April 29, 2011

Ms. Karlene Fine
Executive Director
North Dakota Industrial Commission
600 East Boulevard Avenue
State Capitol, 14th Floor
Bismarck, ND 58505-0840

Dear Ms. Fine:

Contract Nos. FY08-LXIII-162 and G-015-030; EERC Funds 16196 and 15631

Enclosed is a hard copy of the Quarterly Technical Progress Report for the PCOR Partnership Program for Phase III. Also enclosed is a CD-ROM containing the Quarterly Technical Progress Report. A PDF version will also be sent via e-mail.

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

Sincerely,

Edward N. Steadman
Deputy Associate Director for Research

ENS/sah
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Joe Murphy, North Dakota Department of Commerce

c: Corey Irion, EERC
PLAINS CO₂ REDUCTION PARTNERSHIP PHASE III

Quarterly Technical Progress Report

(for the period January 1 – March 31, 2011)

Prepared for:

Karlene Fine

North Dakota Industrial Commission
600 East Boulevard Avenue
State Capitol, 14th Floor
Bismarck, ND 58505-0840

Contract Nos. FY08-LXIII-162 and G-015-030
EERC Funds 16196 and 15631

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April 2011
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EXECUTIVE SUMMARY

The Plains CO₂ Reduction (PCOR) Partnership is one of seven Regional Carbon Sequestration Partnerships (RCSPs) 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 carbon dioxide (CO₂) into deep geologic formations for CO₂ 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 January 1, 2011, through March 31, 2011.

The PCOR Partnership welcomed a new partner in January. Husky Energy Inc. is one of Canada’s largest integrated energy and energy-related companies, with upstream operations that include the exploration, development, and production of crude oil, bitumen, and natural gas in Western Canada and the northwest United States. Plans are also under way for the PCOR Partnership Annual Meeting and Workshop, scheduled for September 12–14 in Denver, Colorado.

Of particular note during this quarter, all of the RCSPs participated in a biennial expert review of Phase III activities. The IEA Greenhouse Gas R&D Programme (IEAGHG) undertook the Phase III technical review and appointed an independent international panel of experts. The PCOR Partnership presented an hour-long overview of its activities on March 15 before the expert panel in Arlington, Virginia. In approximately 2 to 3 months, preliminary results are anticipated, along with an opportunity to comment.

Activities leading to the initiation of CO₂ injection at both demonstration sites continued during this reporting period. Simulation history matching and the next-round risk assessment continued with Spectra Energy for the Fort Nelson demonstration project in British Columbia, Canada. Preliminary monitoring, verification, and accounting planning is well under way with Denbury Resources for the Bell Creek demonstration project in southeastern Montana. Petrological and geochemical analyses continued on cuttings and/or representative outcrops from both sites.
INTRODUCTION

The Plains CO$_2$ Reduction (PCOR) Partnership is one of seven regional partnerships operating under the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) Regional Carbon Sequestration Partnership (RCSP) Program. The PCOR Partnership is led by the Energy & Environmental Research Center (EERC) at the University of North Dakota (UND) in Grand Forks, North Dakota, and includes stakeholders from the public and private sector. The membership as of March 31, 2011, 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 II – Validation Phase (2005–2009): conducted small-scale field validation tests
- Phase III – Development Phase (2007–2017): involves large-volume carbon storage demonstration tests (Figure 1)

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, inclusive)


Figure 1. RCSP development phase: scaling up toward commercialization (figure taken from DOE NETL).
The overall mission of the Phase III program is to 1) gather characterization data to verify the ability of the target formations to store carbon dioxide (CO₂), 2) facilitate the development of the infrastructure required to transport CO₂ from sources to the injection sites, 3) facilitate development of the rapidly evolving North American regulatory and permitting framework, 4) develop opportunities for PCOR Partnership partners to capture and store CO₂, 5) establish a technical framework by which carbon credits can be monetized for CO₂ stored in geologic formations, 6) continue collaboration with other RCSPs, and 7) provide outreach and education for CO₂ capture and storage 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. The PCOR Partnership plans to fully utilize the infrastructure of its region to maximize CO₂ injection volumes. A programmatic RCSP Phase III goal is the injection of approximately 1 million tons of CO₂ a year into at least one regionally significant geologic formation. Each of the RCSP’s large-volume injection tests is designed to demonstrate that CO₂ storage sites have the potential to store regional CO₂ 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 (Spectra’s) Fort Nelson gas-processing facility, situated near Fort Nelson, British Columbia, Canada (Figure 2).

