



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

### **Quarterly Technical Progress Report**

*(for the period July 1 – September 30, 2010)*

*Prepared for:*

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**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 in 2003 as part of a national plan to mitigate greenhouse gas emissions. The PCOR Partnership is led by the Energy & Environmental Research Center 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.

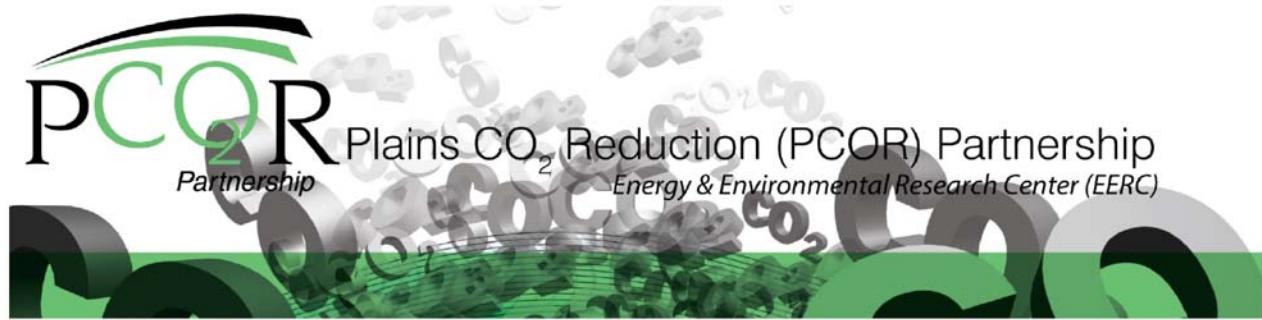
This progress report presents an update of Phase III PCOR Partnership activities from July 1, 2010, through September 30, 2010.

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 with Denbury Resources, Inc., 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 Power River Basin outcrops that serve as analogs for the Bell Creek reservoir and seal.

In July 2010, the PCOR Partnership hosted its second annual regulatory meeting in Deadwood, South Dakota, bringing together regulatory personnel from throughout its region to meet and discuss ways to develop strategies to work past state/provincial boundaries and to establish rules and regulations outside of federal mandate.

The PCOR Partnership had an excellent presence at the 10th International Conference on Greenhouse Gas Control Technologies (GHGT-10) held September 19–23, 2010, in Amsterdam, the Netherlands. All ten of its submitted abstracts were accepted: two oral presentations were given and eight posters were presented (or copresented). With almost 1600 delegates representing 55 countries, it was an excellent international platform for sharing information about the Regional Carbon Sequestration Partnerships.

Efforts also continued for potential joint characterization studies throughout much of the PCOR Partnership region, and work has begun gathering enhanced oil recovery/CO<sub>2</sub> storage data in the Rival oil field located in north-central North Dakota.



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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 September 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 (October 1, 2007 – Present)**

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

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/enhanced oil recovery (EOR) 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

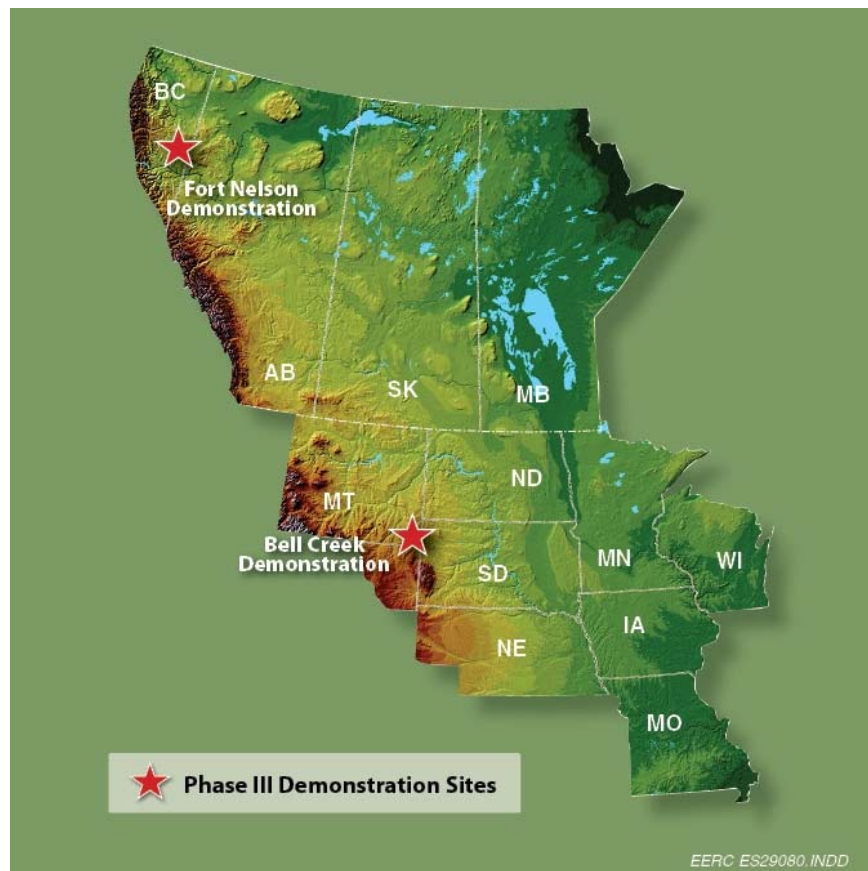


Figure 1. PCOR Partnership Phase III demonstration sites.



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 collaborative efforts for a U.S.–Canada joint characterization effort of the Basal Cambrian Sandstone Aquifer (Deadwood Formation) located in the upper Great Plains of the United States and south-central Canada.
- Continued discussions with government and industry partners regarding a future collaborative effort to characterize the Forest City Basin.
- Initiated compilation of geographic information system (GIS) layers to create a map/poster portrayal of the PCOR Partnership region focusing on the relationship between Native American lands, CO<sub>2</sub> sources, and sink opportunities.
- Continued efforts to update the partners-only Web site as follows:
  - Drafted text for the new carbon markets section.
  - Began extracting material from the Phase II final report to update the online information on the field validation test sites.
  - Added new reports and presentations as well as a revised version of the atlas to the products database.

**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 the annual update of the large stationary sources on the Decision Support System (DSS, © 2007–2010 EERC Foundation) including the following:
  - ◆ Updated the emission data of 127 U.S. power plants, including CO<sub>2</sub>, SO<sub>2</sub>, and NO<sub>x</sub> (the data source is the 2009 U.S. Environmental Protection Agency [EPA] Clean Air Market data and map).
  - ◆ Added 13 U.S. power plants (the data source is the 2009 EPA Clean Air Market data and map).
  - ◆ Using 2009 statistics, updated the majority of the emission data of 83 U.S. ethanol plants, including CO<sub>2</sub>, SO<sub>2</sub> and NO<sub>x</sub> (the data were collected from the online Nebraska Ethanol Board's plant list [[www.ne-ethanol.org/industry/plantlist.htm](http://www.ne-ethanol.org/industry/plantlist.htm)], various company Web sites, and the online Ethanol Producer Magazine [[www.ethanolproducer.com/plant-list.jsp](http://www.ethanolproducer.com/plant-list.jsp)]).
- Completed efforts to compile information on the regional characterization of the large stationary sources for inclusion in Deliverable (D)1 entitled "Review of Source Attributes Update 1."
- The task's research specialist attended the Environmental Systems Research Institute, Inc. (Esri), International User Conference for GIS technology ([www.esri.com/events/user-conference/index.html](http://www.esri.com/events/user-conference/index.html)) in San Diego, California.
- Recalculated regional coal capacity information and transmitted the data to NATional CARBon Sequestration Database and Geographic Information System (NATCARB) personnel for inclusion in the soon-to-be-released DOE NETL atlas.
- Submitted contact page information and images for the PCOR Partnership as requested by the NETL national atlas coordinator.
- Continued development of a series of CCS-related technical briefs to be prepared for a more scientific, rather than general, audience.
- Generated maps of the Bell Creek oil field area showing the distribution of the small communities within a 50-mile radius.
- Targeted the Rival oil field in north-central North Dakota for detailed characterization with respect to EOR-based CO<sub>2</sub> storage. Continued performance of characterization modeling utilizing the Petrel software package, including the following:
  - Created Rival log suite in Excel containing 240 wells in four fields.
  - Identified 38 well logs that had not been previously digitized.
  - Imported the oil field boundary definitions into the Petrel project.
  - Imported LAS (Log Ascii Standard format) logs into the Petrel project.
  - Imported tops from previous Rival projects into the new Rival Petrel project.
- Continued efforts preparing new images and figures for inclusion in PowerPoint presentations, posters, fact sheets, etc.
- Efforts conducted as part of the continuing work at the Zama, Alberta, Canada, field site included the following:
  - Planning activities with specific focus on feasibility analysis of the deployment of vertical seismic profiling field work and wellbore integrity laboratory experimental design setup.
  - Discussions are under way with site host, Apache Canada, Ltd. (Apache), to determine the best survey design to optimize data sets for input into a new geological model of the pinnacle, long-term verification, and improved understanding of reservoir performance.

- Initiated experimental design of wellbore integrity laboratory-based studies. It is anticipated that implementation of these tests will begin in early November 2010.
- Participated in a project meeting with Apache on August 30. The following action items were determined:
  - ◆ The EERC will acquire new seismic data over the “F Pool,” tracer injection, and fluid sampling.
  - ◆ Apache will conduct a brief evaluation of seismic techniques.
  - ◆ The EERC will generate a list of data needs for the creation of a static geological model of the pinnacle.
- Continued efforts to perform laboratory studies on the cement types utilized in the Zama wells to determine the likelihood of potential reactions and the implications to integrity of the system.
- Developed a preliminary static model of the Zama “F Pool” based on data sets collected over the past four project years. Continued planning efforts to improve the model, including collection of the following data:
  - ◆ Geologic framework, degrees of heterogeneity, and reservoir properties
  - ◆ Injection target and sealing formation data from Apache
  - ◆ Seismic information acquired after the winter drilling season
  - ◆ Cement integrity studies (with planned kickoff in November)
- Participated in the 10th International Conference on Greenhouse Gas Control Technologies (GHGT-10) in Amsterdam, the Netherlands, and gave an oral presentation on September 22, entitled “Zama Acid Gas Enhanced Oil Recovery, CO<sub>2</sub> Sequestration, and Monitoring Project.” The paper is available online at <https://www4.eventsinteractive.com/iea/viewpdf.asp?id=270025&file=\\DCFILE01\EP11%24\Eventwin\Pool\office27\docs\pdf\ghgt10Final00558.pdf>.

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

- Activities were slated to begin in July for further characterization of the Zama Acid Gas EOR, CO<sub>2</sub> Storage, and Monitoring Project. However, a change in the site operator’s project lead resulted in a delay. Activities were subsequently begun in August after a visit to the site operator’s offices in Calgary, Alberta, Canada.
- On September 14, approval was received from the NETL project manager to extend D10 entitled “Demonstration Project Reporting System Update” from September 30, 2010, to March 31, 2011. This additional 6 months will provide the time necessary to acquire and interpret information regarding the Phase III demonstration sites prior to upload.

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

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

- Fifteen EERC employees attended three conferences and two workshops, resulting in approximately 2230 external participants that were exposed to the PCOR Partnership name, messaging, and informational materials. Specifically, the PCOR Partnership

outreach activities included eight poster presentations, 15 oral presentations, and two EERC PCOR Partnership-sponsored booths. The following quantities of outreach materials were distributed:

- PCOR Partnership documentary entitled “Nature in the Balance: CO<sub>2</sub> Sequestration” – 33
- PCOR Partnership documentary entitled “Reducing Our Carbon Footprint: The Role of Markets” – 31
- PCOR Partnership documentary entitled “Out of the Air: Into the Soil” – 31
- PCOR Partnership documentary entitled “Managing Carbon Dioxide: The Geologic Solution” – 59
- PCOR Partnership Atlas 3rd Edition – 44
- PCOR Partnership product list – 15
- PCOR Partnership brochure – 14
- PCOR Partnership partner list – 5
- On September 16, participated in the RCSP Outreach Working Group (OWG) monthly conference call.
- As designated lead on a poster presentation for the OWG at GHGT-10, the following actions were taken:
  - Distributed a draft concept and text to the OWG for review and incorporated the comments received.
  - Added the Petroleum Technology Research Centre as a coauthor and featured the Aquistore communications plan as an example of the utility of the RCSP Outreach Best Practices Manual.
  - Submitted a paper to the GHGT-10 Conference entitled “Road-Testing the Outreach Best Practices Manual: Applicability for Implementation of the Development Phase Projects by the Regional Carbon Sequestration Partnerships” on August 31 and submitted the copyright transfer form to allow publication of the paper in the conference proceedings. The paper can be viewed online at <https://www4.eventsinteractive.com/iea/viewpdf.esp?id=270025&file=\\DCFILE01\EP11%24\Eventwin\Pool\office27\docs\pdf\ghgt10Final01020.pdf>.
  - Traveled to Amsterdam, the Netherlands, and participated in GHGT-10, including the following:
    - ◆ Presented the poster on behalf of the OWG on September 22.
    - ◆ Participated on September 22 on a panel in a side meeting held by the Bellona Foundation, an international environmental nongovernmental organization based in Norway.
    - ◆ Participated in a meeting of the International Energy Association’s Social Science Network on September 23.
- Prepared a poster on behalf of the OWG highlighting the Aquistore (Canada) project’s and RCSPs’ use of outreach best practices for presentation at the RCSP Annual Review Meeting scheduled for October 5–7, 2010, in Pittsburgh, Pennsylvania.
- Continued communications with Star Group LLC (consultants) regarding use of the Implications Wheel<sup>®</sup> at the annual meeting workshop.
- Efforts continued toward finalization of the documentary entitled “Global Energy and Carbon: Tracking our Footprint.”
  - The broadcast date with PPB for this documentary was October 18.

- Scheduled the review of the final broadcast-ready copy for October 1.
- Initiated efforts on the Fort Nelson CCS Feasibility Project public outreach poster.
- Continued efforts to update and increase the number of informational fact sheets, including the following:
  - Prepared a draft fact sheet for the Bell Creek test site (D 15) for in-house review.
  - Prepared updated drafts of the terrestrial sequestration fact sheets.
- In cooperation with PPB, granted permission to EPA to use PCOR Partnership documentary video clips in the development of an EPA climate change Web site.
- Continued in-house discussions regarding outreach efforts to community libraries and development of an image archive with PPB.
- Participated in development of an exhibit booth for the North Dakota Library Association (NDLA) 2010 Annual Conference scheduled for September 29 – October 2, 2010, in Grand Forks ([www.ndla.info/Conference/10conf.htm](http://www.ndla.info/Conference/10conf.htm)) as the next step in the efforts to encourage area libraries to stock the PCOR Partnership atlas and documentaries to help reach the general public and school-aged children.
- Received notification on September 22 that the Government Documents Roundtable of NDLA had nominated “Managing Carbon Dioxide: the Geologic Solution” (DVD) for its 2010 Notable Document Award; the Roundtable then distributed the PCOR Partnership link for the online streaming version of the documentary to all NDLA members.

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

- On August 5, a change was requested and approval received for the due date of the Fort Nelson test site public outreach poster (D26). The poster is now due on March 30, 2011, to allow the incorporation of images that will be obtained on a site visit tentatively scheduled for February 2011 and to allow the inclusion of information from core analyses.

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

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

- Participated in conference calls of the Interstate Oil and Gas Compact Commission (IOGCC) Pipeline Transportation Task Force and submitted information for inclusion in its report.
- Held a teleconference with IOGCC personnel about expanded efforts regarding the timely communication of regulatory issues.
- Held the second annual PCOR Partnership regulatory meeting on July 21–22, 2010, in Deadwood, South Dakota. Highlights include the following:
  - There were 22 attendees, including representatives from North Dakota, South Dakota, Missouri, Nebraska, Wyoming, Alberta, British Columbia, Saskatchewan, IOGCC, Melzer Consulting, and Carnegie Mellon University.
  - Updates were given on CCS and pipeline activities in each represented state and province.

- An overview of NETL activities, including the RCSP Program, was also presented.
- An overview of the status of federal legislation and proposed rules was given.
- A review of the PCOR Partnership Phase II results and an update of Phase III activities were presented.
- Plans for ongoing activities were discussed.
- Distributed to meeting participants (via e-mail) the summary of the Deadwood regulatory meeting held in July. The summary has also been uploaded to the partners-only Web site.
- Attended the 4th Annual Carbon Capture & Sequestration: The Business Summit ([www.infocastinc.com/index.php/conference/carbon10/agenda](http://www.infocastinc.com/index.php/conference/carbon10/agenda)) in Washington, D.C. In addition to relevant topics discussed, this conference provided an opportunity to meet and interact with partners and RCSP participants.
- Reviewed EPA's proposed rules released August 12 on Clean Air Act permits for sources of greenhouse gas emissions under the Prevention of Significant Deterioration Program.
- Prepared a summary of the August 12 report of the President's Interagency Task Force on Carbon Capture and Storage (CCS) and continued review of the 233-page document ([www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf](http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf)).
- Participated in an in-house Fort Nelson Carbon Capture and Storage (CCS) Feasibility Project meeting on September 1 with personnel from Spectra Energy.
- Reviewed a 96-page report entitled "The Legal and Regulatory Treatment of Carbon Capture and Storage (CCS) in Canada and the United States" prepared by Nigel Bankes for Natural Resources Canada.
- Initiated development of a "regulatory roundup" to be distributed at the annual meeting in October.
- At a partner's request, provided a brief overview of CCS long-term stewardship options under consideration in the United States and Canada.
- Attended the North Dakota Petroleum Council annual meeting in Minot, North Dakota.

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

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

- 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. Toured the Bell Creek oil field in southeastern Montana. Tour highlights included the following:
  - Examined several water injection and oil production wells.
  - Obtained a keen understanding of the surface features in the Bell Creek area that must be considered when developing monitoring, verification, and accounting (MVA) strategies for CCS.
  - Examined an outcrop of the Cretaceous Muddy Formation, the sandstone formation that serves as the reservoir rock in the Bell Creek oil field.
- Participated in a meeting in Grand Forks, North Dakota, on September 1 with Spectra Energy to review preliminary modeling results.

- Attended GHGT-10 in Amsterdam and presented several posters on September 22, including the following:
  - “The Fort Nelson Carbon Capture and Storage Feasibility Project – A Program for Large-Scale Geologic Storage of CO<sub>2</sub> from a Natural Gas-Processing Plant in British Columbia, Canada.”
  - “Northwest McGregor Field CO<sub>2</sub> Huff ‘n’ Puff: A Case Study of the Application of Field Monitoring and Modeling Techniques for CO<sub>2</sub> Prediction and Accounting.”
  - “Modeling CO<sub>2</sub>–H<sub>2</sub>S–Water–Rock Interactions at Williston Basin Reservoir Conditions.”
  - “Investigation of Geochemical Interactions of Carbon Dioxide and Carbonate Formation in the Northwest McGregor Oil Field after Enhanced Oil Recovery and CO<sub>2</sub> Storage.”
- Papers prepared for GHGT-10 are located at the following Web links:
  - <https://www4.eventsinteractive.com/iea/viewpdf.esp?id=270025&file=\\DCFILE01\EP11%24\Eventwin\Pool\office27\docs\pdf\ghgt10Final00539.pdf>.
  - <https://www4.eventsinteractive.com/iea/viewpdf.esp?id=270025&file=\\DCFILE01\EP11%24\Eventwin\Pool\office27\docs\pdf\ghgt10Final01117.pdf>.
  - <https://www4.eventsinteractive.com/iea/viewpdf.esp?id=270025&file=\\DCFILE01\EP11%24\Eventwin\Pool\office27\docs\pdf\ghgt10Final01114.pdf>.
- Participated in a monthly conference call on September 28 with Spectra Energy regarding action items and upcoming issues for the Fort Nelson CCS Feasibility Project.
- Prepared a draft version of the geomechanical work plan (D87) for the Bell Creek CCS project.

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**

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

- This task was scheduled to begin in July; however, there has been no activity to date because of delays in project negotiations with the site operator.

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

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

- Completed the draft of the capture technology overview. The draft then began the internal PCOR Partnership review process.

- Web-based information about capture technologies continues to be reviewed on a weekly basis.
- In an effort to share resources and thereby maximize use of DOE funding, the task leader provided support to the EERC's Partnership for CO<sub>2</sub> Capture (PCOC) in the following manner:
  - Summarized the capture technology overview document for inclusion in the PCOC Phase I final report
  - Prepared PowerPoint slides summarizing various capture technology types for use in the PCOC annual meeting presentation held at the EERC on August 11.
- Completed the 2010 update and quality assurance/quality control check of the CO<sub>2</sub> emission sources database.
- Prepared a short document containing facts about CO<sub>2</sub> pipelines and compression for a visit by personnel from a partner pipeline company.
- Drafted text on CO<sub>2</sub> pipelines for inclusion in a proposed technical brief and reviewed the first draft of the technical brief.
- Attended the 2010 CO<sub>2</sub> Capture Technology Meeting held September 13–17, 2010, in Pittsburgh, Pennsylvania ([www.netl.doe.gov/events/10conferences/co2capture/index.html](http://www.netl.doe.gov/events/10conferences/co2capture/index.html)).
- Addressed a question from a PCOR Partnership partner regarding the production of methane from brine formations as a result of the injection of CO<sub>2</sub>.
- At the request of a PCOR Partnership partner, the Integrated Environmental Control Model was used to estimate the composition of flue gas generated by combustion of Powder River Basin subbituminous coal at an “average” subcritical power plant.

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.

### **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 for potential additional demonstration projects in the region. Because of the sensitive nature of negotiations, specifics cannot be shared at the present time. The source of CO<sub>2</sub> for both large-scale demos has been secured. Both are natural gas-processing facilities.

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

- While the Bell Creek site was selected and approved by NETL at the end of September 2009, Encore Acquisition Company's merger with Denbury Resources has delayed efforts to gain a firm commitment and cost-share agreement. However, the following activity occurred in September:



- Attorneys at Denbury Resources approved language to be included in a confidentiality agreement.
- A meeting at Denbury Resources’ headquarters in Plano, Texas, is scheduled for October 13.

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

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

- This task was scheduled to begin in July; however, there has been no activity to date because of delays in project negotiations with the site operator.

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

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

- Attended and presented at Computer Modelling Group’s (CMG’s) technical symposium in Calgary, Alberta, Canada; the presentation was entitled “History-Matching a CO<sub>2</sub> Huff’n’Puff EOR Project with CMG’s GEM and CMOST.” ([www.cmgroup.com/2010TS/CMG\\_Technical\\_Symposium\\_2010\\_Announcement.pdf](http://www.cmgroup.com/2010TS/CMG_Technical_Symposium_2010_Announcement.pdf)).
- Continued work on the June 2010 Fort Nelson CCS Feasibility Project geologic model based on refined property data sent by Spectra Energy for incorporation into the recently completed structural model.
- Continued upscaling the June 2010 static model for simulations and presented the same during Spectra Energy’s visit to the EERC on September 1.
- Completed testing of the high-performance computing cluster for use on the PCOR Partnership Phase III projects with CMG technical and management personnel and initiated the purchasing process.
- Continued lab testing of outcrop samples of rocks similar to the reservoir and cap rock found in the Bell Creek field (including porosity and permeability measurements and, eventually, relative permeability).
- Initiated research and construction of a geologic model of the Bell Creek field in Montana.
- Participated in a conference call discussion with RPS Energy Canada (subcontractor) regarding its scope of work, in particular:
  - Modeling the CO<sub>2</sub> heat loss down the prospective wellbore to determine what temperature it will be when it reaches the reservoir.
  - Performing some near wellbore modeling to determine the potential for thermal fracturing as a result of the injection of comparatively cold CO<sub>2</sub> and hot formation and formation fluids.
  - Managing the Hycal lab work for the Fort Nelson core samples, including the following tests:
    - ◆ Basic core tests
    - ◆ Relative permeability tests
    - ◆ Cap rock integrity tests

- ◆ Geomechanical testing
- ◆ CO<sub>2</sub> and H<sub>2</sub>S solubility testing
- Began preparation of an abstract for American Association of Petroleum Geologist's (AAPG's) 2011 Annual Conference & Exhibition ([www.aapg.org/houston2011](http://www.aapg.org/houston2011)) on characterization and modeling of the Rival oil field for potential CO<sub>2</sub> EOR.
- Organized a training opportunity in Houston, Texas, for research staff to learn Techlog Petrophysics, a new Schlumberger petrophysical software package.
- Participated in the September 28 conference call with Spectra Energy.
- Attended GHGT-10 and copresented a poster entitled "An Overview of the IEA Greenhouse Gas R&D Programme Regional Geologic Storage Capacity Studies" on September 22.
- Continued efforts on the simulation portion of the RCSP Sim/Risk best practices manual, including the following:
  - Continued drafting the case study of the Phase II Northwest McGregor Huff 'n' Puff project.
  - Worked on the sidebar.
- Lisa Botnen continued risk management activities, including the following:
  - Updated the risk management portion of the project management plan (PMP).
  - Organized an in-house meeting on September 10 to discuss the path forward for the next round of Fort Nelson risk assessment.
  - Distributed an action item list to Fort Nelson project team members.
  - At GHGT-10, the poster entitled "A New Risk Management Methodology for Large-Scale CO<sub>2</sub> Storage: Application to the Fort Nelson Carbon Capture and Storage Feasibility Project" was presented by EERC staff in attendance.
  - On July 1, 9, and 15, and August 5, participated in RCSP Risk/Sim conference calls and submitted general information on the risk assessment prepared for the Fort Nelson CCS Feasibility Project.
  - Held a conference call with Spectra Energy personnel to discuss project deliverables and the agenda for the upcoming meeting in Grand Forks.

#### **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:

- Welcomed the Wyoming Office of State Lands and Investments to the PCOR Partnership.
- Welcomed several partners to the EERC for visits on July 22, 26, and 30.
- Discussed future characterization activities within the PCOR Partnership region, specifically regarding the Forest City Basin and the Basal Cambrian Sandstone (Deadwood) Formation.
- A postcard announcing registration for the PCOR Partnership Annual Meeting and Workshop was mailed to all partner contacts, invited speakers, and regulatory meeting attendees on July 26. An e-mail blast to the same contacts was sent on July 27.
- Continued planning the annual meeting and workshop, including sending out a hotel deadline reminder to the partnership on September 21, compiling information for the product CD, and contacting presenters and sponsors.
- Participated in conference calls with the Fort Nelson CCS Feasibility Project manager on August 10 and September 27.
- Participated in quarterly conference calls, including all of the key Spectra Energy and EERC staff working on the Fort Nelson project, on August 16 and September 28.
- Hosted Spectra Energy's Fort Nelson project team at the EERC on September 1.
- Continued participation in the Carbon Sequestration Leadership Forum (CSLF) Assessing the Progress in Closing the Gaps – Storage Working Group, including reviews of a technology road map document review and a revised gap analysis checklist.
- At the request of CSLF, provided CSLF-recognized project site photos, i.e., Zama and Fort Nelson, for use in several upcoming applications, including the CSLF Web site, the upcoming 2010 CSLF Annual Meeting, and the CSLF Technology Roadmap.
- Reviewed a summary and detailed record of the first U.S.–Canada Bilateral National Conference on Carbon Capture and Storage held on May 10, 2010, in Pittsburgh, Pennsylvania. This meeting was part of the U.S.–Canada Clean Energy Dialogue.
- Reviewed the DOE draft manual entitled “Site Screening, Site Selection, and Initial Characterization for Storage of CO<sub>2</sub> in Deep Geologic Formations.”
- Provided Phase II site photos for inclusion in the DOE NETL fact sheet that is posted online ([www.netl.doe.gov/publications/factsheets/project/Project687\\_8P.pdf](http://www.netl.doe.gov/publications/factsheets/project/Project687_8P.pdf)).
- Provided comments on a draft U.S. Carbon Sequestration Council paper entitled “Advances in Geologic CO<sub>2</sub> Storage.”
- Submitted and received acceptance for an abstract on the PCOR Partnership for the EUEC 2011 Energy & Environment Conference scheduled for January 31 – February 2, 2011, in Phoenix, Arizona.
- Continued work on the update to the PMP.
- Updated the risk management portion of the PMP and continued to review various methodologies for the development of a PCOR Partnership programmatic risk assessment.

- On August 11, held a conference call with NETL personnel to discuss the overall PCOR Partnership program risk management plan.
- Participated in a conference call on August 4 regarding the “Coordination Between the U.S. Geological Survey (USGS) and the Regional Partnerships” on the USGS Resource Assessment effort.
- Participated on August 5 in a telephone interview with Craig Hart regarding the Phase III study which, as done with the Phase II study, will be reviewed and commented on by the regional partnerships and will be published by Harvard (the study is due to be published in January 2011).
- Presented a PCOR Partnership Program overview at the PCOC Phase II Kickoff Meeting held August 11 at the EERC.
- Attended and gave an oral presentation at GHGT-10 entitled “The Plains CO<sub>2</sub> Reduction (PCOR) Partnership: Developing Carbon Management Options for the Central Interior of North America” to be published in the Conference proceedings. The paper can be viewed online at <https://www4.eventsinteractive.com/iea/viewpdf.asp?id=270025&file=\\DCFILE01\\EP11%24\\Eventwin\\Pool\\office27\\docs\\pdf\\ghgt10Final00681.pdf>
- Presented a PCOR Partnership Program overview at the EERC Hydrogen Action Summit on September 13 in Grand Forks, North Dakota.
- Participated in the 4th Annual American Conference Institute’s Carbon Capture and Sequestration Summit on September 29–30, 2010, in Washington, D.C. ([www.carboncapturesummit.com/agenda.html](http://www.carboncapturesummit.com/agenda.html)).
- Program staff reviewed Chapter 6 from the draft Terrestrial Best Practices Manual and provided comments on September 9.
- Forwarded the FE Techline regarding the Zama project (posted September 23) to the partnership along with the link to the Zama Regional Technology Implementation Plan on the partners-only Web site.
- Deliverables and milestones for July:
  - June monthly update
  - M23: Task 14 – monthly Water Working Group (WWG) conference call held
  - D58/D59: Task 13 – quarterly progress report/milestone quarterly report
- Deliverables and milestones for August:
  - July monthly update
  - M23: Task 14 – monthly WWG conference call held
- Deliverables and milestones for September:
  - August monthly update
  - Task 1 – D1: review of source attributes update 1
  - Task 4 – M9: Bell Creek test site geological model development initiated
  - Task 9 – D52: Fort Nelson test site – site characterization, modeling, and monitoring plan
- John Harju was appointed by U.S. Secretary of Energy Steven Chu to serve as a member of the National Petroleum Council for the 2010–2011 membership term.

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 site, a cost-share agreement has not been completed. Negotiations are ongoing with Denbury Resources and approval of the proposed confidentiality agreement has been received. Preparations have been initiated for a meeting in Plano, Texas, on October 13.

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

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

- Sent the July monthly conference call notes to the WWG.
- Continued work on the road-mapping document, and a draft chapter was sent out to the WWG participants for feedback on its style and direction.
- Continued work on the WWG canned PowerPoint presentation, which may become a value-added deliverable.
- Presented the WWG PowerPoint presentation at the AAPG Geosciences Technology Workshop on Carbon Capture and Sequestration in Golden, Colorado, on August 12 ([www.aapg.org/gtw/CarbonCapture\\_Sequestration/day3.cfm](http://www.aapg.org/gtw/CarbonCapture_Sequestration/day3.cfm)).
- Held the monthly conference call on August 31.
- Initiated preliminary planning to expand task objectives to include a matchup of quality and quantity of produced water with potential end users, along with an economic analysis to test the viability of producing water along with CCS.

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

- On December 15, 2009, DOE waived the water resource estimation methodology documents due February 2010 and May 2011. The fact sheet submitted April 30, 2010, replaced the former. An alternative report to replace the latter is still under consideration.
- The September monthly conference call requirement was waived by DOE because of extensive RCSP travel.

#### **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	4,708,998
Nonfederal Share – Cash	2,411,971	416,300
Nonfederal Share – In-Kind	17,400,865	11,751,352
Total	73,803,499	16,876,650

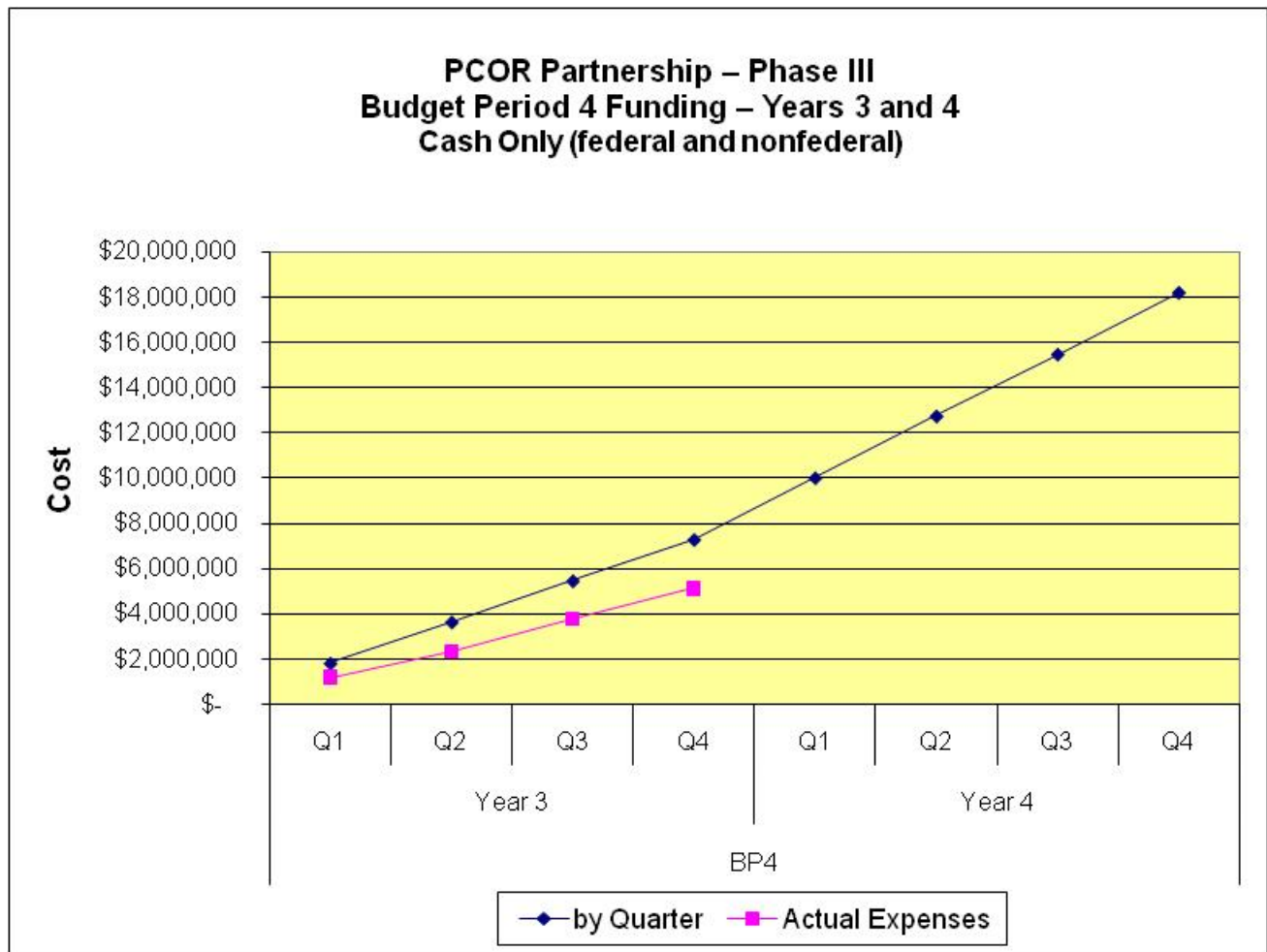


Figure 2. PCOR Partnership Phase III, BP4 – Years 3 and 4 funding (cash only).

**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	\$ 1,692,969	\$ 1,692,969	\$ 1,692,969	\$ 3,385,938	\$ 1,692,969	\$ 5,078,906	\$ 1,692,969	\$ 6,771,875	\$ 2,550,817	\$ 9,322,692	\$ 2,550,817	\$ 11,873,508	\$ 2,550,817	\$ 14,424,325	\$ 2,550,817	\$ 16,975,141
NonFederal Share	\$ 127,735	\$ 127,735	\$ 127,735	\$ 255,470	\$ 127,735	\$ 383,204	\$ 127,735	\$ 510,939	\$ 177,644	\$ 688,583	\$ 177,644	\$ 866,227	\$ 177,644	\$ 1,043,871	\$ 177,644	\$ 1,221,515
Total Planned	\$ 1,820,704	\$ 1,820,704	\$ 1,820,704	\$ 3,641,407	\$ 1,820,704	\$ 5,462,111	\$ 1,820,704	\$ 7,282,814	\$ 2,728,461	\$ 10,011,275	\$ 2,728,461	\$ 12,739,735	\$ 2,728,461	\$ 15,468,196	\$ 2,728,461	\$ 18,196,656
<b>Actual Incurred Cost</b>																
Federal Share	\$ 1,025,953	\$ 1,025,953	\$ 983,104	\$ 2,009,057	\$ 1,352,281	\$ 3,361,338	\$ 1,347,660	\$ 4,708,998								
NonFederal Share	\$ 171,873	\$ 171,873	\$ 164,935	\$ 336,808	\$ 74,929	\$ 411,737	\$ 4,563	\$ 416,300								
Total Incurred Cost	\$ 1,197,826	\$ 1,197,826	\$ 1,148,039	\$ 2,345,865	\$ 1,427,210	\$ 3,773,075	\$ 1,352,223	\$ 5,125,298								
<b>Variance</b>																
Federal Share	\$ 667,016	\$ 667,016	\$ 709,865	\$ 1,376,881	\$ 340,688	\$ 1,717,568	\$ 345,309	\$ 2,062,877								
NonFederal Share	\$ (44,138)	\$ (44,138)	\$ (37,200)	\$ (81,339)	\$ 52,806	\$ (28,533)	\$ 123,172	\$ 94,639								
Total Variance	\$ 622,878	\$ 622,878	\$ 672,665	\$ 1,295,542	\$ 393,494	\$ 1,689,036	\$ 468,481	\$ 2,157,516								

**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	7/29/10
M23: Task 14 – Monthly WWG Conference Call Held	7/31/10	7/28/10
M23: Task 14 – Monthly WWG Conference Call Held	8/31/10	8/31/10
D1: Task 1 – Review of Source Attributes	9/30/10	9/20/10
D52: Task 9 – Fort Nelson Test Site – Site Characterization, Modeling, and Monitoring Plan	9/30/10	9/30/10
M9: Task 4 – Bell Creek Test Site Geological Model Development Initiated	9/30/10	9/30/10
M23: Task 14 – Monthly WWG Conference Call Held	9/30/10	Waived by DOE
<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	
D10: Task 1 – Demonstration Project Reporting System Update	3/31/11	
D18: Task 2 – Bell Creek Test Site PowerPoint Presentation (Update)	3/31/11	
D26: Task 2 – Fort Nelson Test Site Poster	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 . . .

