

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

### **Quarterly Technical Progress Report**

*(for the period April 1 – June 30, 2010)*

*Prepared for:*

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**April 1 – June 30, 2010**

**EXECUTIVE SUMMARY**

The Plains CO<sub>2</sub> Reduction (PCOR) Partnership is one of seven Regional Carbon Sequestration Partnerships competitively awarded by the U.S. Department of Energy National Energy Technology Laboratory (DOE NETL) in 2003 as part of a national plan to mitigate greenhouse gas emissions. The PCOR Partnership is led by the Energy & Environmental Research Center (EERC) at the University of North Dakota and continues to include stakeholders from the public and private sector in Phase III. The PCOR Partnership region includes all or part of nine U.S. states and four Canadian provinces.

Phase III, the Development Phase, a 10-year effort (2007–2017), is an extension of the Characterization (Phase I) and Validation (Phase II) Phases. The Phase III efforts of the PCOR Partnership include two large-volume demonstration tests—one in Canada and one in the United States—that focus on injecting CO<sub>2</sub> into deep geologic formations for CO<sub>2</sub> storage. Budget Period 4 (Years 3–8 of Phase III) began October 1, 2009.

This progress report presents an update of Phase III PCOR Partnership activities from April 1, 2010, through June 30, 2010.

Activities leading to the initiation of CO<sub>2</sub> injection in both demonstration sites continued during this reporting period. The PCOR Partnership continued working with its partner and site-owner, Spectra Energy, on the Fort Nelson demonstration project in British Columbia, Canada, and continued its negotiations to begin work in the Bell Creek oil field in southeastern Montana. Laboratory experiments continued on the effects of CO<sub>2</sub> and H<sub>2</sub>S on samples of potential reservoir and seal rock from the Fort Nelson location and samples from Powder River Basin outcrops that serve as analogs for the Bell Creek reservoir and seal. In collaboration with Spectra Energy, work continued on the development of a new version of the petrophysical model (Version June 2010) for the Fort Nelson site.

For this reporting period, the PCOR Partnership had an excellent presence at training sessions, meetings and conferences held in 23 different locations in four countries (United States, Canada, Netherlands, and Scotland). In fact, at the 9th Annual Conference on Carbon Sequestration held May 10–13, 2010, in Pittsburgh, Pennsylvania, PCOR Partnership staff gave 16 presentations. In addition, it is proud to announce that all 10 abstracts submitted to the upcoming 10th International Conference on Greenhouse Gas Control Technologies to be held in Amsterdam in September were accepted.

In early June, DOE NETL issued a new modification to the PCOR Partnership program award. In addition to an increase in funding, a revision to the Statement of Project Objectives was approved. Over 150 images were added to the Partners-Only Decision Support System (DSS, © 2007–2010 EERC Foundation) and are available for download in a range of file sizes.

Efforts also continued for potential joint characterization studies throughout much of the PCOR Partnership region. The PCOR Partnership reached out to approximately 165 teachers during both the North Dakota Petroleum Council and Lignite Energy Council teacher seminars held in June in Bismarck, North Dakota. Planning continued for the upcoming regulatory meeting scheduled for July 21–22, in Deadwood, South Dakota. The PCOR Partnership has expanded its pipeline regulatory contacts throughout the region. The capture technology overview is in the process of being finalized and an update was completed of CO<sub>2</sub> emission statistics.



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## **INTRODUCTION**

The Plains CO<sub>2</sub> 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, and includes stakeholders from the public and private sector. The membership as of June 30, 2010, is listed in Table 1. 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).

The RCSP Program is part of NETL's Carbon Sequestration Program and is a government–industry effort tasked with determining the most suitable technologies, regulations, and infrastructure needs for carbon capture and storage (CCS) on the North American continent.

The RCSP Program initiative is being implemented in three phases:

- Phase I – Characterization Phase (2003–2005): characterized opportunities for carbon sequestration
- Phase II – Validation Phase (2005–2009): conducted small-scale field validation tests
- Phase III – Development Phase (2007–2017): involves large-volume carbon storage demonstration tests

Phase III is divided into three budget periods (BPs), running from October 1, 2007, to September 30, 2017:

BP3: October 1, 2007 – September 30, 2009

BP4: October 1, 2009 – September 30, 2015

BP5: October 1, 2015 – September 30, 2017

Note: BP1 and BP2 were effective in Phase II.

**Table 1. PCOR Partnership Membership Phase III**

DOE/NETL	Hess Corporation	North Dakota Industrial Commission
UND EERC	Huntsman Corporation	Oil and Gas Research Council
Abengoa Bioenergy New Technologies	Interstate Oil and Gas Compact Commission	North Dakota Natural Resources Trust
Air Products and Chemicals	Indian Land Tenure Foundation	North Dakota Petroleum Council
Alberta Department of Energy	Iowa Department of Natural Resources	North Dakota Pipeline Authority
Alberta Innovates – Technology Futures	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	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.
Biorecro AB	Missouri River Energy Services	Saskatchewan Ministry of 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
Computer Modelling Group, Inc.	Natural Resources Canada	Spectra Energy
Dakota Gasification Company	Nebraska Public Power District	Suncor Energy Inc.
Eagle Operating, Inc.	North American Coal Corporation	TAQA NORTH, Ltd.
Eastern Iowa Community College District	North Dakota Department of Commerce	TGS Geological Products and Services
Enbridge Inc.	Division of Community Services	University of Alberta
Encore Acquisition Company	North Dakota Department of Health	Weatherford Advanced Geotechnology
Energy Resources Conservation Board/Alberta Geological Survey	North Dakota Geological Survey	Western Governors' Association
Environment Canada	North Dakota Industrial Commission	Westmoreland Coal Company
Excelsior Energy Inc.	Department of Mineral Resources, Oil and Gas Division	Williston Basin Interstate Pipeline Company
Great Northern Project Development, LP	North Dakota Industrial Commission	Wisconsin Department of Agriculture, Trade and Consumer Protection
Great River Energy	Lignite Research, Development and Marketing Program	Xcel Energy

The overall mission of the Phase III program is to 1) build upon Phase I and II assessments of regional sequestration data to verify the ability of target formations to store CO<sub>2</sub>, 2) facilitate the development of the infrastructure required to transport CO<sub>2</sub> from the source to the injection site, 3) monitor and facilitate development of the rapidly evolving North American regulatory and permitting framework for CO<sub>2</sub> storage, 4) develop opportunities for PCOR Partnership partners to capture and store CO<sub>2</sub>, 5) establish a means by which carbon markets can facilitate CCS/EOR (enhanced oil recovery) project development in the region, 6) develop the technical expertise that will allow carbon credits to be monetized for CO<sub>2</sub> sequestered in geologic formations, 7) continue collaboration with the other RCSP Program partnerships, and 8) provide outreach and education for CO<sub>2</sub> sequestration stakeholders and the general public.

In Phase III, the PCOR Partnership is building on the information generated in its Characterization (Phase I) and Validation (Phase II) Phases. A programmatic RCSP Phase III goal is the injection of approximately 1 million tons of CO<sub>2</sub> a year into at least one regionally significant geologic formation. Each of the RCSP's large-volume injection tests is designed to demonstrate that CO<sub>2</sub> storage sites have the potential to store regional CO<sub>2</sub> emissions safely, permanently, and economically for hundreds of years.



The PCOR Partnership is working toward the establishment of two demonstration sites. The sites are located 1) in the Bell Creek oil field in Powder River County in southeastern Montana and 2) near Spectra Energy's Fort Nelson gas-processing facility, situated near Fort Nelson, British Columbia, Canada (Figure 1).

The PCOR Partnership's objectives for the demonstration projects are as follows: 1) conduct a successful field demonstration to verify that the region's large number of oil fields have the potential to store significant quantities of CO<sub>2</sub> in a safe, economical, and environmentally responsible manner and 2) conduct a successful demonstration at the Fort Nelson site to verify the economic feasibility of using the region's carbonate saline formations for safe, long-term CO<sub>2</sub> storage. During Phase III, the PCOR Partnership will continue to refine storage resource estimates and evaluate other factors relevant to regional storage goals.

The PCOR Partnership plans to achieve its Phase III mission through a series of 14 tasks: 1) Regional Characterization, 2) Public Outreach and Education, 3) Permitting and National Environmental Policy Act (NEPA) Compliance, 4) Site Characterization and Modeling, 5) Well Drilling and Completion, 6) Infrastructure Development, 7) CO<sub>2</sub> Procurement, 8) Transportation and Injection Operations, 9) Operational Monitoring and Modeling, 10) Site

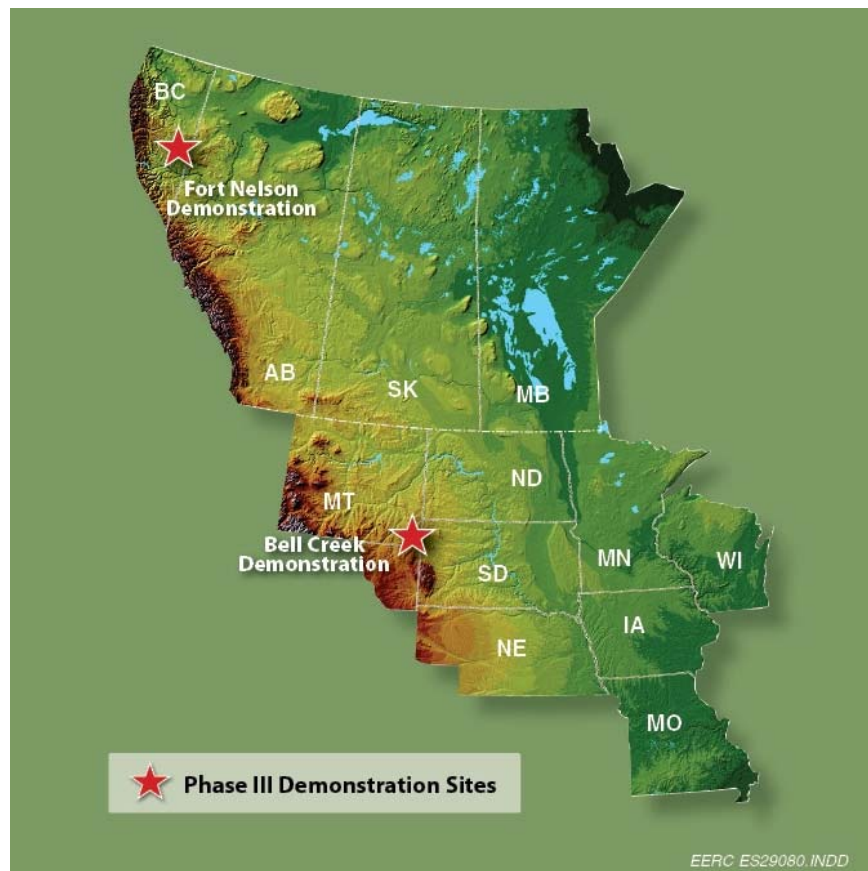


Figure 1. PCOR Partnership Phase III demonstration sites.

Closure, 11) Postinjection Monitoring and Modeling, 12) Project Assessment, 13) Project Management, and 14) RCSP Water Working Group Coordination. See Table 2 for the responsibility matrix of these fourteen tasks.

It should be noted that Tasks 10 and 11 will not be initiated until BP5.

## PROGRESS OF WORK

### Task 1 – Regional Characterization

Significant accomplishments for Task 1 for the reporting period included the following:

- Continued upgrade and modification of the Decision Support System (DSS, © 2007–2010 EERC Foundation). The following efforts have been undertaken:
  - Reviewed and programmed material drafted regarding carbon market information.
  - The flash-based image gallery, containing over 150 images, is now available at [www2.undeerc.org/website/pcorp/ImageGallery/](http://www2.undeerc.org/website/pcorp/ImageGallery/).
  - The new geographic information system (GIS) interface is ready for review. This new interface has changed significantly in appearance from the current version but is hoped to deliver a more productive user experience.
- On April 8, met with a representative of Nebraska Public Power District regarding options for a carbon management plan.
- Initiated collection of preliminary oil field data from the portions of Colorado and Kansas that border the oil field region of western Nebraska. This effort will provide a better understanding of the potential for Nebraska CO<sub>2</sub> storage.

**Table 2. Phase III Responsibility Matrix**

<b>Phase III Task Description</b>	<b>Task Leader</b>
Task 1 – Regional Characterization	Wesley D. Peck
Task 2 – Public Outreach and Education	Daniel J. Daly
Task 3 – Permitting and NEPA Compliance	Lisa S. Botnen
Task 4 – Site Characterization and Modeling	James A. Sorensen
Task 5 – Well Drilling and Completion	Steven A. Smith
Task 6 – Infrastructure Development	Melanie D. Jensen
Task 7 – CO <sub>2</sub> Procurement	John A. Harju
Task 8 – Transportation and Injection Operations	Steven A. Smith
Task 9 – Operational Monitoring and Modeling	Charles D. Gorecki
Task 10 – Site Closure	TBA
Task 11 – Postinjection Monitoring and Modeling	TBA
Task 12 – Project Assessment	Katherine K. Anagnost
Task 13 – Project Management	Edward N. Steadman
Task 14 – RCSP Water Working Group Coordination	Charles D. Gorecki

- Continued compilation of information to be used in a preliminary report on Nebraska geology as it relates to CO<sub>2</sub> storage.
- Completed efforts toward preparation of new text and images for the next DOE NETL Carbon Sequestration Atlas of the United States and Canada (print version) on the background of the PCOR Partnership, as well as information on each of its Phase II field validation tests and its planned Phase III demonstration projects and outreach activities. The new information was due to DOE July 1.
- The first of four GIS layers was sent to NATCARB (the NATional CARBon Sequestration Database and GIS) for use in the electronic version of the national DOE atlas.
- Participated in a conference call on May 20 to discuss progress on the compilation of data for inclusion in the new national atlas.
- Assembled materials for display and distribution at the 18th Williston Basin Petroleum Conference and Expo (May 2–4, 2010) held in Bismarck, North Dakota.
- Discussed potential opportunities to expand a regional characterization effort to examine the basal aquifer system across the Dakotas, Manitoba, Saskatchewan, and Alberta.
- Initiated compilation of base data on the Lower Cambrian aquifer system in the Dakotas. This is part of a larger effort to review this saline system across the Dakotas, Manitoba, Saskatchewan, and Alberta with respect to CO<sub>2</sub> capacity.
- Created and assembled PowerPoint information for presentations at the 9th Annual Conference on Carbon Capture and Sequestration held in Pittsburgh, Pennsylvania (May 10–13, 2010).
- Received and began review of the final subcontractor report from the Missouri Department of Natural Resources – Division of Geology and Land Survey (DGLS).
- On May 25, traveled to the headquarters of DGLS in Rolla, Missouri, to participate in a discussion regarding future characterization of the Forest City Basin.
- On June 1, participated in a RCSP GIS Working Group conference call to discuss the GIS layers to be used by NATCARB.
- Added a new risk management section, including policy and processes, to the DSS.
- Initiated preparation of a value-added technical brief for dissemination amongst partners. This would be the first of a series of informational flyers focusing on specific technical issues related to CCS.
- Completed preparation of PCOR Partnership state and province maps for use during the upcoming regulatory meeting in Deadwood, South Dakota.
- On June 14, presented an overview of PCOR Partnership activities at the Rocky Mountain Section of the American Association of Petroleum Geologists (AAPG) in Durango, Colorado.
- Held multiple in-house meetings and/or discussions with team members to further refine the topics and direction of the proposed CCS Project Development Workshop to be held the day before the annual meeting.
- On June 17, provided information to a partner on a potential characterization study in the southern portion of the PCOR Partnership region.
- On June 23, provided images from the PCOR Partnership Atlas, 3rd Edition, in response to a request from Industrial GHG Solutions magazine for an upcoming article.

- On June 29, met to further discuss and develop the new carbon markets section of the DSS.
- Discussions with Apache Canada Ltd. were conducted in order to initiate follow-on characterization at the Zama Phase II EOR/sequestration site.

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

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

- Seventeen EERC employees attended eight conferences, three workshops, and two seminars, where approximately 5500 external participants were exposed to PCOR Partnership outreach materials from April 1 – June 30, 2010. There were three poster presentations, 21 oral presentations, and one EERC PCOR Partnership-sponsored booth. The following quantities of outreach materials were distributed:
  - PCOR Partnership documentary entitled “Nature in the Balance: CO<sub>2</sub> Sequestration” – nine
  - PCOR Partnership documentary entitled “Reducing Our Carbon Footprint: The Role of Markets” – nine
  - PCOR Partnership documentary entitled “Out of the Air: Into the Soil” – nine
  - PCOR Partnership documentary entitled “Managing Carbon Dioxide: The Geologic Solution” – 283
  - PCOR Partnership Atlas 3rd Edition – 283
  - PCOR Partnership product list – 76
  - PCOR Partnership brochure – 84
  - PCOR Partnership partner list – ten
- Participated in RCSP Outreach Working Group (OWG) conference calls on April 15, May 20, and June 17, 2010.
- Held in-house meetings on April 9, May 19, and May 28 to review proposed video clips (excerpted from the “Managing Carbon Dioxide: The Geologic Solution” documentary) and new Web pages for inclusion on the PCOR Partnership public Web site.
- In collaboration with Prairie Public Broadcasting (PPB), worked on integration of the revised narration track using a new narrator for the “Carbon Footprint: One Size Does Not Fit All” draft documentary.
- Met with PPB on April 6 and 16 to finalize development of the BP4 scope of work and budget and to discuss upcoming education activities.
- Participated in an in-house meeting on May 25 to review the status of outreach video archiving with PPB and to assess progress on efforts to conduct outreach through libraries in the region.
- Participated in in-house meetings on April 23, May 19 and May 24 to begin review and revision of current fact sheets as well as initiated plans for future fact sheets for use within the overall context of PCOR Partnership outreach activities.
- Continued efforts to prepare sample outreach materials for the Indian Land Tenure Foundation.
- Provided requested information on May 4 to ClimateWire regarding PCOR Partnership terrestrial sequestration activities in the region.

- Attended the 9th Annual Conference on Carbon Capture and Sequestration in Pittsburgh, Pennsylvania (<http://carbonsq.com/>), and presented the following:
  - “Covering the Bases – Regional and Project Level Outreach for Sequestration,” presented on May 12 in the Outreach and Education technical concurrent session.
  - “Development of a Manual for Public Outreach Best Practices,” presented on May 12 in the Initiatives under the U.S.–Canada Clean Energy Dialogue technical concurrent session.
- Received notification on May 18 that the abstract on the RCSP OWG’s Best Practices Manual was accepted for poster presentation at the upcoming 10th International Conference on Greenhouse Gas Control Technologies (GHGT-10) in Amsterdam, the Netherlands, in September 2010.
- Participated in an in-house meeting on May 21 to review progress of outreach tracking activities.
- On May 19, held an in-house meeting to review the status of landowner outreach activities including a materials distribution list and an initial draft of landowner outreach materials.
- Participated in a conference call with the Lignite Energy Council on May 24 regarding the upcoming 2010 Lignite Education Seminar: Energy, Economics and Environment at which the PCOR Partnership had been asked to present.
- On June 9, gave two PowerPoint presentations and distributed outreach materials to a group of approximately 40 teachers at the North Dakota Petroleum Council’s (NDPC’s) 2010 Teacher Education Seminar held in Bismarck, North Dakota.
- On June 15, gave a PowerPoint presentation and distributed outreach materials to a group of approximately 125 teachers at the Lignite Energy Council’s (LEC’s) 2010 Lignite Education Seminar: Energy, Economics, and Environment held in Bismarck, North Dakota.
- Continued efforts to gather and assess information in preparation for a quarterly summary of outreach activities including presentations, television broadcasts, material distribution, and Web activity.
- On June 23–24, participated in the OWG’s workshop in Washington, D.C., exploring implications of increased outreach activity at the DOE headquarters level.
- On June 27, contacted Sallie Greenberg (Midwest Geological Carbon Sequestration Consortium) and Judith Bradbury (Midwest Regional Carbon Sequestration Partnership) for input on past interactive workshops in order to further plan for the upcoming pre-annual meeting workshop.
- On June 30, submitted for review and approval Deliverable D17 entitled “General Audience CO<sub>2</sub> Sequestration Outreach PowerPoint Presentation – Update.”
- On June 29, submitted a value-added, noncontractual update to the public Web site for review and approval. This update included a revised video clip gallery format, 29 additional video clips, and three updated Web pages.
- On June 29, submitted, and on June 30 received approval of, Deliverable D19 entitled “Fort Nelson Test Site PowerPoint Presentation – Update 1.”

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

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

- Continued efforts toward planning the upcoming regulatory meeting in Deadwood, South Dakota, July 21–22, 2010, including the following:
  - Held multiple in-house planning meetings
  - Made numerous follow-up telephone calls to invitees
  - Coordinated hotel accommodations and menu options
  - Sent out informational PCOR Partnership materials to new contacts
  - On June 7, sent an updated draft agenda to invitees
  - On June 18, sent a notice that the hotel deadline was extended
- Participated in the Interstate Oil and Gas Compact Commission (IOGCC) Pipeline Transportation Task Force conference calls.
- Completed biennial review of the IOGCC “Summary of State and Provincial Action to Create a Legal and Regulatory Infrastructure for Storage of Carbon Dioxide in Geologic Structures” and the IOGCC “Update on IOGCC Legal and Regulatory Guidance for States and Provinces.”
- Reviewed and commented on various reports currently being finalized by IOGCC.
- Continued developing materials for inclusion on the partners-only Web site regulatory page.
- Completed review of the U.S. Environmental Protection Agency’s (EPA’s) proposed new greenhouse gas (GHG) emission reporting requirements and drafted an e-mail update to the partnership.
- Invited to serve on peer review committee for the EPA on a geologic sequestration guidance document for testing and monitoring.
- Updated internal regulatory guidance documents with information regarding EPA’s Final Tailoring Rule issued in May.
- Attended the UND Law School Energy Law Symposium on April 9, where federal climate legislation was discussed.
- John Harju participated in conference calls of the Presidential Interagency Task Force on CCS, and participated in the DOE CCS Task Force – CO<sub>2</sub> Storage Workgroup conference call on Monday, April 12.
- Attended a full-day workshop hosted by Alberta Innovates in Calgary, Alberta, Canada, on Monday, April 19, 2010. The workshop was meant for attendees to provide insights and advice on the scientific and technical data and information that should be generated and reported from the four large-scale demonstration CCS projects being funded in part under the government of Alberta’s CAN\$2 billion CCS fund. Information about each of these projects can be found on the following Web site: [www.energy.alberta.ca/Initiatives/1438.asp](http://www.energy.alberta.ca/Initiatives/1438.asp).
- Continued review of the Det Norske Veritas CO<sub>2</sub> storage guideline entitled “CO<sub>2</sub>QUALSTORE Guideline for Selection, Characterization and Qualification of Sites and Projects for Geological Storage of CO<sub>2</sub>.”
- Reviewed the U.S. Carbon Sequestration Council (USCSC) paper entitled “Prospecting for Power: The Cost of Meeting Increases in Electricity Demand.”

- On June 1, reviewed a draft USCSC paper entitled “Advances in CO<sub>2</sub> Sequestration Capability,” and provided comments to the author on June 4.
- Submitted on May 19 the NEPA for additional characterization and laboratory work planned for the Zama, Alberta, Canada, site.
- On June 23, provided a spreadsheet showing the status, by state, of legislation and rules for the geologic sequestration of carbon dioxide upon request of a partner.
- Participated in planning meetings for the PCOR Partnership annual meeting workshop.

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

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

- Submitted on April 23 the quarterly “Project Status Report for the Fort Nelson Carbon Capture and Storage Project” to the Carbon Sequestration Leadership Forum (CSLF).
- Attended and presented at the AAPG Annual Convention & Exhibition held in New Orleans April 11–14, 2010 ([www.aapg.org/neworleans](http://www.aapg.org/neworleans)).
- Continued laboratory experiments on the effects of CO<sub>2</sub> and H<sub>2</sub>S on samples of potential reservoir and seal rock from the Fort Nelson location and samples from Powder River Basin outcrops that serve as analogs for the Bell Creek reservoir and seal.
- Attended the 9th Annual Conference on Carbon Capture & Sequestration in Pittsburgh, Pennsylvania (<http://carbonsq.com/>) and presented the following:
  - “A New Risk Management Methodology for Large-Scale CO<sub>2</sub> Storage: Application to Spectra Energy’s Proposed Fort Nelson Carbon Capture and Storage Project,” presented on May 11 in the Geologic Storage/Risk Assessment technical concurrent session.
  - “Results of the Plains CO<sub>2</sub> Reduction Partnership’s Phase II Demonstration in the Northwest McGregor Oil Field, North Dakota,” presented on May 11 in the CCS in Enhanced Oil Recovery (EOR) technical concurrent session.
  - “Zama Acid Gas EOR, CO<sub>2</sub> Sequestration, and Monitoring Project,” presented May 11 in the CCS via EOR technical concurrent session.
  - “CO<sub>2</sub> Storage Pilot Study for Lignite Coal,” presented on May 11 in the Reservoirs/Modeling technical concurrent session.
  - “Northwest McGregor Field CO<sub>2</sub> Huff ‘N’ Puff: A Case Study of the Application of Selected Geophysical Techniques for CO<sub>2</sub> Monitoring in a Deep Carbonate Reservoir,” presented on May 12 in the Geological Storage/Monitoring, Verification, and Accounting (MVA) technical concurrent session.
- Continued update of the petrophysical model for the Fort Nelson CCS site based on input gathered during meetings in Calgary the week of June 1–4, as well as the incorporation of seismic data recently purchased by Spectra Energy.
- Based on initial results from the laboratory experiments, conducted geochemical modeling to evaluate the geochemical reactions that are occurring, or have occurred, between the rocks, brine, and CO<sub>2</sub>/acid gas.
- Held numerous discussions with Oxand Risk & Project Management Solutions regarding the development of a paper and poster for the GHGT-10 Conference.
- Discussed potential updates and revisions to the Fort Nelson risk assessment.

- Lisa Botnen began review of CO<sub>2</sub>-PENS (a CO<sub>2</sub> sequestration systems model supporting risk-based decisions) for possible use when developing the updated risk management plan for the Fort Nelson CCS Feasibility Project.
- Lisa Botnen participated in a training seminar May 18–19 in Calgary, Alberta, Canada, sponsored by Oxand and Petroleum Technology Alliance Canada entitled “Risk Management for CCS Projects” ([www.ptac.org/co2/dl/co2w1001b.pdf](http://www.ptac.org/co2/dl/co2w1001b.pdf)).
- On June 4, 11, 18, and 25, Lisa Botnen participated in RCSP Risk/Sim Working Group conference calls.

Actual or anticipated problems or delays during the reporting period included the following:

- Because of the merger acquisition of our commercial partner at the Bell Creek demonstration site, negotiations have been delayed and the demonstration schedule remains uncertain.

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

This task was anticipated to be initiated in October 2009. Because of delays related to the merger acquisition of our commercial partner for the Bell Creek test site, initiation of efforts will be delayed until July 2010. The Gantt chart in the report reflects the new period of performance for this task.

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

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

- Continued preparation of the capture technology overview.
- Web-based information about capture technologies continues to be reviewed on a weekly basis.
- Completed review of the CO<sub>2</sub> source locations and made appropriate adjustments to the PCOR Partnership database if warranted.
- Completed the update of CO<sub>2</sub> emissions statistics for use in PCOR Partnership presentations and publications. Global emissions for 2007 are proving difficult to find, especially emissions from the transportation sector.
- Comments on a “pipeline basics” overview that was prepared for IOGCC in December were received and addressed, and a corrected version was returned to IOGCC.
- Reviewed the USCSC paper entitled “Prospecting for Power: The Cost of Meeting Increases in Electricity Demand.”
- Provided comments on a draft USCSC paper entitled “Advances in CO<sub>2</sub> Sequestration Capability.”
- Participated in the RCSP Water Working Group (WWG) conference call held April 28.
- Attended the 9th Annual Conference on Carbon Capture and Sequestration (<http://carbonsq.com/>) and presented a poster entitled “Estimating the Cost to Capture, Compress, and Transport CO<sub>2</sub> from Stationary Sources in the PCOR Partnership Region” during the May 11, 2010, Economics of CCS poster session.



- Presented the risks associated with capture, compression, and pipeline transportation at a risk management for CCS training seminar conducted by Oxand Risk Management Solutions and Petroleum Technology Alliance Canada on May 18, 2010, in Calgary, Alberta, Canada ([www.ptac.org/co2/dl/co2w1001b.pdf](http://www.ptac.org/co2/dl/co2w1001b.pdf)).
- Provided updated regional CO<sub>2</sub> emission statistics at the request of a partner.
- Initiated the 2010 update and quality assurance/quality control check of the CO<sub>2</sub> emission sources database, and it is anticipated the effort will continue throughout the summer.
- Reviewed a summary of basic CO<sub>2</sub> compression information. Following internal PCOR Partnership review, the summary will be submitted as a value-added report.
- On June 4, in response to a partner inquiry, provided review of a National Academy of Sciences/National Research Council comprehensive study of climate change report.
- Completed review and submitted comments regarding the latest draft of the CO<sub>2</sub> emission calculation methodology document compiled by NETL and the RCSP Capture and Transportation Working Group.
- On June 28, in response to a partner request, provided information on the Fluor company's Econamine<sup>SM</sup> process.
- Prepared slides for potential use in presentations about the Bell Creek EOR project.
- Prepared a short summary of the PCOR Partnership's expertise and project management approach to the EOR demonstration.

Actual or anticipated problems or delays during the reporting period included the following:

- Some of the work on this task has been delayed while the plans for CO<sub>2</sub> capture and geologic sequestration for the demonstration projects are finalized. New schedules for Subtasks 6.2 and 6.3 are reflected in the Gantt chart.

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

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

- Discussions continued with potential CO<sub>2</sub> suppliers. Because of the sensitive nature of negotiations, specifics cannot be shared at the present time.
- Attended the 4th Annual Wyoming CO<sub>2</sub> Conference June 29–30, 2010.

Actual or anticipated problems or delays during the reporting period included the following:

- Because of delays related to the merger acquisition of our commercial partner for the Bell Creek test site, an agreement has not been finalized.

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

This task is anticipated to be initiated Quarter 3 – BP4, Year 4 (October 2010).

## Task 9 – Operational Monitoring and Modeling

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

- Worked with Weatherford Labs and Spectra Energy to put together an updated quote for the analysis of core from the test well in the Fort Nelson CCS Project.
- Discussed obtaining 2-D seismic lines with Spectra Energy for better formation descriptions in the Fort Nelson CCS Project.
- Secured updated software licenses from Schlumberger for the Petrel, ECLIPSE, and Techlog Petrophysics software for use in modeling both Phase III demonstration sites.
- In collaboration with Spectra Energy, continued to develop a new version of the petrophysical model (Version June 2010) for the Fort Nelson CCS Feasibility Project. This version will be developed using a number of 2-D seismic lines and several 3-D seismic surveys to better gauge the structure and properties in each zone.
- Attended the 9th Annual Conference on Carbon Capture & Sequestration (<http://carbonsq.com/>) and presented the following:
  - “Laboratory and Numerical Modeling of CO<sub>2</sub>–H<sub>2</sub>S–Water–Rock Interactions at Williston Basin Reservoir Conditions,” presented on May 11 in the Reservoirs/Modeling technical concurrent session.
  - “Geochemical Modeling of Enhanced Oil Recovery and CO<sub>2</sub> Storage at the Northwest McGregor Oil Field,” presented on May 11 in the CCS via EOR technical concurrent session.
  - “Developing Resource Estimates for CO<sub>2</sub> Storage in Regional Deep Saline Formations,” presented Tuesday, May 11, in the Large-Scale CCS Projects technical concurrent session.
  - “History Matching a CO<sub>2</sub> Huff ‘N’ Puff EOR Project with CMG’s GEM and CMOST,” presented on May 12 in the Geologic Storage – Simulation poster session.
  - “Introducing New Statistical Methods in Geochemical Kinetics Modeling for Better Estimations of CO<sub>2</sub>–Water–Rock Interactions,” presented on May 11 in the Geologic Storage – Risk Assessment poster session.
- Met with Spectra Energy personnel in Calgary, Alberta, Canada, June 1–4 and worked on updating the Fort Nelson geologic model to be used for future dynamic simulation.
- Participated in RCSP Risk/Sim conference calls.
- Continued the laboratory testing program for the Fort Nelson core samples.
- Continued coordination of the June 2010 version of the Fort Nelson geologic model.
- As a member of the organizing committee for the upcoming AAPG Geotechnical Workshop on Carbon Capture and Storage, August 10–12, 2010, invited Spectra Energy to give a presentation on the Fort Nelson project.
- Ordered parts for the relative permeability apparatus, and testing will begin shortly after they arrive.
- The computer cluster, which will be used to improve simulation turnaround time, is still in the design phase but will likely be ordered in mid-July. Computer Modelling Group has offered to help with the design of this high-performance computing cluster.
- Traveled to Calgary to discuss Fort Nelson project status during the week of June 14.
- While in Calgary, held discussions with vendors regarding the use of microseismic and also regarding a feasibility study that may be performed in the future.

- Activities for the Bell Creek test site are scheduled to begin in July 2010.

#### **Task 10 – Site Closure**

This task is anticipated to be initiated in Quarter 1 – BP5, Year 9 (October 2015).

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

This task is anticipated to be initiated in Quarter 1 – BP5, Year 9 (October 2015).

#### **Task 12 – Project Assessment**

The third annual project assessment report (D57) is due December 31, 2010, for the reporting period of October 1, 2009 – September 30, 2010.

#### **Task 13 – Project Management**

Significant accomplishments for Task 13 for the reporting period included the following:

- Continued planning for the upcoming PCOR Partnership annual meeting and sent an e-mail blast to the partnership on April 27 with date and location information. The annual meeting will be held October 19–21, 2010, at the Graves 601 Hotel (click here) in downtown Minneapolis, Minnesota.
- Presented before the Joint Section Meeting of the Geological Society of America North-Central and South-Central Sections in Branson, Missouri on April 12.
- Submitted the quarterly “Project Status Report for the Zama Acid Gas EOR, CO<sub>2</sub> Sequestration, and Monitoring Project” to the CSLF on April 23.
- Submitted proposed modifications to the Statement of Project Objectives (SOPO) in regard to the Bell Creek MVA project and Zama add-on work on April 9, with the associated budgets sent on April 14.
- On June 1, received a new modification to the PCOR Partnership award with DOE, including most notably the following:
  - Revised the BP4 large-scale CO<sub>2</sub> site location
  - Replaced the Statement of SOPO (the new SOPO is located on the DSS)
  - Replaced the budget pages
  - Provided additional funding
  - Revised/approved subcontractors
  - Revised the NEPA provision (which seemed to indicate that NEPA clearance for at least the Bell Creek site has not been completed)
- Efforts continued on a nontechnical risk register to assist with the overall PCOR Partnership Program risk management.
- Continued discussions with Spectra Energy on the proposed cost-share agreement.
- Held a Fort Nelson CCS Project update meeting with representatives from DOE NETL, Spectra Energy, and the EERC on May 12 at the Pittsburgh Hilton.

- On April 14, distributed the IEA Greenhouse Gas R&D Programme’s “Development of Storage Coefficients for Carbon Dioxide Storage in Deep Saline Formations” to the North American Carbon Atlas Partnership (NACAP) Methodology Subcommittee.
- On May 4, provided a brief discussion to DOE regarding the types of geologic sinks and the agreed-upon methodology for inclusion in the NACAP progress report.
- A total of 18 abstracts were submitted to the 9th Annual Carbon Capture & Sequestration (CCS) Conference in Pittsburgh – one was rejected, and one was declined. Three posters, 12 technical presentations, and one plenary session presentation were presented May 10–13, 2010.
- Attended the 9th Annual Conference on Carbon Capture & Sequestration and presented the following:
  - “The PCOR Partnership: Collaborative U.S.–Canada Carbon Capture and Storage Demonstration Activities,” presented on May 12 in the Initiatives under the U.S.–Canada Clean Energy Dialogue technical concurrent session.
  - “The PCOR Partnership: CCS Demonstration Activities,” presented on May 12 in the The Regional Partnerships Move Forward on CCS Deployment plenary session chaired by Traci Rodosta.
- Distributed PCOR Partnership outreach materials (e.g., atlas, latest documentary on DVD, and general program information) to new contacts made while attending the 9th Annual Conference on Carbon Capture & Sequestration in Pittsburgh.
- Continued planning for the regulatory workshop to be held in Deadwood in July.
- Technical staff are participating in the development of an RCSP Best Practice Manual for drilling, well installation, operations, mitigation, and closure.
- Attended the first Bilateral National Conference on CCS held on May 10 at the Pittsburgh Hilton.
- Attended, presented, and exhibited a display booth at the 2010 Williston Basin Petroleum Conference held May 2–4, 2010, in Bismarck, North Dakota.
- Attended the EPA and DOE first public meeting of the Interagency Task Force on Carbon Capture and Storage on May 6, 2010, in Washington, D.C.
- Participated in a roundtable discussion on May 19 focusing on the challenges and opportunities facing the United States and the international community regarding the rapidly warming Arctic climate. “Climate Change in the Arctic: Global Implications” was organized in partnership with the Royal Norwegian Embassy in Washington, D.C., and Clean Air–Cool Planet, an organization working to motivate the public and U.S. policymakers to take action on climate change, along with the UND Center for Innovation and the Nordic Initiative.
- Participated in a conference call on May 20 regarding the upcoming revised edition of the RCSP Atlas.
- Attended the IOGCC 2010 Midyear Issues Summit in Lexington, Kentucky, on May 23–25. In addition to learning new information from the various presentations, the meeting was very beneficial in paving the way for greater attendance and understanding of the upcoming PCOR Partnership regulatory meeting this summer.
- On May 18, received notifications of acceptance to present for all 10 abstracts submitted to the GHGT-10 Conference in September in Amsterdam.

- On June 3, presented “Reducing Industry’s Carbon Footprint: Exploring Progress Made in Carbon Capture and Storage in B.C.” at The Canadian Institute’s 13th BC Natural Gas Symposium in Vancouver, British Columbia, Canada.
- On June 7, presented at the Geologic Carbon Sequestration Site Integrity: Characterization and Monitoring Science and Technology Workshop at Ohio State University in Columbus, Ohio.
- On June 9, participated in a conference call with a writer from Industrial GHG Solutions magazine regarding a potential article on the Regional Carbon Sequestration Partnerships ([www.industrialghg.com/](http://www.industrialghg.com/)).
- On June 11, participated in a conference call coordinated by Traci Rodosta regarding the U.S. Geological Survey 3-year assessment project entitled “National Geologic CO<sub>2</sub> Sequestration Assessment Project.” Its plans are to estimate the CO<sub>2</sub> storage potential of the nation and describe how each partnership will be called upon to help.
- On June 20, John Harju presented on the topic of “Dividing Responsibility into Partnerships Across the Country” at the Carbon Capture & Storage World Australia 2010 held in Melbourne, Australia.
- Led a task leader meeting on June 16, where topics discussed included Modification No. 17 to the cooperative agreement and the revised SOPO, as well as the upcoming GHGT-10 Conference; task leads provided updates on the demonstration projects and other activities.
- On June 25, presented an overview of the PCOR Partnership Program at the DOE Fossil Energy–Masdar Cooperation Workshop in Pittsburgh, Pennsylvania.
- During June 29–30, attended the 4th Annual Wyoming CO<sub>2</sub> Conference in Casper, Wyoming.
- Continued review and revision of informational fact sheets.
- Agreed to serve on the Storage Working Group of the CSLF Task Force on “Assessing the Progress in Closing the Gap” led by Stefan Bachu of Alberta Innovates – Technology Futures.
- Initiated planning for several partner visits to the EERC in July.
- Deliverables for April:
  - March monthly update
  - M23: Task 14 – monthly WWG conference call held
  - D58/D59: Task 13 – quarterly progress report/milestone quarterly report
- Deliverables and milestones for May:
  - April monthly update
  - M23: Task 14 – monthly WWG conference call held
- Deliverables and milestones for June:
  - May monthly update
  - M23: Task 14 – monthly WWG conference call held
  - D17: Task 2 – general Phase III information PowerPoint presentation (update)
  - D19: Task 2 – Fort Nelson Test Site PowerPoint presentation (update)
- Value-added documents submitted during reporting period include the following:
  - On April 30, submitted WWG fact sheet on the nexus of CCS and water.
  - On June 29, submitted a noncontractual public Web site update.

Actual or anticipated problems or delays during the reporting period included the following:

- Because negotiations for commercial sponsorship are ongoing for the Bell Creek demonstration site, attendant deliverables and milestones were recently approved for extension by DOE NETL. The Gantt chart and deliverables and milestones table reflect the latest approved dates.

#### **Task 14 – RCSP Water Working Group (WWG) Coordination**

Significant accomplishments for Task 14 for the reporting period included the following:

- Distributed the March conference call notes on April 5, 2010.
- Held the monthly conference call on April 28, 2010.
- On April 30, submitted the value-added WWG fact sheet providing an overview of issues and opportunities associated with the nexus of water and CCS.
- On May 10, at the 9th Annual Conference on Carbon Capture & Sequestration, released the WWG fact sheet providing an overview of issues and opportunities associated with the nexus of water and CCS.
- Attended the 9th Annual Conference on Carbon Capture & Sequestration (<http://carbonsq.com/>) and presented the following:
  - “Regional Carbon Sequestration Partnership: Water Working Group” presented May 11 in the Water Resources and CCS technical concurrent session.
- Held the second WWG annual meeting on May 13, 2010, following conclusion of the 9th Annual Conference on Carbon Capture & Sequestration at the Pittsburgh Hilton. Items discussed included:
  - Conducting a road-mapping exercise (to be translated into a WWG deliverable).
  - Development of a path forward for the group as a whole.
- Held the monthly conference call on June 23, during which the following action was taken:
  - Discussed the WWG road-mapping document; a sample will be provided to the group for the next conference call.
  - Asked each partnership to provide by July 15 a list of potential stakeholder groups that would be interested in the nexus of water and CCS (some of these groups may be contacted by WWG and participate in a single call addressing their concerns).
  - Distributed the canned PowerPoint presentation and requested comments by July 15.
  - Announced plans for a WWG mission statement to be distributed by July 15 in order to hold discussion thereon during the July conference call.

Actual or anticipated problems or delays during the reporting period included the following:

- On December 15, DOE waived the water resource estimation methodology documents due February 2010 and May 2011. The fact sheet submitted April 30 replaced the former. An alternative report to replace the latter is still under consideration.

## PHASE III COST STATUS

The approved BP4 (Modification No. 17) budget along with actual costs incurred and in-kind cost share reported is shown in Table 3. A spending plan for BP4 and actual incurred cost by quarter of cash funds for BP4 are provided in Figure 2 and Table 4.

## PHASE III SCHEDULE STATUS

Table 5 lists all deliverables and milestones by quarter, with completion dates, through the end of the reporting period (see Table 6 for the Gantt chart for BP4, Year 3).