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 CO₂ 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 CO₂ storage. During Phase III, the PCOR Partnership will continue to refine storage resource estimates and evaluate other factors relevant to regional storage goals.


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

Task 1 – Regional Characterization

Note: Information on the Further Characterization of the Zama Acid Gas EOR, CO₂ Storage, and Monitoring Project is located in Task 15, and Information on the Basal Cambrian Deadwood Formation is located in Task 16.

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

- Continued efforts on the next version of the PCOR Partnership Atlas – planned for distribution at the upcoming PCOR Partnership Annual Meeting (September 12–14, 2011 in Denver, Colorado).
- Continued drafting a report on the CO₂ storage potential in the state of Iowa.
Table 2. Phase III Responsibility Matrix

<table>
<thead>
<tr>
<th>Phase III Task Description</th>
<th>Task Leader</th>
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<tbody>
<tr>
<td>Task 1 – Regional Characterization</td>
<td>Wesley D. Peck</td>
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<tr>
<td>Task 2 – Public Outreach and Education</td>
<td>Daniel J. Daly</td>
</tr>
<tr>
<td>Task 3 – Permitting and NEPA Compliance</td>
<td>Lisa S. Botnen</td>
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<td>Steven A. Smith</td>
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<tr>
<td>CO₂ Storage, and Monitoring Project</td>
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</tr>
<tr>
<td>Task 16 – Characterization of the Basal Cambrian System</td>
<td>Steven A. Smith</td>
</tr>
</tbody>
</table>

- Prepared numerous maps, including base maps for the Bell Creek project, a documentary broadcast area map, and several maps for inclusion in the PowerPoint presentation given before the IEA Greenhouse Gas R&D Programme’s expert panel review of the RCSPs.
- Created maps for use in planning the soil carbon-monitoring efforts at the Bell Creek site.
- Continued maintenance of the information stored on the partners-only Web site.
- Completed the Demonstration Project Reporting System update (Deliverable [D]10) that will be included on the partners-only Web site.
- Geographic information system (GIS) programming staff attended the Esri Developer Summit held March 7–10 in order to better apply GIS programming advancements to the partners-only Web applications.
- Prepared questions for consideration by the RCSP GIS Working Group regarding proposed database design and functionality.
- Secured updated licenses for NeuraLog.
- Renewed the PennWell MAPSearch (pipeline) Premium Data License Agreement.
- Progress continues on the detailed assessment of the Rival oil field in north-central North Dakota, including the following:
  - Added newly created digitized logs or logs located from missing intervals.
  - Imported 3-D seismic information received from TAQA North Ltd. (TAQA).
  - Uploaded existing 3-D seismic data into the Petrel model.
- Continued digitization of 50+ Black Slough logs that will further extend the study area.
- Added an additional 40 wells into Petrel, expanding the study area to include most of the Black Slough oil field.
- Validated the Black Slough logs that were digitized with Neuralog.
- Continued core-to-log calibration, annotation of core photos including horizons, and the adjustment of horizons in Petrel according to core microfacies and sequences, where the top of the sequences is denoted by a thin shale layer and fractures are associated with chicken-wire anhydrite.
- Continued creation of structural surfaces with trends for input into the model and for trend analysis normalization.
- Participated in conference calls with TAQA, where it was determined that TAQA would provide well files for the Rival Field horizontals and several vertical wells in the Lignite Field as well as convert vintage 1960s neutron log data into the neutron porosity hydrogen index and research the revitalization of vintage cores.
- Project meetings with TAQA were held on March 24 and 25 in Grand Forks regarding the development of detailed CO₂ storage calculations for the field.
- Received pressure data from the most recent injection well.
- Continued locating mud logs for the horizontals.
- Continued use of MudLog software to log core data from core photos.
- Visited the core and sample library at UND, examined three cores from the Rival Field, and collected samples to make thin sections for the characterization of the field.
- Conducted a literature review on the conversion of vintage gamma ray neutron logs to neutron porosity logs.
- Prepared various maps of the Williston Basin oil fields.
- Continued to develop the Rival Field geologic model.

