for BC. We have provided them with a list of data elements that we would like to obtain for each pool, along with a description of the GIS layers that we currently have for BC.

- Requested an updated version of the North Dakota formation tops database from NDIC.

- Working on a developing a subcontract with Missouri Geologic Survey for regional characterization of Missouri.

Other Activities

- Attended the 2007 Environment Systems Research Institute (ESRI) User Conference in San Diego (June 18–22). The PCOR Partnership had a poster of the DSS/Atlas for the poster session.

- Participated in GIS working group conference calls.

- Began work on the next Gap Assessment Report.

- Worked on slides, forms, and requests for information for the Phase II Continuation Application, the Phase III proposal, and the peer review meeting.

- During this quarter, Melzer Consulting reviewed Phase II projects, offered advice on various strategies for the program, and prepared a workshop presentation and materials for a CO_2 panel during the Air Quality Conference in Washington, D.C., in September.

Task 7 – Research Safety, Regulatory, and Permitting Issues

The goal of Task 7 is to identify and track new and existing regulations with respect to the relevant regulatory agencies within each of the PCOR Partnership states and provinces and the relevant federal regulatory agencies of the United States and Canada. Accomplishments during this reporting period include the following.

Field Validation Test of North Dakota Lignite

A permitting punch list was developed to aid in various aspects of the permitting process as well as reporting requirements of the NDIC. The drilling permits for the test were submitted and approval was received by the state. State requirements for handling of drill cuttings and core samples were reviewed to ensure compliance during field activities. Several forms and notices were completed and submitted to the state throughout the drilling phase of the project. They included the following:

- Sundry notices for variations in sample-collecting intervals in three of the observation wells.
- Sundry notices informing the state of the status of pit reclamation.
- Form 6 Completion Notices for all five wells. Supplemental completion forms will be submitted when appropriate.

In addition to the activities listed above, the regulatory requirements that are involved in designing a CO_2 flood for enhanced resource recovery were analyzed.

Task Management and General Task Activities

The April 2007 ruling by the Supreme Court ruling that gives the U.S. Environmental Protection Agency (EPA) the authority to regulate carbon dioxide was reviewed. Potential implications of this ruling continue to be researched, and reactions to the ruling are being analyzed. A review of new guidelines for wetlands permitting, in case it is necessary for future projects, was also completed. Legislative actions that are occurring in Congress continue to be evaluated, including an assessment of a portion of the Farm Bill that gives the government authority to set performance standards for carbon credits from agriculture and forestry. As new bills are introduced in Congress, they are being analyzed and tracked with respect to their impact on the PCOR Partnership and CO_2 sequestration as a whole.

Several conferences were attended during this reporting period. They include the following:

- Carbon Finance and Investment Summit, New York, New York, May 2007.
- Sixth Annual Carbon Capture and Sequestration Conference, Pittsburgh, Pennsylvania, May 2007.
- Interstate Oil and Gas Compact Commission (IOGCC) Midyear Issues Summit, Point Clear, Alabama, May 2007.

At a regional and state level, internal documents that relate to RGGI, California Climate Action Registry, and the Western Regional Climate Action Initiative (WRCAI) were updated. Recently, Massachusetts, Rhode Island, and Maryland have joined RGGI, and British Columbia,

Utah, and Manitoba have joined the WRCAI. The California Climate Action Registry is expanding. More than 30 states and tribes are planning to form a new GHG registry that would standardize best practices in GHG emissions data reporting and management, establish a set of common protocols, and support a common reporting system. The new registry, called The Climate Registry, was incorporated in Washington, D.C., in March 2007. Packages outlining the operation of the new registry and invitations to join were sent to all 50 states and many tribes in March 2007. Additionally, comments were provided to the North Dakota Industrial Commission Department of Mineral Resources Oil and Gas Division on its proposed new chapter to the North Dakota Administrative Code (NDAC), Geologic Storage of Carbon Dioxide Chapter 43-02-04.1.

Research continued on developing business strategies for competing in the carbon marketplace as well as pricing structures and market trends. A meeting was held with staff from Blue Source to discuss carbon markets and film footage for the carbon markets video. Also, work continued on developing a written analysis of carbon market strategies, and a review of numerous cap-and-trade strategies for GHGs put forth by various entities was completed.

Participation in the IOGCC Carbon Capture and Geological Storage Regulatory Task Force is ongoing. The task force has legal and technical subgroups that have developed model regulations and statutes that can be adapted and modified by states. Comments were provided to the IOGCC CO_2 Task Force on their model rules. After the review comments were incorporated, the model regulations and statutes were again evaluated. The IOGCC report entitled "Storage of Carbon Dioxide in Geologic Structures, A Legal and Regulatory Guide for States and Provinces" was assessed and distributed to interested PCOR Partnership partners. In its next phase of activities, the Task Force expects to explore ownership issues, pipeline transportation, and site selection processes.

Task 8 – Public Outreach and Education

The goals of the PCOR Partnership's Public Outreach and Education (Task 8) are to provide 1) outreach and education mechanisms that raise the awareness of sequestration opportunities in the region and 2) outreach to interested stakeholders with information about existing and future sequestration efforts in the region. The following occurred during the reporting period:

- The 2006 public Web site upgrade (submitted on schedule on August 31, 2006, and reviewed by DOE in September of 2006) went live on April 16, 2007, after internal review and changes to incorporate information on areas in Canada added to the PCOR Partnership region during the winter. The 2007 public Web site upgrade was submitted on schedule on August 31, 2007, and was reviewed by DOE during September 2007. The upgraded site is scheduled to go live in October 2007.

- The OAP for the Lignite Field Validation Test was completed and submitted for DOE review on schedule at the end of April 2007.

- A draft of the OAP for the Williston Basin Oil Field Validation Test was initiated. Because of a change in the project schedule, the due date for the Task 2 OAP has been rescheduled for August 2008.

- The PCOR Partnership display booth was submitted for review on schedule at the end of April 2007.

- The carbon market documentary was submitted to DOE for review on schedule at the end of September 2007. The due date had been rescheduled from January of 2007 because of scope changes. Actions during the period included the following:

  – Bill Townsend (Blue Source) was interviewed at the EERC in April 2007.

  – Interviews were held at the EERC in July 2007 for Gerald Groenewold (EERC Director), John Harju (EERC Associate Director) and Ed Steadman (PCOR Partnership Manager).

  – Carl Bauer (NETL) was interviewed at NETL in Pittsburgh in August 2007.

  – The draft voice line, draft animation, and draft graphics were added in September before the documentary was edited to the broadcast time of 26 minutes and 46 seconds.

- Work on the terrestrial sequestration documentary (due to DOE at the end of January 2008) included the following:

  – A week of filming in August in northern California on a segment dealing with forest cleanup to prevent fires and CO_2 release.

  – Schedules were worked out for completing filming of activities by NDSU (soil sampling) and DU (forest and wetland restoration).

In addition, activities under Task 8 also involved attending monthly conference calls with the outreach working group.

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

The goal of Task 9 is to identify sequestration technologies and approaches that are suitable and available for large-scale deployment in the PCOR Partnership region and to estimate their economic viability. Maintaining a current emission database; enhancing the ability to identify good matches between CO_2 emission sources, capture/separation technologies, and appropriate geologic sinks; and accurately estimating the costs of capture, compression, and

transportation are crucial aspects to meeting this goal. Several activities were performed in this area:

- The database of regional CO_2 emissions was checked for accuracy and updated to include the most current data sets from DOE, EPA, and Environment Canada.

- Six carbon management plans have been developed for PCOR Partnership partners incorporating capture and transportation infrastructure information developed by Task 9 personnel.

- A best practices manual (BPM) describing the steps required to develop a carbon management plan is being written.