**Table 3. Phase III Budget – BP4**

Organization	Approved Budget	Actual Costs Incurred
DOE Share – Cash	\$53,990,663	\$3,361,338
Nonfederal Share – Cash	\$2,411,971	\$411,737
Nonfederal Share – In-Kind	\$17,400,865	\$21,523
Total	\$73,803,499	\$3,794,598

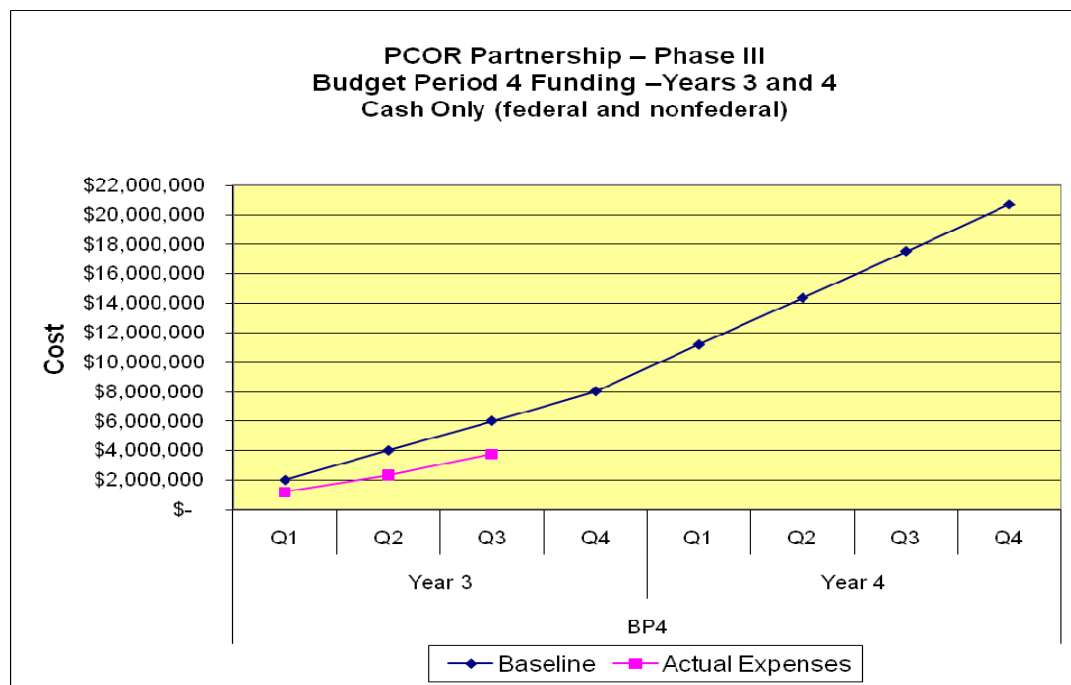


Figure 2. PCOR Partnership Phase III, BP4 – Years 3 and 4 funding (cash only).

**Table 4. BP4 – Years 3 and 4 Spending Plan**

Baseline Reporting Quarter	Year 3								Year 4							
	Q1		Q2		Q3		Q4		Q1		Q2		Q3		Q4	
	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total	Q1	Cum. BP Total	Q2	Cum. BP Total	Q3	Cum. BP Total	Q4	Cum. BP Total
<b>Baseline Cost Plan</b>																
Federal Share	\$ 1,889,558	\$ 1,889,558	\$ 1,889,558	\$ 3,779,115	\$ 1,889,558	\$ 5,668,673	\$ 1,889,558	\$ 7,558,230	\$ 2,984,500	\$ 10,542,730	\$ 2,984,500	\$ 13,527,230	\$ 2,984,500	\$ 16,511,730	\$ 2,984,500	\$ 19,496,230
Nonfederal Share	\$ 117,188	\$ 117,188	\$ 117,188	\$ 234,375	\$ 117,188	\$ 351,563	\$ 117,188	\$ 468,750	\$ 180,000	\$ 648,750	\$ 180,000	\$ 828,750	\$ 180,000	\$ 1,008,750	\$ 180,000	\$ 1,188,750
Total Planned	\$ 2,006,745	\$ 2,006,745	\$ 2,006,745	\$ 4,013,490	\$ 2,006,745	\$ 6,020,235	\$ 2,006,745	\$ 8,026,980	\$ 3,164,500	\$ 11,191,480	\$ 3,164,500	\$ 14,355,980	\$ 3,164,500	\$ 17,520,480	\$ 3,164,500	\$ 20,684,980
<b>Actual Incurred Cost</b>																
Federal Share	\$ 1,025,953	\$ 1,025,953	\$ 983,104	\$ 2,009,057	\$ 1,352,281	\$ 3,361,338										
Nonfederal Share	\$ 171,873	\$ 171,873	\$ 164,935	\$ 336,808	\$ 74,929	\$ 411,737										
Total Incurred Cost	\$ 1,197,826	\$ 1,197,826	\$ 1,148,039	\$ 2,345,865	\$ 1,427,210	\$ 3,773,075										
<b>Variance</b>																
Federal Share	\$ 863,605	\$ 863,605	\$ 906,454	\$ 1,770,058	\$ 537,277	\$ 2,307,335										
Nonfederal Share	\$ (54,686)	\$ (54,686)	\$ (47,748)	\$ (102,433)	\$ 42,259	\$ (60,175)										
Total Variance	\$ 808,919	\$ 808,919	\$ 858,706	\$ 1,667,625	\$ 579,535	\$ 2,247,160										



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

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 1 – Quarter 1 (October–December 2007)</b>		
D37: Task 4 – Fort Nelson Test Site – Geological Characterization Experimental Design Package	12/31/07	12/28/07
D63: Task 13 – Project Management Plan	12/31/07	12/28/07
M17: Task 4 – Fort Nelson Test Site Selected	12/31/07	12/28/07
<b>Year 1 – Quarter 2 (January–March 2008)</b>		
D38: Task 4 – Fort Nelson Test Site – Geomechanical Experimental Design Package	1/31/08	1/31/08
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/08	1/31/08
D11: Task 2 – Outreach Plan	3/31/08	3/31/08
D27: Task 3 – Environmental Questionnaire – Fort Nelson Test Site	3/31/08	4/02/08
D30: Task 4 – Williston Basin Test Site – Geomechanical Experimental Design Package	3/31/08	3/31/08
M1: Task 1 – Three Target Areas Selected for Detailed Characterization	3/31/08	3/20/08
M18: Task 4 – Fort Nelson Test Site Geochemical Work Initiated	3/31/08	3/19/08
<b>Year 1 – Quarter 3 (April–June 2008)</b>		
D14: Task 2 – General Phase III Fact Sheet	4/30/08	4/30/08
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/08	4/30/08
D17: Task 2 – General Phase III Information PowerPoint Presentation	5/30/08	5/30/08
M3: Task 3 – Start Environmental Questionnaire for Williston Basin Test Site	6/30/08	6/27/08
M6: Task 4 – Williston Basin Test Site Geochemical Work Initiated	6/30/08	6/30/08
M7: Task 4 – Williston Basin Test Site Geological Characterization Data Collection Initiated	6/30/08	6/30/08
<b>Year 1 – Quarter 4 (July–September 2008)</b>		
D12: Task 2 – Demonstration Web Pages on the Public Site	7/31/08	7/31/08
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/08	7/31/08
D1: Task 1 – Review of Source Attributes	9/30/08	9/26/08
M2: Task 1 – Demonstration Project Reporting System (DPRS) Prototype Completed	9/30/08	9/26/08
<b>Year 2 – Quarter 1 (October–December 2008)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/08	10/31/08
D20: Task 2 – Documentary Support to PowerPoint and Web Site	12/31/08	12/31/08
D57: Task 12 – Project Assessment Annual Report	12/31/08	12/31/08

Continued . . .

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

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 2 – Quarter 2 (January–March 2009)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/09	1/30/09
M21: Task 14 – Outline of White Paper on Nexus of CO <sub>2</sub> Capture and Sequestration (CCS) and Water, Part Subtask 14.2 – White Paper on Nexus of CCS and Water	2/28/09	2/27/09
D24: Task 2 – PCOR Partnership Region Sequestration General Poster	3/31/09	3/31/09
<b>Year 2 – Quarter 3 (April–June 2009)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/09	4/30/09
M23: Task 14 – Monthly WWG Conference Call Held	4/30/09	4/15/09
D2: Task 1 – First Target Area Completed	5/29/09	5/29/09
M23: Task 14 – Monthly WWG Conference Call Held	5/29/09	5/29/09
D16: Task 2 – Fort Nelson Test Site Fact Sheet	5/29/09	5/29/09
M24: Task 14 – WWG Annual Meeting Held	5/31/09	5/07/09
M23: Task 14 – Monthly WWG Conference Call Held	6/30/09	6/25/09
<b>Year 2 – Quarter 4 (July–September 2009)</b>		
M23: Task 14 – Monthly WWG Conference Call Held	N/A	Not required
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation	7/31/09	7/31/09
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/09	7/31/09
M22: Task 14 – Draft White Paper - Nexus of CCS and Water Available for Comments	8/17/09	8/18/09 (DOE) 8/21/09 (WWG)
M23: Task 14 – Monthly WWG Conference Call Held	8/31/09	8/25/09
D1: Task 1 – Review of Source Attributes	9/30/09	9/25/09
D3: Task 1 – Permitting Review – One State and One Province	9/30/09	9/30/09
D9: Task 1 – Updated DSS	9/30/09	9/29/09
D47: Task 6 – Report on the Preliminary Design of Advanced Compression Technology	9/30/09	9/30/09
D77: Task 13 – Risk Management Plan Outline	9/30/09	9/18/09
M4: Task 4 – Bell Creek Test Site Selected	9/30/09	9/30/09*
M5: Task 4 – Bell Creek Test Site – Data Collection Initiated	9/30/09	9/30/09
M23: Task 14 – Monthly WWG Conference Call Held	9/30/09	9/22/09

Continued . . .

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

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 3 – Quarter 1 (October–December 2009)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/30/09	11/02/09
D78: Task 14 – Final White Paper on the Nexus of CCS and Water	10/30/09	10/28/09
M23: Task 14 – Monthly WWG Conference Call Held	10/31/09	10/26/09
M23: Task 14 – Monthly WWG Conference Call Held	11/30/09	11/16/09
D57: Task 12 – Project Assessment Annual Report	12/31/09	12/31/09
M23: Task 14 – Monthly WWG Conference Call Held	12/31/09	Waived by DOE
<b>Year 3 – Quarter 2 (January–March 2010)</b>		
D13: Task 2 – Public Site Updates	1/15/10	1/15/10
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/10	1/29/10
M23: Task 14 – Monthly WWG Conference Call Held	1/31/10	1/6/10
D79: Task 14 – Water Resource Estimation Methodology Document	2/28/10	Waived by DOE
M23: Task 14 – Monthly WWG Conference Call Held	2/28/10	2/25/10
D11: Task 2 – Outreach Plan	3/31/10	3/31/10
M23: Task 14 – Monthly WWG Conference Call Held	3/31/10	3/23/10
<b>Year 3 – Quarter 3 (April–June 2010)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/10	4/30/10
M23: Task 14 – Monthly WWG Conference Call Held	4/30/10	4/28/10
M23: Task 14 – Monthly WWG Conference Call Held	5/31/10	5/13/10
D17: Task 2 – General Phase III Information PowerPoint Presentation (update)	6/30/10	6/30/10
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation (update)	6/30/10	6/29/10
M23: Task 14 – Monthly WWG Conference Call Held	6/30/10	6/23/10
M24: Task 14 – WWG Annual Meeting Held	6/30/10	5/13/10

Continued . . .

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

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 3 – Quarter 4 (July–September 2010)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/10	
M23: Task 14 – Monthly WWG Conference Call Held	7/31/10	
M23: Task 14 – Monthly WWG Conference Call Held	8/31/10	
D1: Task 1 – Review of Source Attributes	9/30/10	
D10: Task 1 – Demonstration Project Reporting System Update	9/30/10	
D26: Task 2 – Fort Nelson Test Site Poster	9/30/10	
D52: Task 9 – Fort Nelson Test Site – Site Characterization, Modeling, and Monitoring Plan	9/30/10	
M9: Task 4 – Bell Creek Test Site Geological Model Development Initiated	9/30/10	
M23: Task 14 – Monthly WWG Conference Call Held	9/30/10	
<b>Year 4 – Quarter 1 (October–December 2010)</b>		
D87: Task 4 – Bell Creek Test Site – Geomechanical Experimental Design Package	10/30/10	
D15: Task 2 – Bell Creek Test Site Fact Sheet	10/31/10	
D28: Task 3 – Environmental Questionnaire – Bell Creek Test Site	10/31/10	
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	10/31/10	
M23: Task 14 – Monthly WWG Conference Call Held	10/31/10	
D31: Task 4 – Bell Creek Test Site – Geological Characterization Experimental Design Package	11/30/10	
M23: Task 14 – Monthly WWG Conference Call Held	11/30/10	
M28: Task 4 – Bell Creek Geological Experimental Design Package Completed	11/30/10	
D57: Task 12 – Project Assessment Annual Report	12/31/10	
M23: Task 14 – Monthly WWG Conference Call Held	12/31/10	

Continued . . .

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

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 4 – Quarter 2 (January–March 2011)</b>		
M8: Task 4 – Bell Creek Test Site Wellbore Leakage Data Collection Initiated	1/15/11	
D29: Task 3 – Permitting Action Plan	1/31/11	
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	1/31/11	
M23: Task 14 – Monthly WWG Conference Call Held	1/31/11	
D65: Task 4 – Fort Nelson Test Site – Site Characterization Report	2/28/11	
M23: Task 14 – Monthly WWG Conference Call Held	2/28/11	
M29: Task 4 – Fort Nelson Site Characterization Report completed	2/28/11	
D18: Task 2 – Bell Creek Test Site PowerPoint Presentation (Update)	3/31/11	
D85: Task 6 – Report – Opportunities and Challenges Associated with CO <sub>2</sub> Compression and Transportation During CCS Activities	3/31/11	
M23: Task 14 – Monthly WWG Conference Call Held	3/31/11	
<b>Year 4 – Quarter 3 (April–June 2011)</b>		
M30: Task 5 – Bell Creek Test Site Baseline MVA Initiated	4/01/11	
M23: Task 14 – Monthly WWG Conference Call Held	4/30/11	
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	4/30/11	
D17: Task 2 – General Phase III Information PowerPoint Presentation (Update)	5/31/11	
D34: Task 4 – Bell Creek Test Site – Baseline Hydrogeological Final Report	5/31/11	
M23: Task 14 – Monthly WWG Conference Call Held	5/31/11	
D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation (Update)	6/30/11	
D60: Task 13 – Site Development, Operations, and Closure Plan	6/30/11	
M23: Task 14 – Monthly WWG Conference Call Held	6/30/11	
M24: Task 14 – WWG Annual Meeting Held	6/30/11	

Continued . . .

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

<b>Title/Description</b>	<b>Due Date</b>	<b>Actual Completion Date</b>
<b>Year 4 – Quarter 4 (July–September 2011)</b>		
D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report	7/31/11	
M23: Task 14 – Monthly WWG Conference Call Held	7/31/11	
D81: Task 1 – Regional Carbon Sequestration Atlas (Update)	8/31/11	
M23: Task 14 – Monthly WWG Conference Call Held	8/31/11	
D1: Task 1 – Review of Source Attributes	9/30/11	
D4: Task 1 – Permitting Review – Two Additional States	9/30/11	
D9: Task 1 – Updated DSS	9/30/11	
D25: Task 2 – Bell Creek Test Site Poster	9/30/11	
D50: Task 9 – Bell Creek Test Site – Site Characterization, Modeling, and Monitoring Plan	9/30/11	
M23: Task 14 – Monthly WWG Conference Call Held	9/30/11	
M31: Task 9 – Bell Creek Test Site – Site Characterization, Modeling, and Monitoring Plan Completed	9/30/11	

**Table 6. PCOR Partnership Phase III BP4, Years 3–4 Gantt Chart**

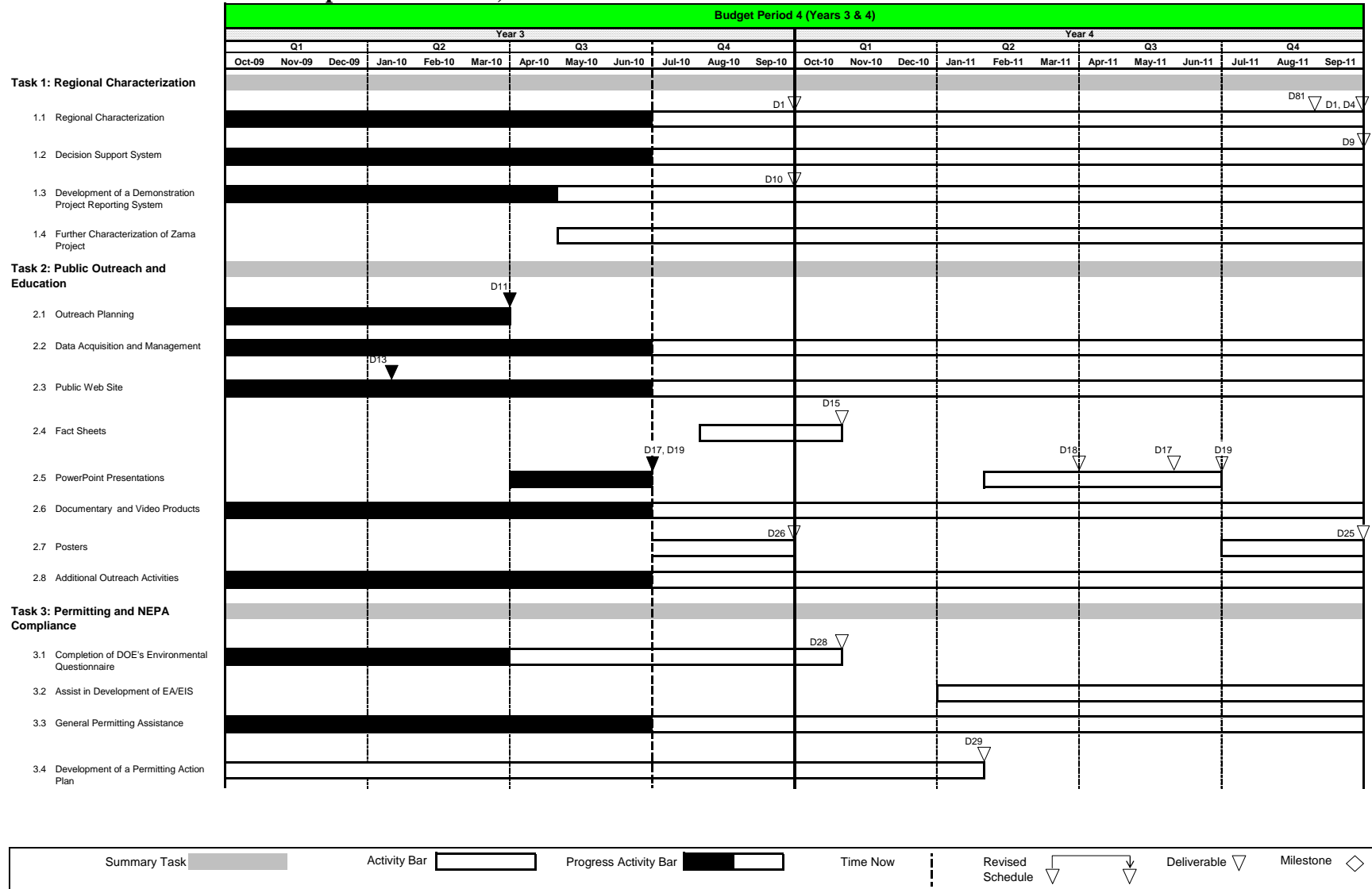


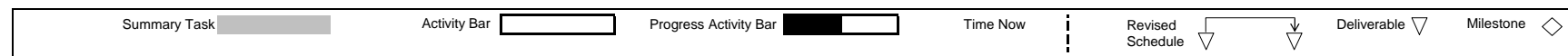
Table 6. PCOR Partnership Phase III BP4, Years 3–4 Gantt Chart (continued)



Continued...



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Key for Deliverables (D) ▼				Key for Milestones (M) ◆	
D1	Review of Source Attributes	D29	Permitting Action Plan	M8	BC Test Site – Wellbore Leakage Data Collection Initiated
D4	Permitting Review – Two Additional States	D31	BC Test Site – Geological Characterization Experimental Design Package	M9	BC Test Site – Geological Model Development Initiated
D9	Updated DSS	D34	BC Test Site – Baseline Hydrogeological Experimental Design Package	M23	Monthly WWG Conference Call Held
D10	DPRS Update	D50	BC Test Site – Site Characterization, Modeling, and Monitoring Plan	M24	WWG Annual Meeting Held
D11	Outreach Plan	D52	FN Test Site – Site Characterization, Modeling, and Monitoring Plan	M28	BC Test Site – Geological Characterization Experimental Design Package Completed
D13	Public Site Updates	D57	Project Assessment Annual Report	M29	FN Test Site – Site Characterization Report Completed
D15	Bell Creek (BC) Test Site Fact Sheet	D58	Quarterly Progress Report	M30	BC Test Site – Baseline MVA Activities Initiated
D16	Fort Nelson (FN) Test Site Fact Sheet	D59	Milestone Quarterly Report	M31	BC Test Site – Site Characterization, Modeling, and Monitoring Plan Completed
D17	General Phase III Information PowerPoint Presentation	D65	FN Test Site – Site Characterization Report		
D19	FN Test Site PowerPoint Presentation	D78	White Paper – Nexus of CCS and Water		
D20	Video Support to PowerPoint and Web Site	D81	Regional Carbon Sequestration Atlas (update)		
D24	PCOR Partnership Region CO <sub>2</sub> Storage General Poster	D85	Report – Opportunities and Challenges Associated with CO <sub>2</sub> Compression and Transportation During CCS Activities		
D25	BC Test Site Poster				
D26	FN Test Site Poster	D87	BC Test Site – Geomechanical Experimental Design Package		
D28	BC Test Site – Environmental Questionnaire				

## PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES

During the reporting period, there were two abstracts accepted for presentation, an abstract and four papers submitted, three posters presented, and 31 presentations given.

### Abstracts

During the reporting period, there were two abstracts accepted for presentation, an abstract and four papers submitted, three posters presented and 31 presentations given.