**Task 2 – Public Outreach and Education**

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

- Eleven EERC employees attended six conferences, resulting in approximately 3084 external participants that were exposed to the PCOR Partnership name, messaging, and informational materials. Specifically, the PCOR Partnership outreach activities included 11 oral presentations. The following quantities of outreach materials were distributed:
  - PCOR Partnership documentary entitled “Reducing Our Carbon Footprint: The Role of Markets” – 51
  - PCOR Partnership documentary entitled “Out of the Air: Into the Soil” – 55
• Met with partner Indian Land Tenure Foundation at the EERC on February 9.
• Continued preparation of a fact sheet intended for landowner outreach discussing the status of carbon markets and carbon management.
• Participated in the Weyburn–Midale Outreach Panel discussions regarding actions to respond to the news of the alleged release of sequestered CO₂ at the site.
• Participated in the Regional Carbon Sequestration Partnership Outreach Working Group (OWG) conference calls on January 20, February 17, and March 10.
• In coordination with the OWG, submitted an abstract to the 10th Annual Carbon Capture & Sequestration Conference scheduled for May in Pittsburgh, Pennsylvania (www.carbonsq.com).
• As a result of efforts by Prairie Public Broadcasting (PPB), an electronic broadcast-quality copy of the documentary Global Energy and Carbon: Tracking Our Footprint was made available to the National Educational Television Association, which, on January 21, made the documentary available by satellite feed to the 350 public television stations across the continent.
• On January 14, an e-mail was sent to all the PCOR Partnership members residing outside of the PPB region, first inquiring whether they would be interested in contacting their local public television station to request the broadcast of Global Energy and Carbon and then providing the contact information if they were interested. Twenty members agreed to contact their local public television station.
• Met with PPB’s education group to initiate planning for a multiyear effort to provide teachers in North Dakota and the region with classroom activities built around the documentary clips, various PCOR Partnership outreach materials, and other DOE-approved materials.
• Met with PPB’s education group to learn about its Teacher Training Institutes and the potential application to the PCOR Partnership’s outreach activities for educators in the region.
• Continued assessment of the geographic distribution of teachers exposed to PCOR Partnership materials and information.
• In cooperation with PPB’s education group, prepared outreach materials for 30+ teachers and initiated planning a fall workshop.
• Summarized documentary broadcast data on public television for the period May 2005 – February 2011.
• Continued efforts to create a database to more efficiently track the outreach products.
• Prepared a Bell Creek fact sheet (D15) that can be viewed at www.undeerc.org/PCOR/newsandpubs/pdf/FactSheet17.pdf.
• Prepared a Bell Creek PowerPoint presentation (D18) that is currently under review.
• Prepared a Fort Nelson public outreach poster (D26) that is currently under review.
Investigated Wikipedia authorship guidelines as part of the ongoing assessment of Web and social media.

Accepted an invitation from the Lignite Energy Council to give a presentation at its annual teacher workshop scheduled for June in Bismarck, North Dakota. The 3-day workshop is typically attended by more than 100 teachers.

Task 3 – Permitting and NEPA Compliance

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

- Continued to review and analyze all of the U.S. Environmental Protection Agency’s (EPA’s) recently promulgated rules, including Mandatory Reporting of Greenhouse Gases and Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide Geologic Sequestration Wells.
- