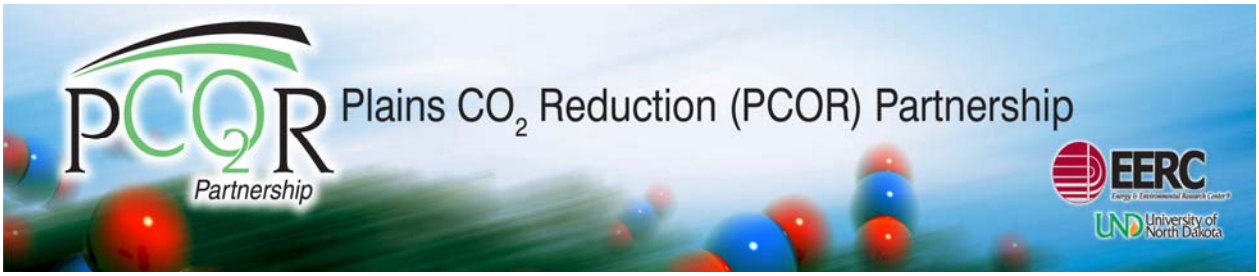

PLAINS CO_2 REDUCTION PARTNERSHIP PHASE II

Quarterly Technical Progress Report

(for the period July 1 – September 30, 2009)

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INTRODUCTION

The Plains CO_2 Reduction (PCOR) Partnership is one of seven regional partnerships operating under the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) Regional Carbon Sequestration Partnership (RCSP) Program. The PCOR Partnership is led by the Energy & Environmental Research Center (EERC) at the University of North Dakota (UND) in Grand Forks, North Dakota. The PCOR Partnership region includes all or part of nine states (Iowa, Minnesota, Missouri, Montana, Nebraska, North Dakota, South Dakota, Wisconsin, and Wyoming) and four Canadian provinces (Alberta, British Columbia, Manitoba, and Saskatchewan).

Phase II is a 4-year project, divided into two budget periods (BPs), running from October 1, 2005, to September 30, 2009. This progress report summarizes the activities for the above-referenced reporting period (July 1 – September 30, 2009) for Phase II.

The activities for Phase II of the PCOR Partnership include four validation tests (Figure 1) along with regional characterization, regulatory and permitting activities, and outreach. Ten tasks have been developed; see Table 1 for the responsibility matrix.

Table 1. Phase II Responsibility Matrix

Phase II Task Description	Responsible Party
Task 1 – Project Management and Reporting	Ed Steadman
Task 2 – Field Validation Test in a Williston Basin Oil Field, North Dakota	Jim Sorensen
Task 3 – Field Validation Test at Zama, Alberta	Steve Smith
Task 4 – Field Validation Test of North Dakota Lignite	Lisa Botnen
Task 5 – Terrestrial Validation Test	Barry Botnen
Task 6 – Characterization of Regional Sequestration Opportunities	Wes Peck
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

SUMMARY OF SIGNIFICANT PHASE II ACCOMPLISHMENTS

Task 1 – Project Management and Reporting

The PCOR Partnership currently has 86 partners. The latest addition to the program is Oxand Risk & Project Management Solutions, which joined the PCOR Partnership on August 17, 2009.

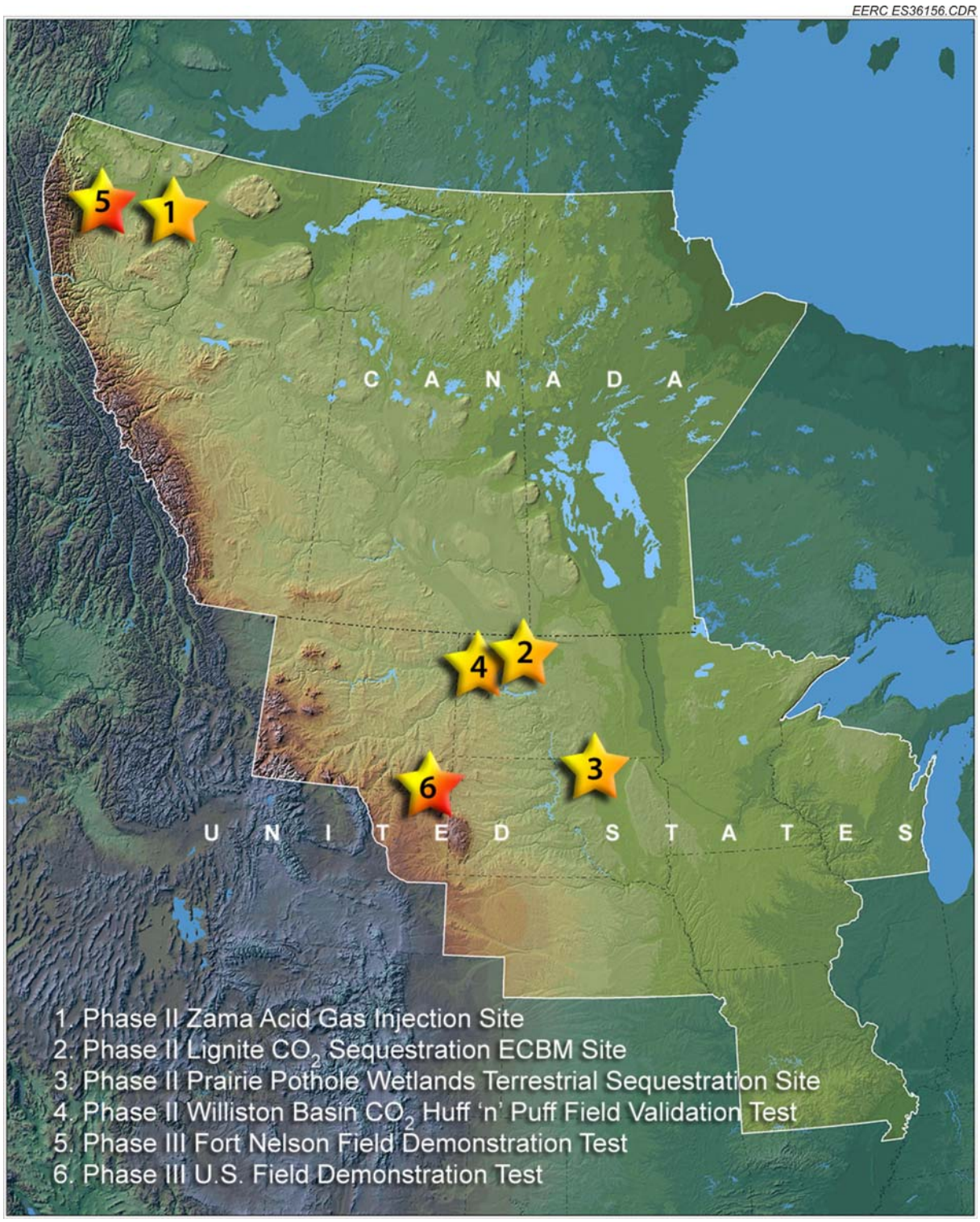

Figure 1. PCOR Partnership Phase II validation test sites.

Phase II members in good standing were automatically enrolled in Phase III for overlapping years (October 1, 2007 – September 30, 2009). The membership, as of September 30, 2009, is listed in Table 2.

Significant accomplishments for project management and reporting for the period included the following:

- A poster entitled "Carbon Capture and Storage (CCS) Opportunities for Marathon and an Approach to Identify and Manage Potential Project Risks" was prepared for Marathon Oil Company for its use at an internal poster session.
- On August 17, 2009, DOE NETL posted a news release on its Web site regarding the PCOR Partnership's use of its Decision Support System (DSS, ©2007–2009 EERC Foundation) in the preparation of a carbon management plan for one of its partners, Excelsior Energy Inc. This release, entitled "Regional Partner's Decision Support System Used in Development of Carbon Management Plan for Industry," was also

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

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

posted on the EERC Web site (www.undeerc.org/news/newsitem.aspx?id=347) and the PCOR Partnership Web site (www.undeerc.org/PCOR/newsandpubs/newsitem.aspx?id=347).

- On August 26, 2009, a DOE Fossil Energy Techline was posted announcing that the carbon sequestration film, produced with support from DOE and Prairie Public Broadcasting (PPB), had received a 2009 Gold Aurora Award in the documentary category for nature/environment. For more details, see DOE's Fossil Energy Web site at www.fossil.energy.gov/news/techlines/2009/09061-CCS_Documentary_Wins_Award.html
- The announcement regarding "Out of the Air – Into the Soil" was also posted on:
  - The EERC Web site (www.undeerc.org/news/newsitem.aspx?id=348).
  - The PCOR Partnership public-accessible Web site (www.undeerc.org/PCOR/newsandpubs/newsitem.aspx?id=348).
  - The Carbon Sequestration Leadership Forum (CSLF) Web site (www.cslforum.org/projects/rcsp.html) and an e-mail notice was sent to its members.
- An e-mail blast (www.undeerc.org/PCOR/PCOR09/email/email090911.asp) was sent to the membership on Friday, September 11, 2009, and included all the information needed to register for the premeeting workshops, the meeting, and the evening dinner. Links to the annual meeting registration Web site can be found on the EERC's Web site, the PCOR Partnership public Web site, and the Partners-Only DSS Web site.

Task 2 – Field Validation Test – Williston Basin Oil Field, North Dakota

Significant accomplishments for Task 2 for the reporting period included the following:

- In mid-June, a total of 440 tons of CO_2 was injected into the E. Goetz #1 well in the Northwest McGregor oil field in Williams County, North Dakota.

Task 3 – Field Validation Test at Zama, Alberta

Significant accomplishments for Task 3 for the reporting period included the following:

- A cumulative total of over 800 million cubic feet (approximately 40,000 tons) of gas has been injected, with an average composition of 80% CO_2 and 20% hydrogen sulfide (H_2S).
- 25,000 barrels of oil have been produced from this pinnacle as of August 30, 2009.
- The draft Regional Technology Implementation Plan (RTIP) (D52) was completed on September 30, 2009.
- The preliminary final task report was completed.

Task 4 – Field Validation Test of North Dakota Lignite

Significant accomplishments for Task 4 for the reporting period included the following:

- The draft RTIP (D53) was completed on September 30, 2009.
- The preliminary final task report was completed.

- Analysis of monitoring data concluded that the injected CO_2 stayed within the coal seam.

Task 5 – Terrestrial Validation Test

Significant accomplishments for Task 5 for the reporting period included the following:

- The draft RTIP (D54) was completed on July 30, 2009. The RTIP provides a "user's manual" with instructive information on how to implement terrestrial offset projects in the PCOR Partnership region based on the work completed during Phase II.
- The preliminary final task report was completed.
- Additional accomplishments include the following:
  - The Avoided Grassland Conversion project was added to the project inventory of the Forest Carbon Portal, an online resource for terrestrial carbon projects. A description of the project can be found at www.forestcarbonportal.com/.
  - Economic analysis of landowner acceptance and opportunity in the PCOR Partnership region was completed by Dr. Ben Rashford at the University of Wyoming. Model results were summarized in the RTIP report and are presented in the final task report. A separate manuscript will also be submitted for publication in a peer-reviewed journal.

Task 6 – Characterization of Regional Sequestration Opportunities

Significant accomplishments for Task 6 for the reporting period included the following:

- A major remodel of the PCOR Partnership DSS was completed. The non-geographic information system (GIS) portion of the DSS has a completely new look and organization.
- The draft third edition of the PCOR Partnership Regional Atlas (D49) was completed.
- A reconnaissance-level investigation of potential geologic storage opportunities in Iowa was completed. This effort drew from existing information and staff expertise and focused on the following:
  - Paleozoic sandstone and carbonate strata, which are unused, mineralized aquifers in the southwestern part of the state.
  - Precambrian-age clastic rocks associated with the Mid-Continent Rift.
  - Pennsylvanian strata and associated coals located in the southern part of the state.
- The preliminary final task report was completed.

Task 7 – Research Safety, Regulatory, and Permitting Issues

Significant accomplishments for Task 7 for the reporting period included the following:

- The preliminary final task report was completed.

Task 8 – Public Outreach and Education

Significant accomplishments for Task 8 for the reporting period included the following:

- The public Web site update (D22) was completed on August 30, 2009.
- Filming for Carbon Footprint (D51) documentary was completed.
- The preliminary final task report was completed.

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

Significant accomplishments for Task 9 for the reporting period included the following:

- Additional text and figures were prepared as part of the effort to update the draft Best Practices Manual: Regional Sequestration Opportunities (D44) that was submitted for review in July 2008.
  - The updated report includes regional gas-processing facilities in addition to the ethanol plants and the electricity-generating stations.
  - This value-added document will be submitted to DOE following an internal review by PCOR Partnership management.
- The preliminary final task report was completed.

Task 10 – Regional Partnership Program Integration

Significant accomplishments for Task 10 for the reporting period included the following:

- EERC staff participated in conference calls for the Outreach; Geologic and Modeling; Simulation and Risk Assessment; GIS; North American Energy Working Group (NAEWG), and Water Working Groups.

PHASE II PROGRESS OF WORK

Task 1 – Project Management and Reporting

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 RCSP Program and the PCOR Partnership, 3) enlisting new partners in the PCOR Partnership, and 4) discussing existing and potential demonstration activities with prospective Phase II participants. Efforts undertaken in Task 1 also included the following:

- EERC staff participated in the Geologic Working Group meeting held on July 13 at the EERC.
- EERC staff led a meeting of the PCOR Partnership task leaders on July 27 at the EERC. Topics discussed included Phase II, Year 4 budget status; progress on the RTIPs; upcoming deliverables, milestones, and travel; preparation for the Phase II final report; the status of DOE Fossil Energy Techlines; the PCOR Partnership Annual Meeting; an update on the McGregor huff 'n' puff (H&P), as well as other task leader activities.

- EERC staff attended the North Dakota Industrial Commission Oil & Gas Meeting on August 6, 2009, in Bismarck, North Dakota, and updated the Oil & Gas Council on the progress of the field validation projects, including the ongoing Northwest McGregor H&P project.
- Work continued on the Phase II Final Report (D56). The final report is due on December 29, 2009.
- A meeting was held with Phase II task leaders on September 3, 2009, to discuss the format, time line, and funding for preparation of the final report for each task.
- A meeting was held on September 10, 2009, to review the modifications made to the Partners-Only DSS.
- A task leader meeting was held on September 11, 2009. Topics discussed included the Phase II final report, new internal procedures for deliverables and milestones, and plans for the upcoming annual meeting.
- The updated documentary entitled "Managing Carbon Emissions: The Geologic Solution" was reviewed. This documentary is slated for broadcast on November 10, 2009, on Prairie Public Television, and the DVD is planned for distribution at the upcoming PCOR Partnership Annual Meeting.
- The updated PCOR Partnership Atlas, 3rd Edition, was reviewed and the printing process initiated to ensure timely distribution of the atlas at the upcoming PCOR Partnership Annual Meeting.
- Work continued on planning the PCOR Partnership Annual Meeting to be held in St. Louis, Missouri, on December 2–3, 2009. Two half-day premeeting workshops, one on Effective CCS Outreach Strategies and another on Carbon Management, will be held on the afternoon of December 1, 2009. A fee will be charged to non-PCOR Partnership members. Continued efforts to promote attendance at the workshops and encourage participation in the PCOR Partnership and/or other RCSP programs. A Web site is currently under development.
- Preparations continued for the Air Quality VII Conference, October 26–29, 2009, in Arlington, Virginia. A preconference workshop (October 25, 2009) on CO_2 sequestration will be chaired by PCOR Partnership senior management, Ed Steadman and John Harju. A presentation on carbon management will also be given on October 26, 2009, at Session A1, chaired by John Litynski, NETL Division Director, Sequestration.
- Preparation continued of a poster of the CSLF-recognized (May 2007) Zama Acid Gas EOR, CO_2 Sequestration, and Monitoring Project for exhibition at the Third CSLF Ministerial Meeting in London, England, October 11–16, 2009.

Task 2 – Field Validation Test – Williston Basin Oil Field, North Dakota

The goal of Task 2 is to conduct a field validation test in the Williston Basin oil field in northwestern North Dakota to evaluate the potential for geological sequestration of CO_2 in a deep carbonate reservoir for the dual purpose of CO_2 storage and enhanced oil recovery (EOR). The following activities have been undertaken during this reporting period:

- In mid-June, a total of 440 tons of CO_2 was injected into the E. Goetz #1 well in the Northwest McGregor oil field in Williams County, North Dakota.

- The injection zone is in a limestone interval of the Mission Canyon Formation at a depth of approximately 8050 ft below ground surface.
- Injection occurred over a period of 2 days. The well was shut in immediately upon the completion of the injection.
- The injected CO_2 was allowed to soak for a period of 2 weeks, after which the well was brought back onto production.
- The well was operated in production mode, producing oil, water, and CO_2.
- Monitoring, verification, and accounting (MVA) activities were conducted to monitor for CO_2 and tracer in fluids from the nearby observation well and shallow groundwater resources.
- Initial results suggest that CO_2 has increased the oil productivity of the E. Goetz #1 well and has not migrated outside the injection zone.

Task 3 – Field Validation Test at Zama, Alberta

The goal of the field validation test in the Zama Field of Alberta, Canada, 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 injected for the concurrent purposes of CO_2 sequestration, H_2S disposal, and EOR. The following activities have been undertaken during this reporting period:

- Continued injection of gas during this reporting period.
- Injected a cumulative total of over 800 million cubic feet (approximately 40,000 tons) of gas, with an average composition of 80% CO_2 and 20% H_2S. This equates to approximately 20,000 tons of CO_2 stored throughout the operational period.
- Injection rates throughout this reporting period have remained relatively stable at approximately 1 million cubic feet per day but have generally increased over the past year to meet voidage replacement demands.
- Oil is currently produced at an average rate of 100 barrels per day (Figure 2).
- As of August 30, 2009, 25,000 barrels of oil have been produced from this pinnacle.

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 storage and enhanced coalbed methane (ECBM) production were evaluated in the Williston Basin. The following activities have been undertaken during this reporting period:

- All monitoring equipment was removed from the site including the office trailer.

Task 5 – Terrestrial Validation Test

The objective of 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. The following activities have been undertaken during this reporting period:

- All analyses were completed.

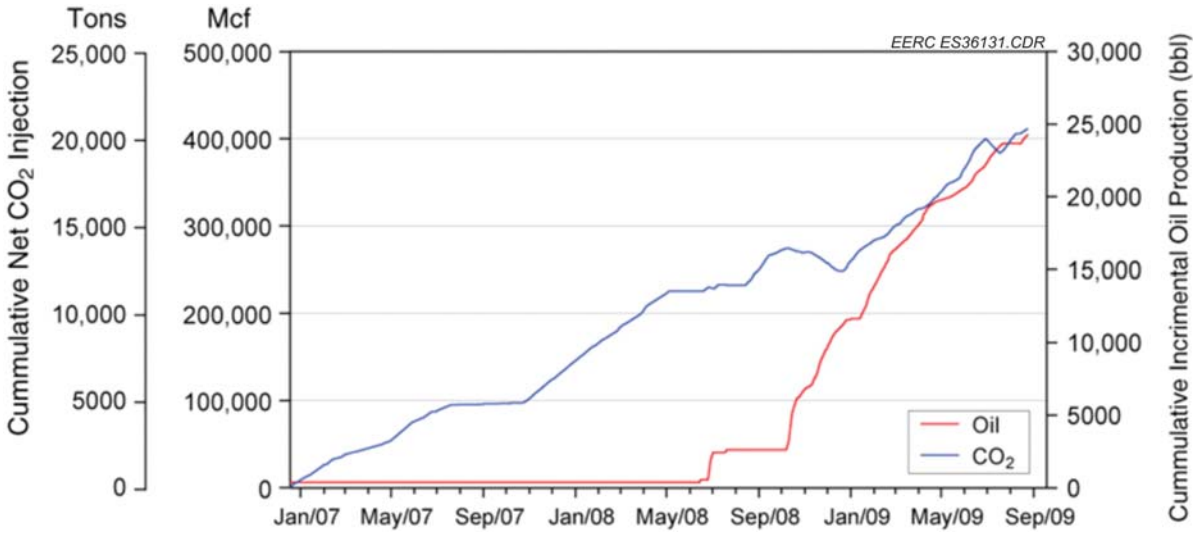

Figure 2. Zama acid gas injection profile.

Task 6 – Characterization of Regional Sequestration Opportunities

The goal of Task 6 is to characterize the PCOR Partnership region with respect to regional sequestration opportunities and to provide this information to our partners through our Web-based DSS. Progress within the reporting period included the following:

- Iowa has completed its subcontract work for the project. In summary, there are sufficient data available to provide basic information on porosities and matrix permeabilities of individual aquifers as well as the three-dimensional distribution and stratigraphic container for each of five major aquifer systems. Existing data suggest that dissolved solids concentrations are typically below 10,000 mg/L across most of the aquifer volume. These low-total dissolved solids (TDS) values put the aquifer systems in the protected classification, requiring an exemption from the U.S. Environmental Protection Agency (EPA) to be used as a target for CO_2 storage.
- The saline systems that were evaluated in Phase I of the project were reevaluated from the aspect of the current DOE assessment methodologies. Results of this reexamination modified the potential storage capacities considerably in some cases, and with the Lower Cretaceous New Castle Formation of the Williston Basin, all storage was eliminated.

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. Activities in Task 7 included the following:

- Various state, provincial, and regional GHG reduction and CCS initiatives were tracked and analyzed.
- Analysis of carbon market strategies continued.
- Legislative actions occurring in Congress for any implications relating to CCS were followed and reviewed.
- Recent publications relating to regulating CO_2 sequestration and MVA issues were received.
- Review of EPA's Notice of Data Availability (NODA) for the Underground Injection Control (UIC) Program for geologic sequestration wells was completed.
- EERC staff participated in the Interstate Oil and Gas Compact Commission (IOGCC) CCS Task Force meeting in St. Louis, Missouri.
- EERC staff also participated in numerous IOGCC Pipeline Transportation Task Force conference calls.

Task 8 – Public Outreach and Education

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

- The raw video shot for the upcoming documentary entitled "Carbon Footprint: One Size Does Not Fit All" (D51) was reviewed, including indexing the footage and the identifying segments for potential use in the documentary.
- Comments from NETL, PCOR Partnership senior management, and EERC senior management continued to be incorporated into the documentary on Geologic Sequestration (D46).
- EERC staff participated in the monthly conference calls and related activities of the Outreach Working Group.
- A workshop in Washington, D.C. (July 2009) was attended to develop a draft Best Practices Manual for outreach.
- External documents were reviewed such as the World Resources Institute draft report on community engagement for CCS projects.
- A Keystone Teacher Training Seminar in Omaha, Nebraska (July 2009), was attended and filmed.
- Preparations were initiated for the Outreach Workshop for the PCOR Partnership Annual Meeting to be held in early December in St. Louis, Missouri.

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. Activities in Task 9 included the following:

- Preparation of additional text and figures continued as part of the effort to update the draft Best Practices Manual: Regional Sequestration Opportunities (D44) that was submitted in July 2008.
  - The revised document will include updated CO_2 emission information as well as the inclusion of more than 200 additional natural gas-processing or transportation facilities.
  - Potential pipeline routes are being adjusted to incorporate the gas-processing facilities.

Task 10 – Regional Partnership Program Integration

Task 10 consists of the PCOR Partnership's active participation in and leadership to technical working groups to identify, discuss, and resolve common issues related to the deployment of CCS technologies. Activities in Task 10 included the following:

- The Program Manager continued his efforts as the chairman of the NAEWG North American Carbon Atlas Partnership (NACAP) Methodology Subcommittee, including the following:
  - On July 1, 2009, a confidential draft final report was sent to subcommittee members for review.
  - On July 14, 2009, a conference call was held to discuss the draft final report entitled "Development of Storage Coefficients for Carbon Dioxide Storage in Deep Saline Formations."
  - On July 21, 2009, minutes were distributed from the conference call to subcommittee members.
  - On July 22–23, 2009, subcommittee efforts were presented at the NAEWG–NACAP meeting in Pittsburgh, Pennsylvania.
  - Work was initiated to determine the "level of detail/granularity in publically accessible GIS" as assigned to the Methodology Working Group and Information Technology Working Group. This work must be completed by the next NACAP meeting.
  - Discussions continued with NACAP committee members on additional work assigned.
  - EERC staff participated in the kickoff conference call for the RCSP Atlas and the NACAP Atlas on September 10, 2009.
- Preparations continued for the 2009 RCSP Annual Review Meeting to be held November 16–19, 2009, in Pittsburgh, Pennsylvania.
- An e-mail inquiry was sent on September 15, 2009, to the PCOR Partnership partners to determine interest in receiving an invitation to the RCSP annual review meeting scheduled for November 16–19, 2009, in Pittsburgh, Pennsylvania.
- A draft RCSP Annual Review Meeting agenda was received on September 24, 2009, asking for a review of the agenda and speakers to fill the time slots. It is proposed that the PCOR Partnership present on its Terrestrial field validation test, its Lignite field validation test, its Northwest McGregor H&P project, and its Phase III development phase projects. RCSP working groups will also hold meetings.

- EERC staff participated in conference calls and activities for the Outreach Working Group, including the following:
  - A draft final copy of the Outreach Working Group report entitled "Best Practices Manual for Outreach" was received for comment.
  - A review of the draft document entitled "Guidelines for Community Engagement Regarding Carbon Dioxide Capture and Storage (CCS) Projects" by the World Resources Institute was prepared and submitted on September 25, 2009.
- EERC staff participated in conference calls for other various working groups, including Geologic and Modeling, Capture and Transportation, Simulation and Risk Assessment, GIS, and the Water Working Group.

PHASE II COST STATUS

The approved budget for Phase II, along with actual costs incurred and in-kind cost share reported, is shown in Table 3.

Table 3. Phase II Budget and Actual Costs Incurred

Organization	Approved Budget	Actual Costs Incurred
DOE Share – Cash	$15,913,178	$14,842,384
Nonfederal Share – Cash	$2,321,410	$3,028,712
Nonfederal Share – In-Kind	$7,825,301	$10,242,161
Total	$26,059,889	$28,113,257

PHASE II SCHEDULE STATUS

Table 4 contains a listing of all deliverables and milestones by quarter, with completion dates, for the duration of Phase II. Table 5 contains project milestones and deliverables (Gantt chart) for the duration of Phase II.

ACTUAL OR ANTICIPATED PHASE II PROBLEMS OR DELAYS

Task 1 – Project Management and Reporting

Nothing to note at this time.

Task 2 – Field Validation Test – Williston Basin Oil Field, North Dakota

- Unavoidable weather-related delays at the site resulted in actual injection on June 16–17, 2009.
- The soak portion of the test was concluded in early July and the production phase has been under way since then.

Table 4. Phase II Milestones and Deliverables

Title/Description	Due Date	Actual Completion Date
Year 1 – Quarter 1 (October–December 2005)		
M1: Task 1 – Project Management Plan Completed	12/31/05	12/30/05
D1: Task 1 – Project Management Plan	12/31/05	12/30/05
D2: Task 8 – Regional CO_2 Sequestration Potential – Field Validation Tests (Fact Sheet 6)	12/31/05	12/29/05
D5: Task 3 – Zama Field Validation Test NEPA Compliance Document	2/28/06	12/21/05
Year 1 – Quarter 2 (January–March 2006)		
D3: Task 1 – Quarterly and Earned Value Management (EVM) Report	1/31/06	1/30/06
M3: Task 3 – Zama Field Validation Test Experimental Design Package Completed	2/28/06	2/28/06
M2: Task 6 – First Regional Characterization Data Gap Assessment Completed	2/28/06	2/28/06
D4: Task 3 – Zama Field Validation Test Experimental Design Package	2/28/06	2/28/06
D6: Task 5 – Terrestrial Field Validation Test Experimental Design Package	2/28/06	2/28/06
D7: Task 5 – Terrestrial Field Validation Test NEPA Compliance Document	2/28/06	2/14/06
D8: Task 6 – First Regional Characterization Data Gap Assessment	2/28/06	2/28/06
D9: Task 8 – Outreach Action Plan – Carbon Sequestration	2/28/06	2/28/06
D10: Task 3 – Zama Field Validation Test Site Health and Safety Plan	3/31/06	3/31/06
D11: Task 3 – Zama Field Validation Test Regulatory Permitting Action Plan	3/31/06	3/28/06
D12: Task 5 – Terrestrial Field Validation Test Site Health and Safety Plan	3/31/06	2/2/06
D13: Task 5 – Terrestrial Field Validation Test Regulatory Permitting Action Plan	3/31/06	3/27/06
Year 1 – Quarter 3 (April–June 2006)		
D3: Task 1 – Quarterly and EVM Report	4/30/06	4/28/06
D14: Task 1 – Semiannual Report	4/30/06	4/28/06
D15: Task 3 – Zama Field Validation Test Outreach Action Plan	4/30/06	4/28/06
D16: Task 5 – Terrestrial Field Validation Test Outreach Action Plan	4/30/06	4/28/06
D17: Task 8 – PowerPoint Presentation: General Audience CO_2 Sequestration Outreach	5/31/06	5/31/06
D18: Task 3 – Zama Field Validation Test Sampling Protocols	6/30/06	6/29/06
D19: Task 5 – Terrestrial Field Validation Test Sampling Protocols	6/30/06	6/21/06
M4: Task 5 – Terrestrial Field Validation Test Sampling Protocols Completed	6/30/06	6/21/06
Year 1 – Quarter 4 (July–September 2006)		
D3: Task 1 – Quarterly and EVM Report	7/31/06	7/26/06
D20: Task 8 – Zama Acid Gas Project (Fact Sheet 7)	7/31/06	7/28/06
D21: Task 10 – Regional Partnership Integration Plan	7/31/06	7/18/06
D22: Task 8 – Web Site Update	8/31/06	8/31/06

Continued…

Table 4. Phase II Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 2 – Quarter 1 (October–December 2006)		
D3: Task 1 – Quarterly and EVM Report	10/31/06	10/31/06
D14: Task 1 – Semiannual Report	10/31/06	10/31/06
D23: Task 9 – Best Practices Manual: Using Wind Power to Offset the Energy Requirements of CO_2 Compression for Sequestration	10/31/06	10/31/06
D24: Task 4 – Lignite Field Validation Test NEPA Compliance Document	10/31/06	10/13/06
D25: Task 8 – CO_2 Sequestration Through Habitat Restoration – Defining Best Terrestrial Sequestration Practices for Landowners (Fact Sheet 8)	12/31/06	12/29/06
Year 2 – Quarter 2 (January–March 2007)		
D3: Task 1 – Quarterly and EVM Report	1/31/07	1/31/07
D17: Task 8 – PowerPoint Presentation: General Audience CO_2 Sequestration Outreach	2/28/07	2/28/07
D26: Task 4 – Lignite Field Validation Test Experimental Design Package	2/28/07	2/28/07
D27: Task 4 – Lignite Field Validation Test Site Health and Safety Plan	3/30/07	3/29/07
D28: Task 4 – Lignite Field Validation Test Regulatory Permitting Action Plan	3/30/07	3/30/07
M5: Task 4 –Specific Well Location at the Lignite Field Validation Test Identified	2/28/07	2/28/07
M6: Task 4 – Finalized Drilling Prognosis for the Five-Spot Research Wells for the Lignite Field Validation Test	3/30/07	3/30/07
Year 2 – Quarter 3 (April–June 2007)		
D3: Task 1 – Quarterly and EVM Report	4/31/07	4/25/07
D14: Task 1 – Semiannual Report	4/30/07	4/30/07
D29: Task 4 – Lignite Field Validation Test Outreach Action Plan	4/30/07	4/27/07
D30: Task 8 – Outreach Booth	4/30/07	4/30/07
D31: Task 8 – CO_2 Sequestration Validation Test in a Deep, Unminable Lignite Seam in Western North Dakota (Fact Sheet 10)	5/31/07	5/31/07
D32: Task 4 – Lignite Field Validation Test Sampling Protocols	6/29/07	6/29/07
D33: Task 6 – Denver–Julesberg Basin EOR Potential Report	6/29/07	4/30/07
Year 2 – Quarter 4 (July–September 2007)		
D3: Task 1 – Quarterly and EVM Report	7/31/07	7/25/07
D34: Task 1 – Phase II Continuation Application/Progress Report	7/31/07	7/31/07
M7: Task 4 – White Paper on CO_2 Flood Design for Simultaneous Evaluation of Carbon Sequestration and ECBM Recovery – Lignite Field Validation Test Site Completed	7/31/07	7/16/07
D22: Task 8 – Web Site Update	8/31/07	8/31/07

Continued…

Table 4. Phase II Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 2 – Quarter 4 (July–September 2007), continued		
M8: Task 5 – Best Management Practices for Terrestrial Carbon Sequestration on Private Lands in the Prairie Pothole Region (Fact Sheet 11) Completed	9/30/07	9/28/07
D35: Task 8 – Documentary: Carbon Trading	9/30/07	9/28/07
Year 3 – Quarter 1 (October–December 2007)		
D3: Task 1 – Quarterly Report	10/31/07	10/31/07
D14: Task 1 – Semiannual Report	10/31/07	10/31/07
D36: Task 6 – Regional Characterization Data Gap Assessment Update	10/31/07	10/31/07
D37: Task 8 – CO_2 Sequestration Validation Test in a Deep Oil Field in the Williston Basin (Fact Sheet 12)	10/31/07	10/30/07
D38: Task 9 – Best Practices Manual: Excelsior Energy	11/30/07	11/30/07
M9: Task 3 – Progress of Geomechanical Evaluation Reported	12/31/07	12/28/07
Year 3 – Quarter 2 (January–March 2008)		
D3: Task 1 – Quarterly Report	1/31/08	1/31/08
D22: Task 8 – Web Site Update	3/31/08	3/31/08
Year 3 – Quarter 3 (April–June 2008)		
D3: Task 1 – Quarterly Report	4/30/08	4/30/08
D39: Task 8 – Documentary: Terrestrial CO_2 Sequestration	4/30/08	4/30/08
M10: Task 8 – Documentary: Terrestrial CO_2 Sequestration Reported	4/30/08	4/30/08
D17: Task 8 – PowerPoint Presentation: General Audience CO_2 Sequestration Outreach	5/30/08	5/30/08
Year 3 – Quarter 4 (July–September 2008)		
D3: Task 1 – Quarterly Report	7/31/08	7/31/08
D44: Task 9 – Best Practices Manual: Regional Sequestration Opportunities	7/31/08	7/31/08
Year 4 – Quarter 1 (October–December 2008)		
D3: Task 1 – Quarterly Report	10/31/08	10/31/08
D40: Task 2 – Williston Basin Field Validation Test Regulatory Permitting Action Plan	11/28/08	12/11/08
D41: Task 2 – Williston Basin Field Validation Test NEPA Compliance Document	11/28/08	12/03/08
M11: Task 2 – Williston Basin Field Validation Test NEPA Compliance Document	11/28/08	12/03/08
D42: Task 2 – Williston Basin Field Validation Test Experimental Design Package	12/31/08	12/31/08
D43: Task 2 – Williston Basin Field Validation Test Site Health and Safety Plan	12/31/08	12/23/08
D17: Task 8 – PowerPoint Presentation: General Audience CO_2 Sequestration Outreach	12/31/08	12/31/08

Continued…

Table 4. Phase II Milestones and Deliverables (continued)

Title/Description	Due Date	Actual Completion Date
Year 4 – Quarter 2 (January–March 2009)		
D3: Task 1 – Quarterly Report	1/31/09	1/30/09
M12: Task 2 – Williston Basin Field Validation Test Outreach Action Plan	2/27/09	2/27/09
D45: Task 2 – Williston Basin Field Validation Test Outreach Action Plan	2/27/09	2/27/09
D22: Task 8 – Web Site Update	2/27/09	2/23/09
Year 4 – Quarter 3 (April–June 2009)		
D3: Task 1 – Quarterly Report	4/30/09	4/30/09
D47: Task 2 – Williston Basin Field Validation Test Sampling Protocols	4/30/09	4/30/09
M13: Task 2 – Williston Basin Field Validation Test Sampling Protocols Completed	4/30/09	4/30/09
D46: Task 8 – Documentary: Geologic Sequestration	5/29/09	5/29/09
D48: Task 8 – Best Practices Manual: Outreach	5/29/09	5/29/09
D50: Task 7 – Road Map Document	6/30/09	6/30/09
Year 4 – Quarter 4 (July–September 2009)		
D3: Task 1 – Quarterly Report	7/31/09	7/31/09
D54: Task 5 – Terrestrial Field Validation Test Regional Technology Implementation Plan	7/31/09	7/30/09
D22: Task 8 – Web Site Update	8/31/09	8/31/09
D49: Task 6 – Regional Atlas	9/30/09	9/21/09
D52: Task 3 – Zama Field Validation Test Regional Technology Implementation Plan	9/30/09	9/30/09
D53: Task 4 – Lignite Field Validation Test Regional Technology Implementation Plan	9/30/09	9/30/09
D3: Task 1 – Quarterly Report	10/31/09	
D55: Task 2 – Williston Basin Field Validation Test Regional Tech. Implementation Plan	11/30/09	
D51: Task 8 – Documentary: Carbon Footprint: One Size Does Not Fit All	12/29/09	
D56: Task 1 – Phase II Final Report	12/29/09	

Table 5. PCOR Partnership Phase II Gantt Chart

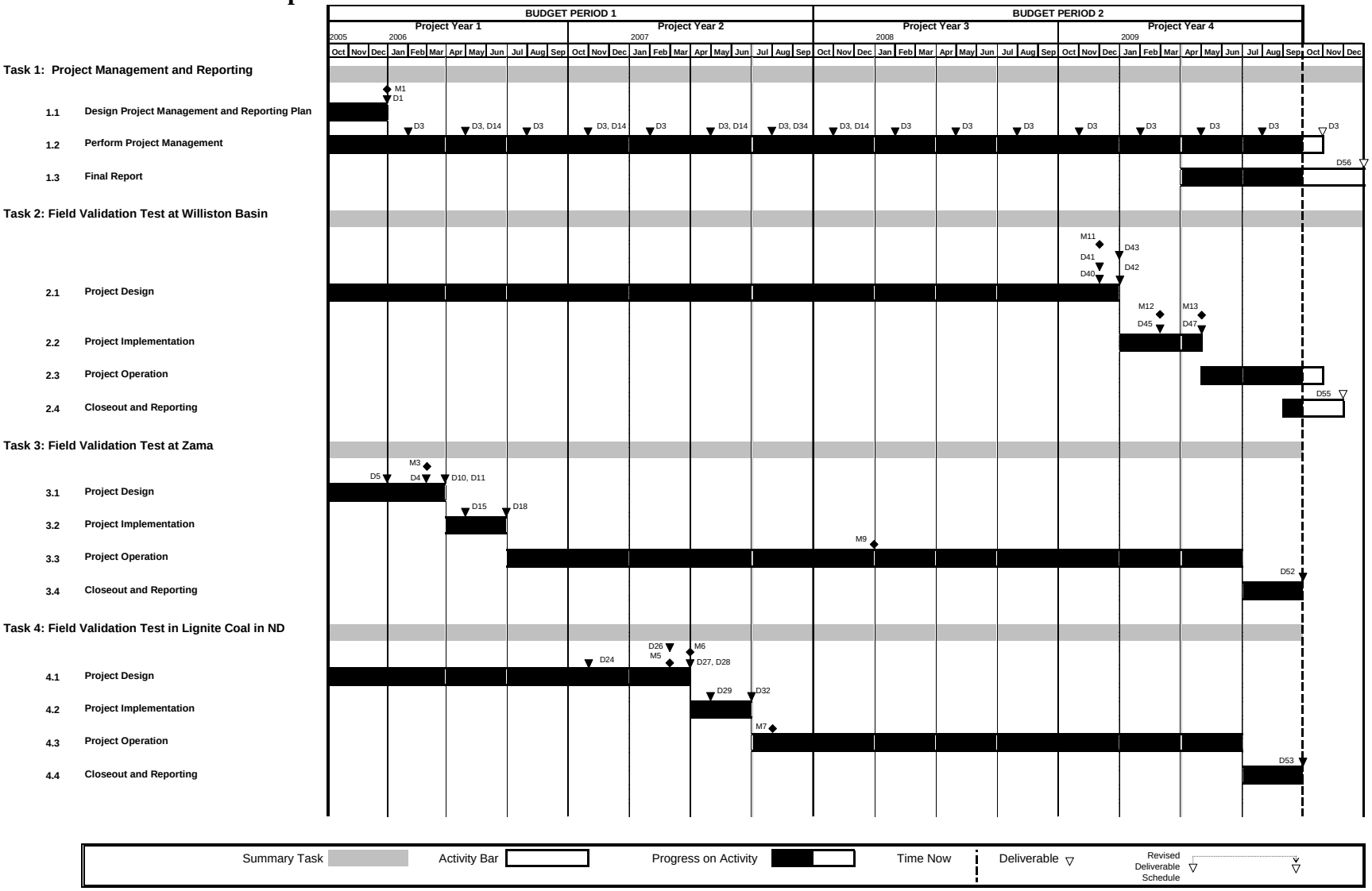

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Table 5. PCOR Partnership Phase II Gantt Chart (continued)

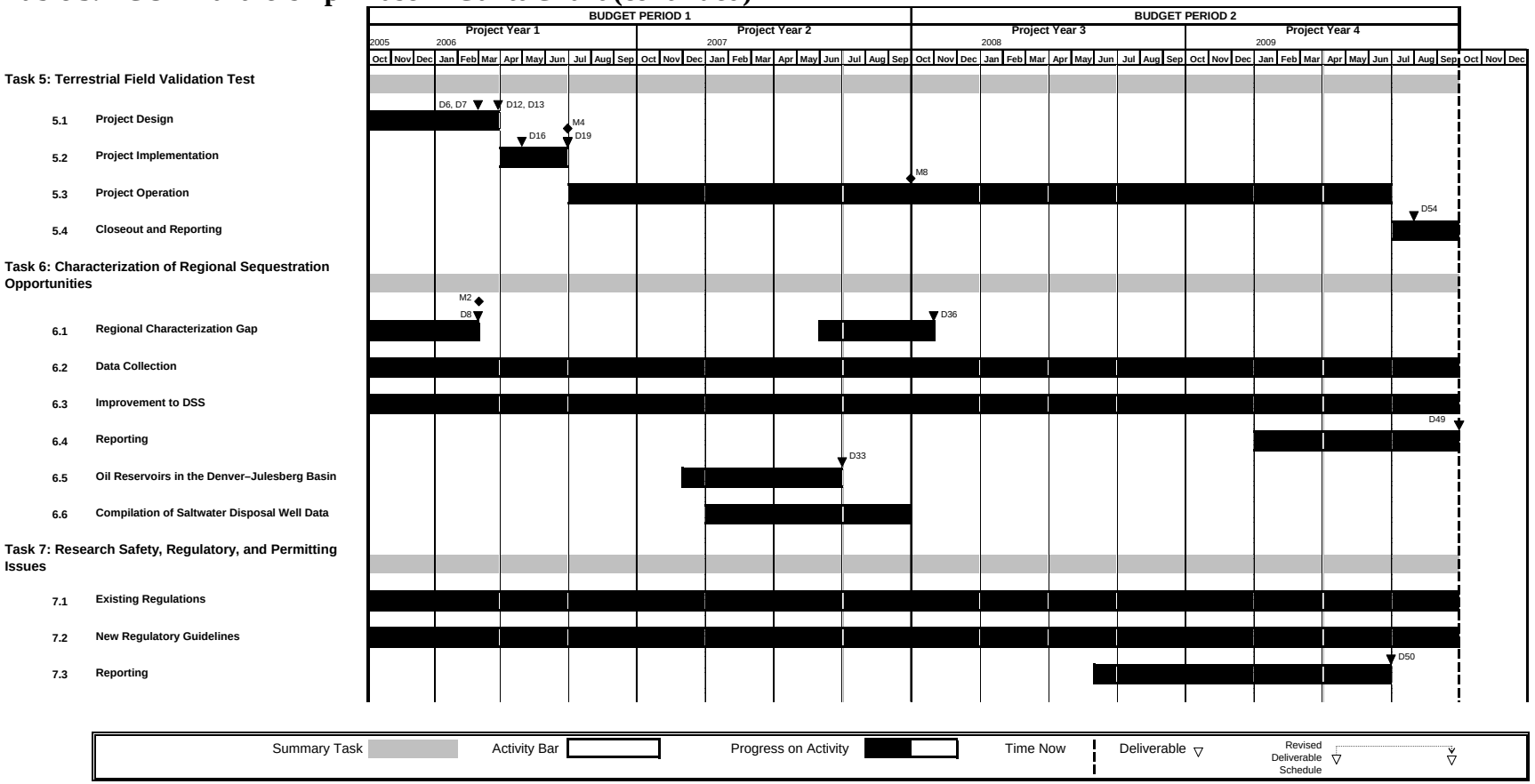

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Table 5. PCOR Partnership Phase II Gantt Chart (continued)

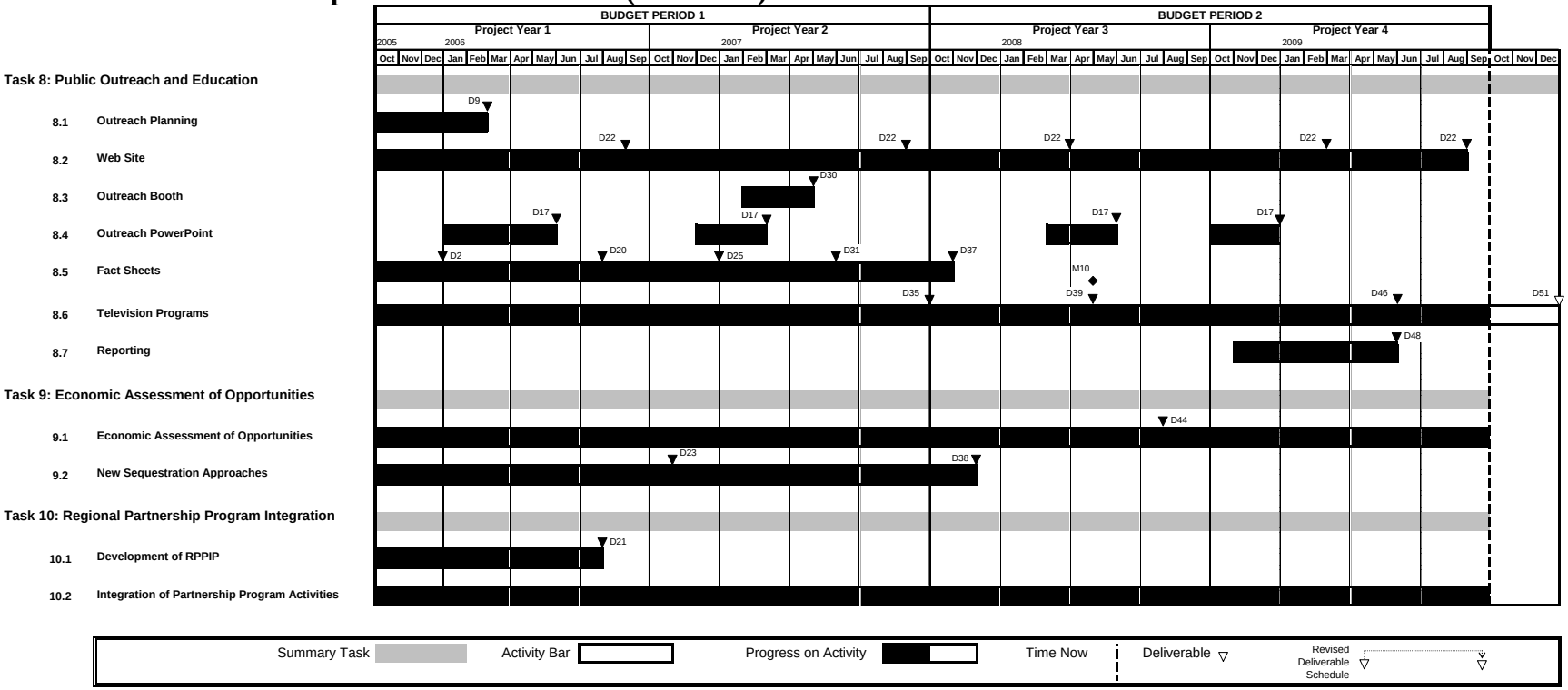

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Table 5. PCOR Partnership Phase II Gantt Chart (continued)

Key for Phase II Deliverables ▼

D1 Project Management Plan
D2 Fact Sheet 6 – Regional CO_2 Sequestration Potential – Field Validation Tests
D3 Quarterly Progress Reports
D4 Zama Field Validation Test Site – Experimental Design Package
D5 Zama Field Validation Test Site – NEPA Compliance Document
D6 Terrestrial Field Validation Test Site – Experimental Design Package
D7 Terrestrial Field Validation Test Site – NEPA Compliance Document
D8 Regional Characterization Data Gap Assessment
D9 Outreach Action Plan – Carbon Sequestration
D10 Zama Field Validation Test Site – Site Health & Safety Plan
D11 Zama Field Validation Test Site – Regulatory Permitting Action Plan
D12 Terrestrial Field Validation Test Site – Site Health & Safety Plan
D13 Terrestrial Field Validation Test Site – Regulatory Permitting Action Plan
D14 Semiannual Progress Report
D15 Zama Field Validation Test Site – Outreach Action Plan
D16 Terrestrial Field Validation Test Site – Outreach Action Plan
D17 PowerPoint Presentation: General Audience CO_2 Sequestration Outreach
D18 Zama Field Validation Test Site – Sampling Protocols
D19 Terrestrial Field Validation Test Site – Sampling Protocols
D20 Fact Sheet 7– Zama Acid Gas Project
D21 Regional Partnership Program Integration Plan
D22 Web Site Update
D23 Best Practices Manual – Using Wind Power to Offset the Energy Requirements of CO_2 Compression for Sequestration
D24 Lignite Field Validation Test Site – NEPA Compliance Document
D25 Fact Sheet 8 – CO_2 Sequestration through Habitat Restoration
D26 Lignite Field Validation Test Site – Experimental Design Package
D27 Lignite Field Validation Test Site – Site Health & Safety Plan
D28 Lignite Field Validation Test Site – Regulatory Permitting Action Plan
D29 Lignite Field Validation Test Site – Outreach Action Plan
D30 Outreach Booth
D31 Fact Sheet 10 – CO_2 Sequestration Validation Test in a Deep, Unminable Lignite Seam in Western North Dakota
D32 Lignite Field Validation Test Site – Sampling Protocols
D33 Denver–Julesberg Basin EOR Potential Report
D34 Continuation Application
D35 Video 1– Carbon Trading
D36 Regional Characterization Data Gap Assessment Update
D37 Fact Sheet 12 – CO_2 Sequestration Validation Test in a Deep Oil Field in the Williston Basin
D38 Best Practices Manual – Excelsior Energy
D39 Video 2 – Terrestrial CO_2 Sequestration
D40 Williston Basin Field Validation Test Site – Regulatory Permitting Action Plan
D41 Williston Basin Field Validation Test Site – NEPA Compliance Document
D42 Williston Basin Field Validation Test Site – Experimental Design Package
D43 Williston Basin Field Validation Test Site – Site Health & Safety Plan
D44 Best Practices Manual – Regional Sequestration Opportunities
D45 Williston Basin Field Validation Test Site – Outreach Action Plan
D46 Video 3 – Geologic Sequestration
D47 Williston Basin Field Validation Test Site – Sampling Protocols
D48 Best Practices Manual – Outreach and Education
D49 Regional Atlas
D50 Road Map Document
D51 Video 4 – CO_2 Sequestration and Global Warming
D52 Zama Field Validation Test Site – Regional Technology Implementation Plan
D53 Lignite Field Validation Test Site – Regional Technology Implementation Plan
D54 Terrestrial Field Validation Test Site – Regional Technology Implementation Plan
D55 Williston Basin Field Validation Test Site – Regional Technology Implementation Plan
D56 Final Report

Key for Phase II Milestones ◆

M1 Project Management Plan Completed
M2 Regional Characterization Data Gap Assessment Completed
M3 Zama Field Validation Test Site – Experimental Design Package Completed
M4 Terrestrial Field Validation Test Site – Sampling Protocol Completed
M5 Identification of Specific Well Location at the Lignite Field Validation Test
M6 Finalized Drilling Prognosis for the Five-spot Research Wells for the Lignite Field Validation Test
M7 White Paper on CO_2 Flood Design for CO_2 Sequestration and ECBM Recovery Completed
M8 Fact Sheet 11 – Best Management Practices for Terrestrial Carbon Sequestration on Private Lands in the Prairie Pothole Region
M9 Progress of Geomechanical Evaluation Reported
M10 Video 2 Completed – Terrestrial CO_2 Sequestration
M11 Williston Basin Field Validation Test Site – NEPA Compliance Document Completed
M12 Williston Basin Field Validation Test Site – Outreach Action Plan Completed
M13 Williston Basin Field Validation Test Site – Sampling Protocol Completed

- Production data collected over the course of the quarter indicate that the production phase of the H&P will continue beyond the end of BP3.
- It is necessary to operate the well in a production mode for several weeks before disrupting the reservoir conditions for the application of downhole geophysical logging tools.
- Therefore, final application of field-based downhole monitoring techniques (e.g. reservoir saturation tool [RST] and vertical seismic profiling [VSP] logging) is scheduled to occur in early October 2009.
- Routine monitoring of produced fluids from the E. Goetz #1 well and the nearby observation well for CO_2 and tracer are planned to continue through October and into November 2009.