An important aspect of characterizing the CO_2 emission sources and identifying appropriate capture technologies and sequestration scenarios is disseminating the information to interested stakeholders. Several information dissemination activities were performed, including:

- The most recent emission data from the Canadian portion of the PCOR Partnership region (data from 2004) were integrated with the 2002 U.S. data from EPA to form an updated regional CO_2 emission summary for use in the new version of the PCOR Partnership Atlas and on the updated PCOR Partnership public Web site.

- An extensive table summarizing CO_2 capture technologies that was prepared during the July through September 2006 quarter is being included on the PCOR Partnership "Partners-Only" Web site.

- A capture and separation section was prepared for the new version of the PCOR Partnership Atlas.

- A BPM for estimating the technical and economic feasibility of using wind power to offset the use of electricity during sequestration activities is being finalized, incorporating outside reviewers' comments.

- A topical report describing the calculation methodologies and databases used to quantify the region's CO_2 emissions point sources is being prepared.

- The PCOR Partnership hosted the DOE regional partnerships Capture and Transportation Working Group annual workshop in June 2007. The workshop is an annual event held to offer the CO_2 capture leads from each of the regional partnerships the opportunity to discuss their activities and to learn more about a particular topic of interest by attending presentations by invited speakers. This year's workshop lasted 3 days.

  – The first day consisted of a tour of the Dakota Gasification Company's Great Plains Synfuels Plant in Beulah, North Dakota.

– The second day consisted of speakers from various companies who discussed the change in perspective towards CO_2 capture by their particular industry.

– The third day included overviews of the capture activities of each of the partnerships, a tour of the EERC in which various processing systems and laboratories were highlighted with respect to CO_2-related projects, and a discussion by the partnerships' capture leads regarding common activities to be undertaken during the upcoming year.

The utilization and management of CO_2 is a major subtask within Task 9. A BPM for developing carbon management plans will be prepared by November 30, 2007.

Task 10 – Regional Partnership Program Integration

Task 10 consists of the PCOR Partnership actively participating in and providing leadership to technical working groups to identify, discuss, and resolve common issues related to the deployment of sequestration technologies.

Management

During this reporting period, a number of new partners joined Phase II of the PCOR Partnership:

- North American Coal Company
- Enbridge, Inc.
- Minnesota Geological Survey – University of Minnesota
- American Lignite Energy (ALE)

Membership discussions continued with numerous organizations on Phase II opportunities and also on future Phase III activities. We are currently working on a regional partnership integration fact sheet to be submitted as a value-added product to DOE. The PCOR Partnership joined the MMV working group. The PCOR Partnership will also be participating in the MMV subgroup, the capacity working group. Further, the PCOR Partnership continued participation in working group conference calls, including the following:

- GIS
- Capture, Separation, and Transportation
- Geologic
- Outreach and Education

CONCLUSIONS

Work is progressing, and deliverables for the reporting period (April 1 – September 30, 2007) were submitted on schedule, unless an extension was established. The PCOR Partnership continues to grow, with four new members since the last reporting period.

COST STATUS

The approved budget for Phase II, along with actual costs incurred and cost share, is shown in Table 4.

SCHEDULE STATUS

Table 5 contains all the deliverables and submission dates for the period. See Table 6 for a listing of all milestones and completion dates for the duration of the project listed by task.

SUMMARY OF SIGNIFICANT ACCOMPLISHMENTS

Significant deliverables for the second budget period include quarterly PowerPoint presentations, semiannual progress reports, and outreach materials. Additionally, detailed briefings (monthly updates) explaining the plans, progress, and results of the technical effort have been presented to the COR. Project task managers participated in regional partnership working groups to integrate and collaborate with other RCSPs. Project milestones are shown in Table 5.

ACTUAL OR ANTICIPATED PROBLEMS OR DELAYS

Nothing to note at this time.

DESCRIPTION OF PRODUCTS

The PCOR Partnership produced, or assisted in the production of, a number of products. These products included the following:

- PCOR Partnership documentary
  - *Nature in the Balance* (Phase I video) won a 2006 Telly Award and has been shown in over 108 Public Television markets since spring of 2005.
- Web site
  - PCOR Partnership public Web site update was developed and has been reviewed by DOE. The current site can be found at www.undeerc.org/pcor.

REFERENCES

None.

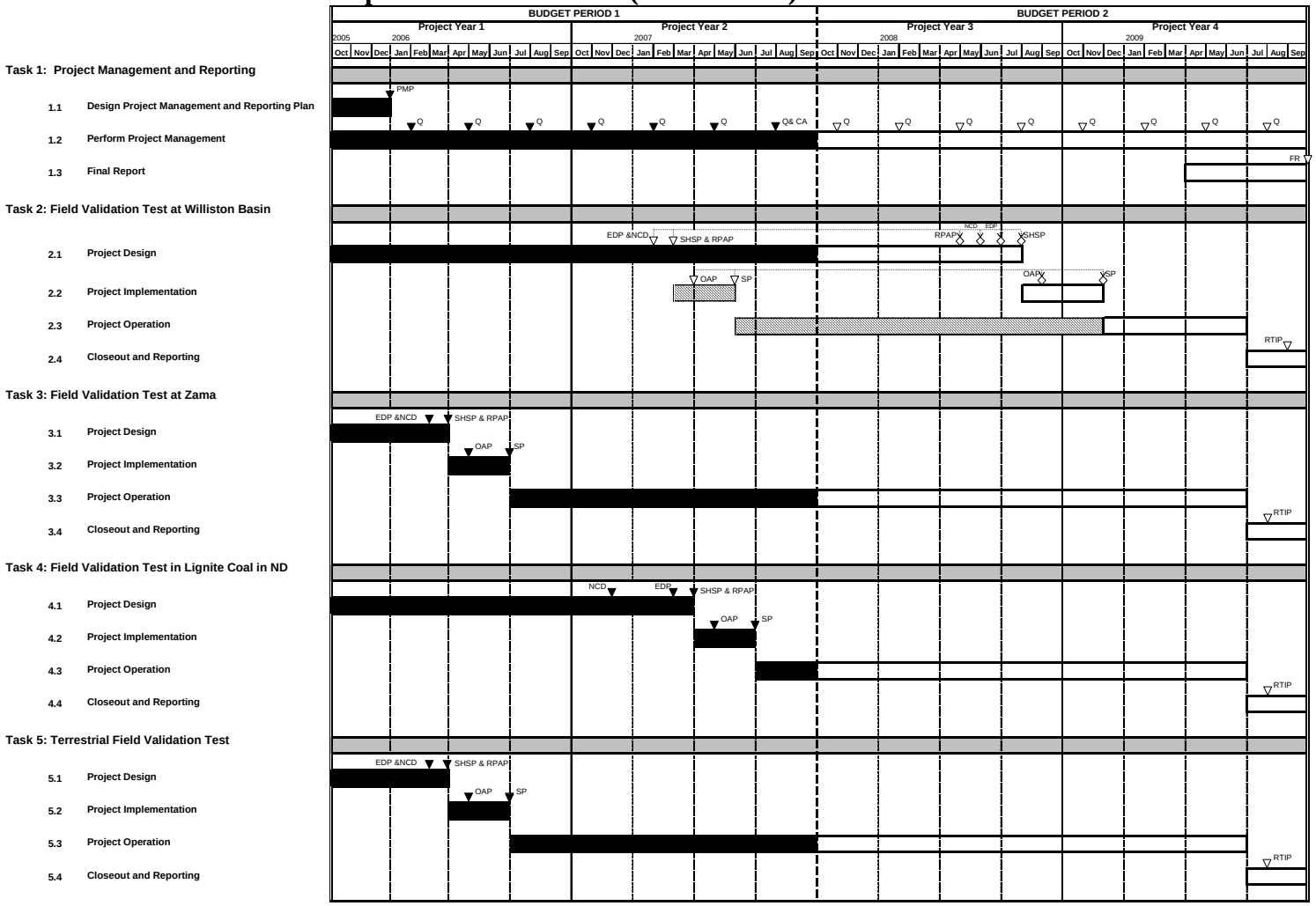
Table 4. Phase II Budget and Actual Costs Incurred

Organization	Approved Budget	Actual Costs Incurred
DOE Share	$15,913,178	$6,411,383
Nonfederal Share	$10,146,711	$9,989,564
Total	$26,059,889	$16,400,947

Table 5. PCOR Partnership Deliverables for April 1 – September 30, 2007

Deliverables	Date Submitted
Task 1 – Quarterly PowerPoint Presentation and EVM Report (for the period January 1 – March 31, 2007)	April 25, 2007
Technical Progress Report (semiannual) to DOE and NDIC (for the period October 1, 2006 – March 31, 2007)	April 30, 2007
Task 4 – Outreach Action Plan	April 27, 2007
Task 8 – Outreach Booth	April 30, 2007
Monthly Update for April	April 30, 2007
Task 8 – Fact Sheet 10 (Task 4 – Unminable Lignite CO_2 Sequestration Validation Test)	May 31, 2007
Monthly Update for May	May 31, 2007
Task 4 – Sampling Protocols	June 29, 2007
Task 4 (2007 Q3 Milestone) – CO_2 Flood Design for the Carbon Sequestration and ECBM Recovery	June 16, 2007
Monthly Update for June	June 29, 2007
Task 1 – Quarterly PowerPoint Presentation and EVM Report (for the period April 1 – June 30, 2007)	July 25, 2007
Continuation Application (Tasks 1 – 10 Progress Report included)	July 31, 2007
Monthly Update for July	July 31, 2007
Task 8 – Web Site Update	August 31, 2007
Monthly Update for August	August 31, 2007
Task 5 (2007 Q4 Milestone) – Fact Sheet 11 “Land-Use Management Practices that Increase SOC”	September 28, 2007
Task 8 – Carbon Markets and Trading Video	September 28, 2007
Monthly Update for September	September 28, 2007