#### *Abstracts – Accepted for Presentation*

Holubnyak, Y.I., Hawthorne, S.B., Mibeck, B.A., Miller, D.J., Bremer, J.M., Smith, S.A., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Comparison of CO<sub>2</sub> and acid gas interactions with reservoir fluid and rocks at Williston Basin conditions [abs.]: 2nd International Acid Gas Injection Symposium, Calgary, Alberta, September 28–29, 2010.

Holubnyak, Y.I., Mibeck, B.A., Bremer, J.M., Smith, S.A., Sorensen, J.A., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2010, Geochemical modeling of huff ‘n’ puff oil recovery with CO<sub>2</sub> at the Northwest McGregor oil field [abs.]: 2nd International Acid Gas Injection Symposium, Calgary, Alberta, September 28–29, 2010.

#### *Abstracts – Submitted*

Schmidt, D.D., Sorensen, J.A., Smith, S.A., and Harju, J.A., 2010, Evaluation of key factors affecting successful oil production in the Bakken Formation, North Dakota [abs.]: SPE ATW—Maximizing Tight Oil in the Bakken Workshop, Keystone, Colorado, August 4–6, 2010.

### Papers

Harju, J.A., Steadman, E.N., and Anagnost, K.K., 2010, Dividing responsibility into partnerships across the country—The Plains CO<sub>2</sub> Reduction (PCOR) Partnership – one of the U.S. Department of Energy’s regional carbon sequestration partnerships: Presented at Carbon Capture and Storage World Australia 2010, Melbourne, Australia, June 21–23, 2010.

Schmidt, D.D., Botnen, L.S., Dobroskok, A.A., Rovenko, R.J., Knutson, R.D., Steadman, E.N., Harju, J.A., and Nakles, D.V., 2010, CO<sub>2</sub> storage pilot study for lignite coal, *in* 9th Annual Conference on Carbon Capture and Sequestration: Pittsburgh, Pennsylvania, May 10–13, 2010: Proceedings.

Smith, S.A., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Zama acid gas EOR, CO<sub>2</sub> sequestration, and monitoring project, *in* 9th Annual Conference on Carbon Capture and Sequestration: Pittsburgh, Pennsylvania, May 10–13, 2010: Proceedings.

Sorensen, J.A., Schmidt, D.D., Knudsen, D.J., Smith, S.A., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2010, Results of the Plains CO<sub>2</sub> Reduction Partnership's Phase II demonstration in the Northwest McGregor oil field, North Dakota, *in* 9th Annual Conference on Carbon Capture and Sequestration: Pittsburgh, Pennsylvania, May 10–13, 2010: Proceedings.

### **Presentations, Posters, and Other Media**

Ayash, S.C., Giry, E., Frenette, R., Meyer, V., Moffatt, D., Sorensen, J.A., Steadman, E.N., Harju, J.A., and Smith, S.A., 2010, A new risk management methodology for large-scale CO<sub>2</sub> storage—application to Spectra Energy's Fort Nelson carbon capture and storage (CCS) feasibility project: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.

Daly, D.J., 2010, Best practices—CCS–GS outreach: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.

Daly, D.J., and Crocker, C.R., 2010, Energy and CO<sub>2</sub> management—carbon capture and storage: Presented at the 2010 Lignite Education Seminar, Bismarck, North Dakota, June 15, 2010.

Daly, D.J., and Crocker, C.R., 2010, Energy and CO<sub>2</sub> management—carbon capture and storage: Presented at the North Dakota Petroleum Council Teacher Education Workshop, Bismarck, North Dakota, June 9, 2010.

Daly, D.J., Crocker, C.R., Hanson, S.K., Steadman, E.N., and Harju, J.A., 2010, Covering the bases—regional- and project-level outreach for sequestration: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.

Gorecki, C.D., and Klapperich, R.J., 2010, Regional Carbon Sequestration Partnership Water Working Group: Presented at the 9th Annual Conference on Carbon Capture & Sequestration Regional Carbon Sequestration Partnership Water Working Group Annual Meeting, Pittsburgh, Pennsylvania, May 13, 2010.

Gorecki, C.D., Klapperich, R.J., Bremer, J.M., Holubnyak, Y., and McNemar, A., 2010, Regional Carbon Sequestration Partnership Water Working Group: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.

Gorecki, C.D., Knudsen, D.J., Liu, G., Bremer, J.M., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, History matching a CO<sub>2</sub> huff 'n' puff EOR project with CMG's GEM and CMOST. Poster presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.

Gorecki, C.D., Sorensen, J.A., Bremer, J.M., Steadman, E.N., Harju, J.A., and Wildgust, N., 2010, Developing resource estimates for CO<sub>2</sub> storage in regional deep saline formations: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.

- Gorecki, C.D., Sorensen, J.A., Bremer, J.M., Steadman, E.N., and Harju, J.A., 2010, Developing resource estimates for CO<sub>2</sub> storage in regional deep saline formations: Presented at the UK–US Carbon Capture & Sequestration R&D Workshop, Pittsburgh, Pennsylvania, May 10, 2010.
- Harju, J.A., Steadman, E.N., and Anagnost, K.K., 2010, Dividing responsibility into partnerships across the country—The Plains CO<sub>2</sub> Reduction (PCOR) Partnership – one of the U.S. Department of Energy’s regional carbon sequestration partnerships: Presented at Carbon Capture and Storage World Australia 2010, Melbourne, Australia, June 21–23, 2010.
- Holubnyak, Y.I., Hawthorne, S.B., Mibeck, B.A., Miller, D.J., Bremer, J.M., Smith, S.A., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Laboratory and numerical modeling of CO<sub>2</sub>–H<sub>2</sub>S–water–rock interactions at Williston Basin reservoir conditions: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.
- Holubnyak, Y.I., Knudsen, D.J., Mibeck, B.A., Bremer, J.M., Smith, S.A., Sorensen, J.A., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2010, Geochemical modeling of enhanced oil recovery and CO<sub>2</sub> storage at the Northwest McGregor oil field: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.
- Holubnyak, Y.I., Rygalov, V., Smith, S.A., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Introducing new statistical methods in geochemical kinetics modeling for better estimations of CO<sub>2</sub>–water–rock interactions: Poster presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.
- Jensen, M.D., 2010, Risks associated with capture, compression, and transport of CO<sub>2</sub>: Presented at the Risk Management for CCS Projects Training Seminar, Calgary, Alberta, May 18, 2010.
- Jensen, M.D., Pavlish, B.M., Pei, P., Leroux, K.M.B., Steadman, E.N., and Harju, J.A., 2010, Estimating the cost to capture, compress, and transport CO<sub>2</sub> from stationary sources in the PCOR Partnership region: Poster presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.
- Knudsen, D.J., Gorecki, C.D., Bremer, J.M., Holubnyak, Y.I., Mibeck, B.A., Schmidt, D.D., Smith, S.A., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Characterization and modeling of a CO<sub>2</sub> huff ‘n’ puff to predict and verify EOR production and CO<sub>2</sub> storage: Presented at the American Association of Petroleum Geologists (AAPG) Annual Convention & Exhibition, New Orleans, Louisiana, April 11–14, 2010.
- Ness, R., and Daly, D.J., 2010, The energy–water connection—keeping the Bakken pump primed: Presented at the North Dakota Petroleum Council Teacher Education Workshop, Bismarck, North Dakota, June 9, 2010.

- Peck, W.D., and Steadman, E.N., 2010, The Plains CO<sub>2</sub> Reduction (PCOR) Partnership—carbon capture and storage demonstration activities: Presented at the American Association of Petroleum Geologists Rocky Mountain Section Meeting, Durango, Colorado, June 13–16, 2010.
- Schmidt, D.D., Botnen, L.S., Dobroskok, A.A., Rovenko, R.J., Knutson, R.D., Steadman, E.N., Harju, J.A., and Nakles, D.V., 2010, CO<sub>2</sub> storage pilot study for lignite coal: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.
- Smith, S.A., 2010, Overview of Phase II PCOR Partnership MVA activities: Presented at the International Energy Agency Greenhouse Gas (IEAGHG) Monitoring Network Meeting, Natchez, Mississippi, May 6–8, 2010.
- Smith, S.A., 2010, Overview of the PCOR Partnership’s Phase III field demonstration—Spectra Energy’s Fort Nelson carbon capture and storage (CCS) feasibility project: Presented at the International Energy Agency Greenhouse Gas (IEAGHG) Monitoring Network Meeting, Natchez, Mississippi, May 6–8, 2010.
- Smith, S.A., 2010, Zama acid gas EOR, CO<sub>2</sub> storage and monitoring project: Presented at the IEAGHG Weyburn-Midale CO<sub>2</sub> Monitoring and Storage Project Meeting, Saskatoon, Saskatchewan, June 21–23, 2010.
- Smith, S.A., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Zama acid gas EOR, CO<sub>2</sub> sequestration, and monitoring project: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.
- Sorensen, J.A., Knudsen, D.J., Pluemer, B., Butsch, R., Malkewicz, N., Mahoney, K., Peters, D., Nutt, L., Smith, S.A., Steadman, E.N., and Harju, J.A., 2010, Northwest McGregor field CO<sub>2</sub> huff ‘n’ puff—a case study of the application of selected geophysical techniques for CO<sub>2</sub> monitoring in a deep carbonate reservoir: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.
- Sorensen, J.A., Schmidt, D.D., Knudsen, D.J., Smith, S.A., Gorecki, C.D., Steadman, E.N., and Harju, J.A., 2010, Results of the Plains CO<sub>2</sub> Reduction Partnership’s Phase II demonstration in the Northwest McGregor oil field, North Dakota: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.
- Steadman, E.N., 2010, Plains CO<sub>2</sub> Reduction (PCOR) Partnership update: Presented at the Geological Society of America North-Central Section (44th Annual) and South-Central (44th Annual) Joint Meeting, Branson, Missouri, April 11–13, 2010.
- Steadman, E.N., 2010, Reducing industry’s carbon footprint—exploring progress made in carbon capture and storage in BC: Presented at The Canadian Institute’s 13th BC Natural Gas Symposium, Vancouver, British Columbia, June 2–3, 2010.

Steadman, E.N., and Harju, J.A., 2010, Characterization and monitoring for the carbon capture and storage (CCS) demonstrations of the Plains CO<sub>2</sub> Reduction (PCOR) Partnership: Presented at the 2010 Geological Carbon Sequestration Site Integrity: Characterization and Monitoring Science and Technology Workshop, Columbus, Ohio, June 7–8, 2010.

Steadman, E.N., and Harju, J.A., 2010, Plains CO<sub>2</sub> Reduction (PCOR) update: Presented to Excelsior Energy, Inc., Grand Forks, North Dakota, April 27, 2010.

Steadman, E.N., and Harju, J.A., 2010, Plains CO<sub>2</sub> Reduction (PCOR) Partnership update: Presented to GE Global, Grand Forks, North Dakota, May 20, 2010.

Steadman, E.N., and Harju, J.A., 2010, The Plains CO<sub>2</sub> Reduction (PCOR) Partnership—carbon capture and storage demonstration activities: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.

Steadman, E.N., and Harju, J.A., 2010, The Plains CO<sub>2</sub> Reduction (PCOR) Partnership—collaborative U.S.–Canada carbon capture and storage demonstration activities: Presented at the 9th Annual Carbon Capture & Sequestration Conference, Pittsburgh, Pennsylvania, May 10–13, 2010.

Steadman, E.N., Harju, J.A., Sorensen, J.A., Gorecki, C.D., and Smith, S.A., 2010, CO<sub>2</sub>-based enhanced oil recovery experience in the PCOR Partnership: Presented at the U.S. Department of Energy/Masdar Cooperation Workshop, Pittsburgh, Pennsylvania, June 25, 2010.

### **Reports and Meeting Minutes**

Botnen, L.S., Smith, S.A., and Steadman, E.N., 2006, Zama Field validation test: Task 3 Deliverable D10 site health and safety plan for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2010-EERC-05-13, Grand Forks, North Dakota, Energy & Environmental Research Center, March.

Botnen, L.S., and Steadman, E.N., 2006, Terrestrial field validation test—prairie pothole wetlands: Task 5 Deliverable D13 regulatory permitting action plan for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2010-EERC-05-14, Grand Forks, North Dakota, Energy & Environmental Research Center, March.

Cihacek, L.J., Botnen, B.W., and Steadman, E.N., 2010, A sampling protocol for monitoring, measurement, and verification of terrestrial carbon sequestration in soils: Value-added report for North Dakota State University, Grand Forks, North Dakota, Energy & Environmental Research Center, April.

Gorecki, C.D., 2010, Minutes—Regional Carbon Sequestration Partnership Water Working Group conference call: April 28.

Gorecki, C.D., 2010, Minutes—Regional Carbon Sequestration Partnership Water Working Group conference call: May 13.

Gorecki, C.D., 2010, Minutes—Regional Carbon Sequestration Partnership Water Working Group conference call: June 22.

Peck, W.D., Daly, D.J., Botnen, L.S., Sorensen, J.A., Smith, S.A., Jensen, M.D., Harju, J.A., Gorecki, C.D., Anagnost, K.A., and Steadman, E.N., 2010, Plains CO<sub>2</sub> Reduction (PCOR) Partnership: Phase III monthly report (March 1–31, 2010) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, March.

Peck, W.D., Daly, D.J., Botnen, L.S., Sorensen, J.A., Smith, S.A., Jensen, M.D., Harju, J.A., Gorecki, C.D., Anagnost, K.A., and Steadman, E.N., 2010, Plains CO<sub>2</sub> Reduction (PCOR) Partnership: Phase III monthly report (April 1–30, 2010) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, April.

Peck, W.D., Daly, D.J., Botnen, L.S., Sorensen, J.A., Smith, S.A., Jensen, M.D., Harju, J.A., Gorecki, C.D., Anagnost, K.A., and Steadman, E.N., 2010, Plains CO<sub>2</sub> Reduction (PCOR) Partnership: Phase III monthly report (May 1–31, 2010) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, May.

Smith, S.A., Sorensen, J.A., Steadman, E.N., Harju, J.A., Jackson, B., Nimchuk, D., and Burke, L., 2010, Plains CO<sub>2</sub> Reduction (PCOR) Partnership (Phase II) – Zama field validation test regional technology implementation plan: Task 3 Deliverable D52 Final Report for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2010-EERC-05-03, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

Sorensen, J.A., Schmidt, D.D., Smith, S.A., Bailey, T.P., Mibeck, B.A.F., and Harju, J.A., 2010, Subtask 1.2 – Evaluation of key factors affecting successful oil production in the Bakken Formation, North Dakota: Final report (October 1, 2008 – March 30, 2010) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-08NT43291, Grand Forks, North Dakota, Energy & Environmental Research Center, March.

Sorensen, J.A., Schmidt, D.D., Smith, S.A., Knudsen, D.J., Steadman, E.N., and Harju, J.A., 2010, Plains CO<sub>2</sub> Reduction (PCOR) Partnership (Phase II) – Williston Basin field demonstration, Northwest McGregor CO<sub>2</sub> huff ‘n’ puff – regional technology implementation plan (RTIP): Deliverable report D55 Task 2 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2010-EERC-04-10, Grand Forks, North Dakota, Energy & Environmental Research Center, December.

Steadman, E.N., and Harju, J.A., 2010, Fort Nelson carbon capture and storage feasibility project: Final Phase III – Task 2 Deliverable D19 (Update 1) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, June.

Steadman, E.N., and Harju, J.A., 2010, Plains CO<sub>2</sub> Reduction Partnership (PCOR) general audience CO<sub>2</sub> sequestration outreach PowerPoint: Task 2 Deliverable D17 draft update for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, June.

Steadman, E.N., Harju, J.A., Romuld, L., Sorensen, J.A., Daly, D.J., Jensen, M.D., Botnen, L.S., Botnen, B.W., Peck, W.D., Smith, S.A., and Nakles, D., 2009, Results of Plains CO<sub>2</sub> (PCOR) Partnership Phase II: Deliverable D56 topical report (October 1, 2005 – December 29, 2009) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, December.

Steadman, E.N., Harju, J.A., Romuld, L., Sorensen, J.A., Daly, D.J., Jensen, M.D., Botnen, L.S., Peck, W.D., Smith, S.A., Gorecki, C.D., Votava, T.J., and Anagnost, K.K., 2010, Plains CO<sub>2</sub> Reduction Partnership Phase III: Quarterly technical progress report (January 1 – March 31, 2010) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592 and North Dakota Industrial Commission Contract Nos. FY08-LX111-162 and G-015-030, Grand Forks, North Dakota, Energy & Environmental Research Center, April.

Stepan, D.J., Shockey, R.E., Kurz, B.A., Kalenze, N.S., Cowan, R.M., Ziman, J.J., and Harju, J.A., 2010, Bakken water opportunities assessment – Phase 1: Final report summary (June 19, 2009 – March 15, 2010) for North Dakota Industrial Commission Contract No. G018-036, EERC Publication 2010-EERC-04-03, Grand Forks, North Dakota, Energy & Environmental Research Center, April.

## **MEETINGS/TRAVEL**

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

- March 27 – April 4, 2010: Attended the 6th Institute of Mathematics and its Applications Conference on Modelling Permeable Rocks, held March 29 – April 1 in Edinburgh, Scotland.
- April 9–15, 2010: Attended two short courses entitled “Assessment of Unconventional Shale Resources Using Geochemistry” and “Reservoir Engineering for Geologists” in New Orleans, Louisiana.
- April 11–12, 2010: Presented at the Joint Section Meeting of the Geological Society of America North-Central and South-Central Sections in Branson, Missouri.



- April 11–14, 2010: Attended and presented at the AAPG 2010 Annual Convention & Exhibition in New Orleans, Louisiana.
- April 16 and 21, 2010: Participated in documentary editing sessions at PPB in Fargo, North Dakota.
- April 18–19, 2010: Attended the CO<sub>2</sub> Capture and Storage Information Needs and Knowledge Sharing Workshop for Alberta’s Four Large-Scale Demonstration Projects in Calgary, Alberta, Canada.
- April 24–30, 2010: Attended the IEA Greenhouse Gas R&D Programme 6th Wellbore Integrity Network Meeting in The Hague, Amsterdam.
- April 24–30, 2010: Attended the 17th Society of Petroleum Engineers Improved Oil Recovery Symposium and short courses in Tulsa, Oklahoma.
- April 26–30, 2010: Attended the AAPG short course entitled “Basic Well Log Analysis” in Austin, Texas.
- May 1–4, 2010: Attended and exhibited at 18th Williston Basin Petroleum Conference & Expo, Bismarck, North Dakota, May 2–4, 2010.
- May 4, 2010: Participated in PCOR Partnership educational materials development meeting with PPB, Fargo, North Dakota.
- May 5–6, 2010: Attended EPA and DOE First Public Meeting of Interagency Task Force on Carbon Capture and Storage, Washington, D.C., May 6, 2010.
- May 5–7, 2010: Presented at IEA Greenhouse Gas R&D Programme’s 6th Monitoring Network Meeting, Natchez, Mississippi, May 6–8, 2010.
- May 9–13, 2010: Presented at 9th Annual Conference on Carbon Capture and Sequestration, Pittsburgh, Pennsylvania, May 10–13, 2010.
- May 10, 2010: Attended 2010 U.S.–Canada Clean Energy Dialogue Bilateral National Conference, Pittsburgh, Pennsylvania.
- May 16–19, 2010: Presented at 12th Annual Electric Power Conference & Exhibition, Baltimore, Maryland.
- May 20–26, 2010: Participated in IOGCC Pipeline Transportation Task Force meeting, Lexington, Kentucky, May 20–21, 2010, and attended IOGCC 2010 Midyear Issues Summit, Lexington, Kentucky, May 23–25, 2010.
- May 25–27, 2010: Participated in meeting with DGLS regarding characterization of Forest City Basin, Rolla, Missouri, May 26, 2010.
- June 1–4, 2010: Participated in meetings with Spectra Energy in Calgary, Alberta, Canada.
- June 1–4, 2010: Presented at The Canadian Institute’s 13th Annual BC Natural Gas Symposium in Vancouver, British Columbia, Canada.
- June 6–7, 2010: Presented at the Geologic Carbon Sequestration Site Integrity: Characterization and Monitoring Science and Technology Workshop in Columbus, Ohio.
- June 7–11, 2010: Attended the AAPG Hedberg Research Conference entitled Applications of Reservoir Fluid Geochemistry in Vail, Colorado.
- June 8–10, 2010: Presented at the NDPC’s 2010 Teacher Education Seminar in Bismarck, North Dakota.
- June 13–15, 2010: Presented at the AAPG Rocky Mountain Section Meeting in Durango, Colorado.

- June 14–16, 2010: Presented at LEC's 2010 Lignite Education Seminar: Energy, Economics and Environment in Bismarck, North Dakota
- June 15–18, 2010: Participated in project meetings with subcontractors in Calgary and Edmonton, Alberta, Canada.
- June 19–21, 2010: Attended advanced D8 x-ray diffractometer service training (and received certification) at Bruker AXS Inc. in Madison, Wisconsin.
- June 21–24, 2010: Attended an IEA Greenhouse Gas R&D Programme Weyburn–Midale CO<sub>2</sub> Monitoring and Storage Project (PRISM–VI) meeting in Saskatoon, Saskatchewan, Canada.
- June 22–24, 2010: Participated in an RCSP OWG meeting in Washington, D.C.
- June 24–25, 2010: Presented at a DOE Fossil Energy–Masdar Cooperation Workshop in Pittsburgh, Pennsylvania.
- June 28 – July 1, 2010: Attended the 4th Annual Wyoming CO<sub>2</sub> Conference in Casper, Wyoming.
- June 28 – July 5, 2010: Traveled with PPB to Pueblo, Colorado, to gather imagery for use in outreach materials and presentations.

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

## REFERENCES

None.