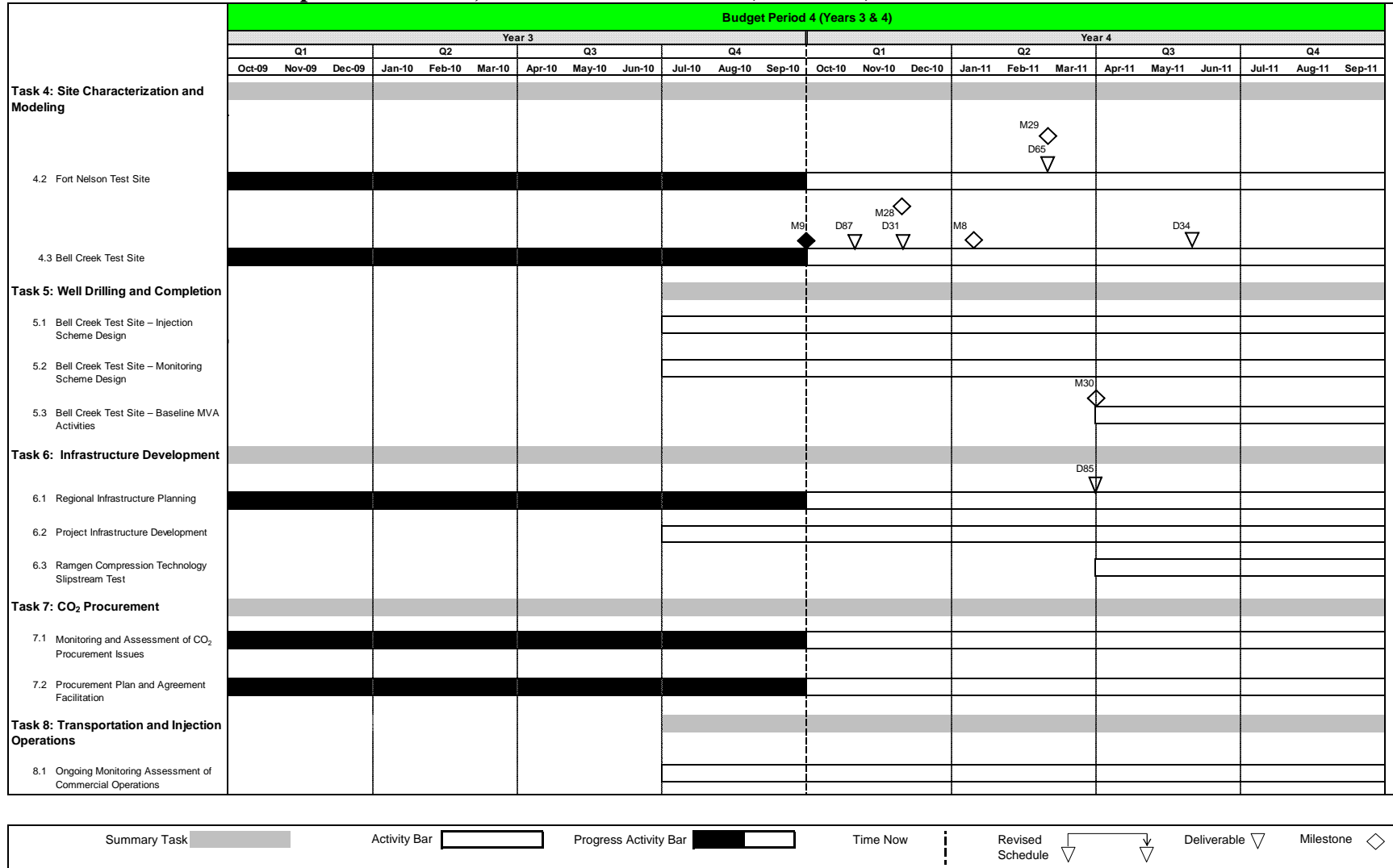
**Table 5. Phase III Milestones and Deliverables (continued)**

<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**

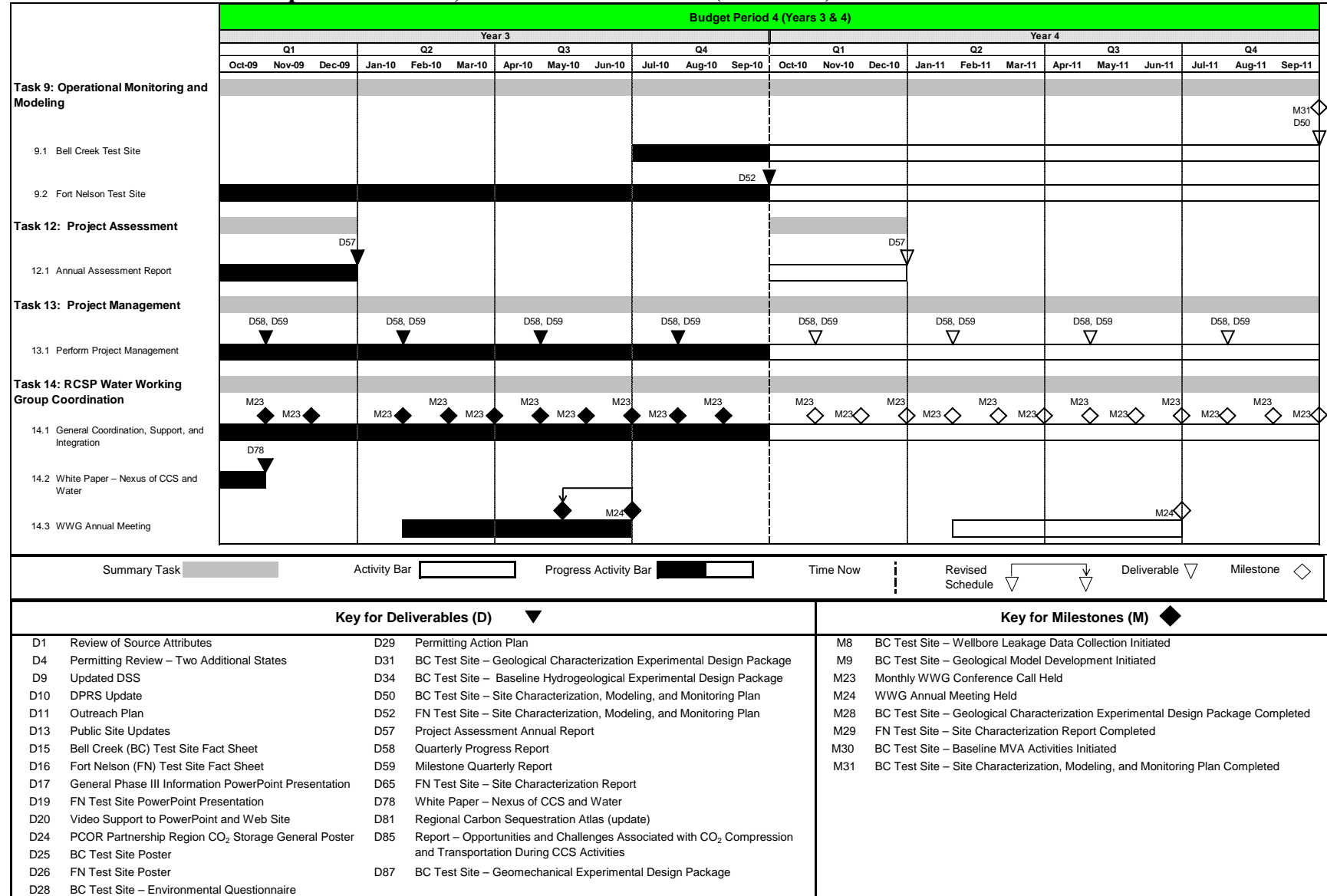


Table 6. PCOR Partnership Phase III BP4, Years 3–4 Gantt Chart (continued)



Continued...

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





## **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 – Submitted**

Braunberger, J.R., Bremer, J.M., Liu, G., Gorecki, C.D., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Characterization and modeling using macrofacies and microfacies intervals of the rival “Nesson” beds in the Mississippian Lower Charles Formation, Burke County, North Dakota [abs.]: American Association of Petroleum Geologists (AAPG) 2011 Annual Convention & Exhibition, Houston, Texas, April 10–13, 2011.

Gorecki, C.D., Liu, G., Bremer, J.M., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Modeling and monitoring the Northwest McGregor huff ‘n’ puff EOR project [abs.]: 73rd European Association of Geoscientists & Engineers (EAGE) Conference & Exhibition incorporating SPE EUROPEC 2011, Vienna, Austria, May 23–26, 2011.

Gorecki, C.D., Liu, G., Bremer, J.M., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Modeling and monitoring the Northwest McGregor CO<sub>2</sub> huff ‘n’ puff EOR project [abs.]: Society of Petroleum Engineers Reservoir Simulation Symposium, The Woodlands, Texas, February 21–23, 2011.

Holubnyak, Y.I., Liu, G., 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 CO<sub>2</sub>-based huff ‘n’ puff oil recovery at the Northwest McGregor oil field: Submitted to the 2011 SPE International Symposium on Oilfield Chemistry, The Woodlands, Texas, April 11–13, 2011.

Steadman, E.N., Harju, J.A., Anagnost, K.K., Botnen, L.S., Daly, D.J., Gorecki, C.D., Jensen, M.D., Peck, W.D., Smith, S.A., and Sorensen, J.A., 2010, The Plains CO<sub>2</sub> Reduction (PCOR) Partnership—ongoing carbon management activities in the interior plains of North America [abs.]: Submitted to the EUEC 2011 Energy & Environment Conference, Phoenix, Arizona, January 31 – February 2, 2011.

### **Abstracts – Submitted and 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, Geochemical interactions of CO<sub>2</sub> with reservoir fluid and rocks of Powder River Basin [abs.]: 2010 Geological Society of America Annual Meeting, Denver, Colorado, October 31 – November 3, 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 EOR with CO<sub>2</sub> at the Northwest McGregor oil field [abs.]: 2010 Geological Society of America Annual Meeting, Denver, Colorado, October 31 – November 3, 2010.

Holubnyak, Y.I., Rygalov, V., Smith, S.A., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Statistical probability estimations for geochemical kinetics modeling of CO<sub>2</sub>–water–rock interactions [abs.]: 2010 Geological Society of America Annual Meeting, Denver, Colorado, October 31 – November 3, 2010.

Klapperich, R.J., Gorecki, C.d., and McNemar, A., 2010, Regional carbon sequestration partnerships water working group [abs.]: 2010 Ground Water Protection Council (GWPC) Water/Energy Sustainability Symposium, Pittsburgh, Pennsylvania, September 26–29, 2010.

### **Book Chapters**

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, *in* Advances in Natural Gas Engineering, v. 2.: Salem, Massachusetts, Scrivener Publishing [in press].

Holubnyak, Y.I., Mibeck, B.A.F., 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, *in* Advances in Natural Gas Engineering, v. 2.: Salem, Massachusetts, Scrivener Publishing [in press].

### **Papers**

Botnen, L.S., Sorensen, J.A., Steadman, E.N., Harju, J.A., Ayash, S.C., Giry, E.F., Frenette, R., Meyer, V., and Moffatt, D.J. , 2010, A new risk management methodology for large-scale CO<sub>2</sub> storage—application to the Fort Nelson carbon capture and storage feasibility project: Paper for the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.

Bremer, J.M., Mibeck, B.A.F., Huffman, B.W., Gorecki, C.D., Sorensen, J.A., Schmidt, D.D., and Harju, J.A., 2010, Mechanical and geochemical assessment of hydraulic fracturing proppants exposed to carbon dioxide and hydrogen sulfide, *in* Proceedings of the Canadian Unconventional Resources & International Petroleum Conference: Calgary, Alberta, October 19–21, 2010, No. CSUG/SPE 136550.

Daly, D.J., Bradbury, J., Garrett, G., Greenberg, S., Myhre, R., Peterson, T., Tollefson, L., Wade, S., and Sacuta, N., 2010, Road-testing the outreach best practices manual—applicability for implementation of the development phase projects by the regional carbon sequestration partnerships: Paper for the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.

Hawthorne, S.B., Miller, D.J., Holubnyak, Y.I., Harju, J.A., Kutchko, B.G., and Strazisar, B.R., 2010, Experimental investigations of the effects of acid gas (H<sub>2</sub>S/CO<sub>2</sub>) exposure under geological sequestration conditions: Paper for the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.

- Holubnyak, Y.I., Hawthorne, S.B., Mibeck, B.A.F., Miller, D.J., Bremer, J.M., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Modeling CO<sub>2</sub>–H<sub>2</sub>S–water–rock interactions at Williston Basin reservoir conditions: Paper for the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 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, Investigation of geochemical interactions of carbon dioxide and carbonate formation in the Northwest McGregor oil field after enhanced oil recovery and CO<sub>2</sub> storage: Paper for the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.
- Smith, S.A., Sorensen, J.A., Steadman, E.N., Harju, J.A., and Ryan, D., 2010, Zama acid gas EOR, CO<sub>2</sub> sequestration, and monitoring project: Paper for the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.
- Sorensen, J.A., Schmidt, D.D., Knudsen, D.J., Smith, S.A., Gorecki, C.D., 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 field monitoring and modeling techniques for CO<sub>2</sub> prediction and accounting: Paper for the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.
- Sorensen, J.A., Smith, S.A., Steadman, E.N., Harju, J.A., Moffatt, D., and Laundry, A., 2010, The Fort Nelson carbon capture and storage feasibility project— a program for large-scale geologic storage of CO<sub>2</sub> from a natural gas-processing plant in British Columbia, Canada: Paper for the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.
- Steadman, E.N., Anagnost, K.K., Botnen, B.W., Botnen, L.S., Daly, D.J., Gorecki, C.D., Harju, J.A., Jensen, M.D., Peck, W.D., Romuld, L., Smith, S.A., Sorensen, J.A., and Votava, T.J., 2010, The Plains CO<sub>2</sub> Reduction (PCOR) Partnership—developing carbon management options for the central interior of North America: Paper for the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.
- Wildgust, N., Gorecki, C.D., and Bremer, J.M., 2010, An overview of the IEA Greenhouse Gas R&D Programme regional geologic storage capacity studies: Paper for the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.

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

- Botnen, L.S., 2010, Carbon capture and storage review and recap of 2009 PCOR Partnership regulatory meeting: Presented at the Plains CO<sub>2</sub> Reduction (PCOR) Partnership 2nd Annual Regulatory Meeting: Deadwood, South Dakota, July 21–22, 2010.

- Botnen, L.S., 2010, Summary—Plains CO<sub>2</sub> Reduction (PCOR) Partnership 2nd annual regulatory meeting: Deadwood, South Dakota, July 21–22, 2010.
- Botnen, L.S., Ayash, S.C., Giry, E.F., Frenette, R., Meyer, V., Moffatt, D.J., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Spectra Energy's Fort Nelson CCS feasibility project: Poster presented at the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.
- Burke, L.H., Smith, S.A., Sorensen, J.A., Steadman, E.N., Harju, J.A., Ryan, D., Nimchuk, D., and Jackson, B., 2010, Impact of acid gas exposure on cap rock integrity properties at Apache Zama EOR & storage project: Poster presented at the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.
- Daly, D.J., Bradbury, J., Garrett, G., Greenberg, S., Myhre, R., Peterson, T., Tollefson, L., and Wade, S., 2010, Road-testing the outreach best practices manual—applicability for implementation of the development phase projects by the Regional Carbon Sequestration Partnerships: Poster presented at the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.
- Gorecki, C.D., Liu, G., Sorensen, J.A., Schmidt, D.D., and Smith, S.A., 2010, History-matching a CO<sub>2</sub> huff 'n' puff EOR project with CMG's GEM and CMOST: Presented at CMG's Technical Symposium, Calgary, Alberta, July 7–9, 2010.
- Gorecki, C.D., Liu, G., Sorensen, J.A., Schmidt, D.D., and Smith, S.A., 2010, Monitoring and modeling a CO<sub>2</sub> huff 'n' puff EOR test: Presented at the AAPG Geosciences Technology Workshop on Carbon Capture and Sequestration, Golden, Colorado, August 10–12, 2010.
- Harju, J.A., 2010, Identifying U.S. geologic basins appropriate for large-scale sequestration of CO<sub>2</sub> and avoiding potential pitfalls in carbon geostorage: Presented at the 4th Annual Carbon Capture and Sequestration Summit, Washington, D.C., September 29–30, 2010.
- Holubnyak, Y.I., Hawthorne, S.B., Mibeck, B.A.F., Miller, D.J., Bremer, J.M., Sorensen, J.A., Steadman, E.N., and Harju, J.A., 2010, Modeling CO<sub>2</sub>–H<sub>2</sub>S–water–rock interactions at Williston Basin reservoir conditions: Poster presented at the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 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, Comparison of CO<sub>2</sub> and acid gas interactions with reservoir fluid and rocks at Williston Basin conditions, *in* Acid Gas Injection Symposium 2010, Calgary, Alberta, Canada, September 28–29, 2010, Proceedings.
- Holubnyak, Y.I., Mibeck, B.A.F., Bremer, J.M., Smith, S.A., Gorecki, C.D., Sorensen, J.A., 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, *in* Acid Gas Injection Symposium 2010, Calgary, Alberta, Canada, September 28–29, 2010, Proceedings.

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, Investigation of geochemical interactions of carbon dioxide and carbonate formation in the Northwest McGregor oil field after enhanced oil recovery and CO<sub>2</sub> storage: Poster presented at the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.

Klapperich, R.J., Gorecki, C.D., and McNemar, A., 2010, Regional Carbon Sequestration Partnership Water Working Group: Presented at the Water–Energy Sustainability Symposium 2010, Pittsburgh, Pennsylvania, September 26–29, 2010.

Moffatt, D., Laundry, A., Sorensen, J.A., Smith, S.A., Steadman, E.N., and Harju, J.A., 2010, The Fort Nelson carbon capture and storage feasibility project—a program for large-scale geologic storage of CO<sub>2</sub> from a natural gas-processing plant in British Columbia, Canada: Poster presented at the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.

Smith, S.A., 2010, Zama acid gas EOR, CO<sub>2</sub> storage and monitoring project: Presented at the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.

Sorensen, J.A., Knudsen, D.J., Smith, S.A., Gorecki, C.D., 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 field monitoring and modeling techniques for CO<sub>2</sub> prediction and accounting: Poster presented at the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.

Steadman, E.N., 2010, Coproduction of hydrogen with power, fuels, and chemicals from fossil fuels: Presented at Advancing the Hydrogen Economy Action Summit III, Grand Forks, North Dakota, September 13, 2010.

Steadman, E.N., 2010, The Plains CO<sub>2</sub> Reduction (PCOR) Partnership: Presented at the PCOR Partnership Group Meeting, Grand Forks, North Dakota, August 16, 2010.

Steadman, E.N., 2010, Plains CO<sub>2</sub> Reduction (PCOR) Partnership update: Presented at the Partnership for CO<sub>2</sub> Capture Phase II kickoff meeting, Grand Forks, North Dakota, August 11, 2010.

Steadman, E.N., 2010, Plains CO<sub>2</sub> Reduction (PCOR) Partnership update: Presented to Schlumberger Carbon Services, Grand Forks, North Dakota, July 30, 2010.

Steadman, E.N., 2010, Plains CO<sub>2</sub> Reduction (PCOR) Partnership update: Presented to Williston Basin Interstate Pipeline Company, Grand Forks, North Dakota, July 26, 2010.

Steadman, E.N., and Harju, J.A., 2010, Plains CO<sub>2</sub> Reduction (PCOR) Partnership update: Presented at the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.

Wildgust, N., and Gorecki, C.D., 2010, Development of storage coefficients for carbon dioxide storage in deep saline formations: Poster presented at the International Conference on Greenhouse Gas Control Technologies (GHGT-10), Amsterdam, The Netherlands, September 19–23, 2010.

### **Reports and Meeting Minutes**

Daly, D.J., Crocker, C.R., 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 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.

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

Gorecki, C.D., 2010, Minutes—Regional Carbon Sequestration Partnership Water Working Group conference call: August 31.

Gorecki, C.D., Sorensen, J.A., Klapperich, R.J., Holubnyak, Y.I., Hamling, J.A., Bremer, J.M., Smith, S.A., Steadman, E.N., and Harju, J.A., 2010, Fort Nelson test site – site characterization, modeling, and monitoring plan: Plains CO<sub>2</sub> Reduction (PCOR) Partnership Phase III draft Task 9 Deliverable D52 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

Jensen, M.D., Pei, P., Peck, W.D., Steadman, E.N., and Harju, J.A., 2010, Review of source attributes: Update 1 of Task 1 Deliverable D1 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05BT42592, EERC Publication 2010-EERC-10-05, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

Sorensen, J.A., Steadman, E.N., Harju, J.A., and Moffatt, D.J., 2010, Bell Creek test site geological model development initiated: Plains CO<sub>2</sub> Reduction (PCOR) Partnership Task 4 Milestone 9 report for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592, EERC Publication 2010-EERC-10-04, Grand Forks, North Dakota, Energy & Environmental Research Center, September.

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., Anagnost, K.K., and Votava, T.J., 2010, Plains CO<sub>2</sub> Reduction Partnership Phase III: Quarterly technical progress report (April 1 – June 30, 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, July.

## MEETINGS/TRAVEL

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

- June 28 – July 1, 2010: Attended the 4th Annual Wyoming CO<sub>2</sub> Conference in Casper, Wyoming.
- June 28 – July 5, 2010: Traveled to Bueyeros, New Mexico, with PPB personnel to capture images of the Bravo Dome CO<sub>2</sub> production, regional setting, and geology.
- July 6–10, 2010: Attended and presented at CMG’s Technical Symposium 2010 in Calgary, Alberta, Canada.
- July 11–16, 2010: Attended the Esri International User Conference held in San Diego, California.
- July 11–25, 2010: Attended Schlumberger Petrel seismic interpretation software training courses in Houston, Texas.
- July 13–15, 2010: Attended 4th Annual Carbon Capture & Sequestration: The Business Summit in Washington, D.C.
- July 18–28, 2010: Attended Schlumberger Techlog and Petrel software training courses in Houston, Texas.
- July 19–20, 2010: Traveled to the Bell Creek oil field in southeastern Montana.
- July 20–22, 2010: Hosted the second annual PCOR Partnership regulatory meeting in Deadwood, South Dakota.
- June 28 – July 5, 2010: Traveled with PPB to Pueblo, Colorado, to gather imagery for use in outreach materials and presentations.
- August 4, 2010: Traveled for an edit session at PPB’s offices in Fargo, North Dakota.
- August 5–6, 2010: Attended the Midwest Geological Sequestration Consortium STEP Advisory Group meeting in Champaign, Illinois.
- August 8–19, 2010: Attended Schlumberger software training courses, i.e., Petrel Introduction and Petrel Reservoir Engineering, in Houston, Texas.
- August 9–13, 2010: Presented at the AAPG Geosciences Technology Workshop on Carbon Capture and Sequestration in Golden, Colorado.
- August 19–20, 2010: Attended partner meetings in Bismarck, North Dakota.
- August 24, 2010: Traveled for an edit session at PPB’s offices in Fargo, North Dakota.
- August 29 – September 1, 2010: Traveled to Calgary, Alberta, Canada, for meetings with Spectra Energy and traveled to Edmonton, Alberta, Canada, for meetings with Natural Resources Canada.
- August 29 – September 1, 2010: Traveled to Calgary, Alberta, Canada, for meetings with Spectra Energy and traveled to Edmonton, Alberta, Canada, for meetings with Natural Resources Canada.

- September 1, 17, and 21, 2010: Traveled for edit sessions to PPB's offices in Fargo, North Dakota.
- September 9–10, 2010: Attended Computer Modelling Group Training entitled "Chemical and Thermal EOR Modelling with STARS" in Houston, Texas.
- September 13–17, 2010: Attended Schlumberger training courses entitled Techlog Basic and Techlog Fundamentals in Houston, Texas.
- September 13–17, 2010: Attended the DOE/NETL 2010 CO<sub>2</sub> Capture Technology Meeting in Pittsburgh, Pennsylvania.
- September 19–23, 2010: Participated in GHGT-10 in Amsterdam, the Netherlands.
- September 22–23, 2010: Attended the North Dakota Petroleum Council Annual Meeting in Minot, North Dakota.
- September 28–30, 2010: Attended the Second International Acid Gas Injection Symposium and Acid Gas Injection Workshop in Calgary, Alberta, Canada.
- September 28, 2010: Presented at the Water–Energy Sustainability Symposium 2010 in Pittsburgh, Pennsylvania.
- September 29–30, 2010: Presented at the American Conference Institute's 4th Annual Carbon Capture and Sequestration Summit in Washington, D.C.

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.