Task 3 – Field Validation Test at Zama, Alberta

Nothing to note at this time.

Task 4 – Field Validation Test of North Dakota Lignite

Nothing to note at this time.

Task 5 – Terrestrial Validation Test

Nothing to note at this time.

Task 6 – Characterization of Regional Sequestration Opportunities

A particular challenge in characterizing Iowa's sequestration potential, particularly with quantitative estimates, is the relative lack of deep wells, core tests, geophysical logs, surface geophysics, and other data commonly generated in areas with oil, gas, or CBM production, particularly those which supply data on unit porosity and permeability. Existing geologic data, modeling, and extrapolation of other data allow for characterization of the target units geometry and preliminary estimates.

Carbon sequestration within saline aquifers is considered a possibility for several Paleozoic aquifer systems. Five aquifer systems were examined and the Cambro-Ordovician and Mt. Simon Aquifers provide the best targets for further investigation. These two aquifers both contain intervals of high porosity (>20%–25%) and high permeabilities (>500–1000 millidarcies), and both are bounded by effective confining beds. Because these two aquifers are in the deeper part of the stratigraphic section, they also have the widest geographic distribution at appropriate depths.

Although there are sufficient data available to provide basic information on porosities and matrix permeabilities of individual aquifers as well as the three-dimensional distribution and stratigraphic container for each of the five major aquifer system, existing data suggest that dissolved solids concentrations are below 10,000 mg/L across most of the aquifer volume. These low TDS values put the aquifer systems in the protected classification, requiring an exemption from EPA to be used as a target for CO_2 storage.

Task 7 – Research Safety, Regulatory, and Permitting Issues

Nothing to note at this time.

Task 8 – Public Outreach and Education

Because of the volume of video obtained on location and the timing of the trips for location filming, the submittal of the draft final copy of the documentary "Carbon Footprint: One Size Does Not Fit All" (D51) to DOE for review has been rescheduled from August 31, 2009, to December 29, 2009.

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

Nothing to note at this time.

Task 10 – Regional Partnership Program Integration

Nothing to note at this time.

PHASE II PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES

Task 1 – Project Management and Reporting

- The Quarterly Progress Report/Milestone Quarterly Report (D3) for the reporting period April – June 2009 was submitted to DOE for approval on July 31, 2009.
- The following PowerPoint presentations were given during the reporting period:

Report from the Methodology Working Group – Capacity Estimations
North American Carbon Atlas Partnership Meeting
July 22, 2009
Pittsburgh, PA

Overview of the PCOR Partnership Field-Based Activities:
Williston Basin Demonstration Project;
Fort Nelson CCS Project;
McGregor Huff 'n' Puff Project
July 30, 2009
Jim Sorensen, Steve Smith, Darren Schmidt, Ed Steadman, John Harju
Energy & Environmental Research Center

Plains CO_2 Reduction (PCOR) Partnership Project
Biorecro AB
September 28, 2009
Ed Steadman and John Harju
Energy & Environmental Research Center

Plains CO_2 Reduction (PCOR) Partnership Project
Apache Canada Ltd.
September 23, 2009
Calgary, Alberta, Canada
Ed Steadman
Energy & Environmental Research Center

Plains CO_2 Reduction (PCOR) Partnership Project
Neumann Systems Group, Inc.
September 15, 2009
Grand Forks, North Dakota
Ed Steadman
Energy & Environmental Research Center

Task 2 – Field Validation Test – Williston Basin Oil Field, North Dakota

A presentation entitled "The Plains CO_2 Reduction (PCOR) Partnership: CO_2 Storage and EOR Opportunities in North Dakota" was presented on September 16, 2009, at the 14th Annual North Dakota Solid Waste & Recycling Symposium in Minot, North Dakota.

Task 3 – Field Validation Test at Zama, Alberta

- A poster presentation entitled "Work Flow Procedures for Deploying Prediction and Verification Techniques for Two CO_2 Enhanced Oil Recovery Projects" was given August 16–19, 2009, at the American Association of Petroleum Geologists (AAPG)/Society of Petroleum Engineers (SPE)/Society of Exploration Geophysicists (SEG) Joint Hedberg Research Conference in Vancouver, British Columbia, Canada.
- The draft Zama Field Validation Test RTIP (D52) was completed on September 30, 2009.

Task 4 – Field Validation Test of North Dakota Lignite

- A final overview of the lignite field validation test was provided for the new PCOR Partnership Atlas.
- The Lignite Field Validation Test RTIP (D53) was completed on September 30, 2009.

Task 5 – Terrestrial Validation Test

- The terrestrial Field Validation Test RTIP (D54) was completed on July 30, 2009.
- Meetings took place with several investors this quarter interested in developing biological carbon offset portfolios. Separate meetings were held with the Carbon Fund and other entities in which a confidentiality agreement prohibits disclosure of their name.
- PCOR Partnership partners met with Senate and Agency staff in Washington, D.C. to discuss terrestrial sequestration opportunities in North Dakota and throughout the United States. The trip also included a meeting with the Chief Executive Operator of the Voluntary Carbon Standard, a leading standard in the voluntary carbon market, to discuss opportunities and issues for the development of an Avoided Grassland Conversion methodology.

Task 6 – Characterization of Regional Sequestration Opportunities

- The revised version of the partners-only Web site has been completed.
- The draft third edition of the PCOR Partnership Regional Atlas (D49) was completed September 21, 2009. It is planned that 800 copies of the document will be printed for distribution.

Task 7 – Research Safety, Regulatory, and Permitting Issues

- EERC staff attended the IOGCC CCS Task Force meeting in St. Louis, Missouri.
- EERC staff also participated in numerous IOGCC Pipeline Transportation Task Force conference calls.

Task 8 – Public Outreach and Education

- The draft final of the PCOR Partnership public Web site (D22) was completed on August 31, 2009.

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

- Provided updated CO_2 emission statistics for use in the new edition of the atlas and the revised version of the partners-only Web site.

Task 10 – Regional Partnership Program Integration

- Attended the RCSP Outreach Working Group Workshop on July 13-16 in Washington, D.C.; for preparation of Best Practices Manual for Outreach.

MEETINGS/TRAVEL

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

- July 13–16; Attended Outreach Working Group Workshop in Washington, D.C.
- August 27, 2009: Attended editing session for geologic sequestration documentary at Prairie Public Broadcasting studios in Fargo, North Dakota.
- September 1–3, 2009: Attended the North Dakota Petroleum Council Annual Meeting in Medora, North Dakota.
- September 2, 4, 15, and 25, 2009: Attended editing sessions with Prairie Public Broadcasting at their offices in Fargo, North Dakota.
- September 9–11, 2009: Attended meetings with Ducks Unlimited in Bismarck, North Dakota.
- September 14–18, 2009: Traveled to Minneapolis, Minnesota, to complete filming for the Carbon Footprint documentary.

- September 21–24, 2009: Attended the 26th Annual International Pittsburgh Coal Conference in Pittsburgh, Pennsylvania.

Materials presented at these meetings will be available to partners on the PCOR Partnership DSS Web site (http://www2.undeerc.org/website/pcorp/).

REFERENCES

None.