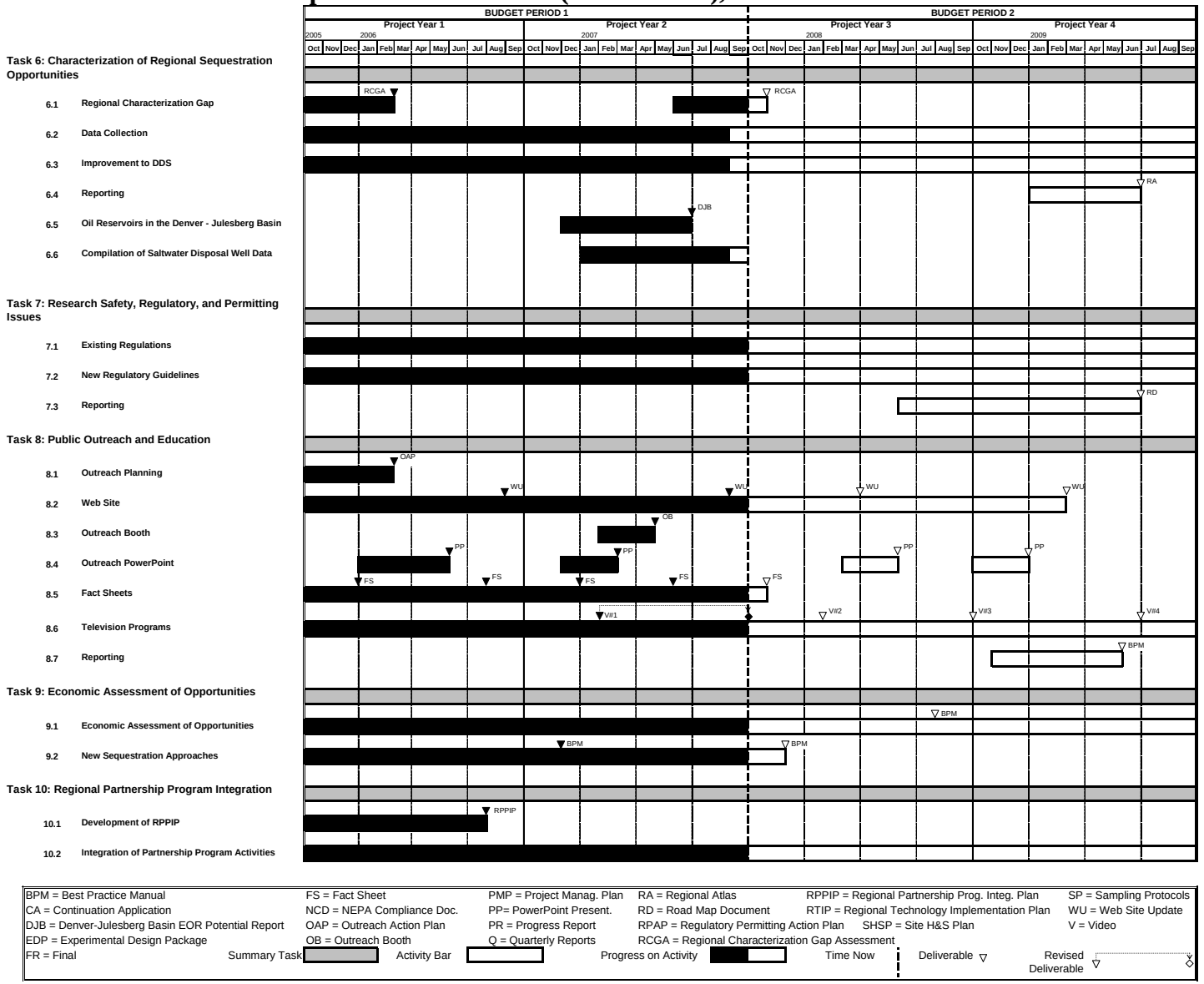
Table 6. PCOR Partnership Phase II Milestones (Gantt Chart)



BPM = Best Practice Manual	FS = Fact Sheet	PMP = Project Manag. Plan	RA = Regional Atlas	RPPIP = Regional Partnership Prog. Integ. Plan	SP = Sampling Protocols
CA = Continuation Application	NCD = NEPA Compliance Doc.	PP= PowerPoint Present.	RD = Road Map Document	RTIP = Regional Technology Implementation Plan	WU = Web Site Update
DJB = Denver-Julesberg Basin EOR Potential Report	OAP = Outreach Action Plan	PR = Progress Report	RPAP = Regulatory Permitting Action Plan	SHSP = Site H&S Plan	V = Video
EDP = Experimental Design Package	OB = Outreach Booth	Q = Quarterly Reports	RCGA = Regional Characterization Gap Assessment		
FR = Final	Summary Task	Activity Bar	Progress on Activity	Time Now	Deliverable ▽ Revised Deliverable ▽ ◇

Continued…

Table 6. PCOR Partnership Phase II Milestones (Gantt Chart), continued



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DJB = Denver-Julesberg Basin EOR Potential Report	OAP = Outreach Action Plan	PR = Progress Report	RPAP = Regulatory Permitting Action Plan	SHSP = Site H&S Plan	V = Video
EDP = Experimental Design Package	OB = Outreach Booth	Q = Quarterly Reports	RCGA = Regional Characterization Gap Assessment		
FR = Final	Summary Task	Activity Bar	Progress on Activity	Time Now	Deliverable ▽ Revised Deliverable ▽ ◇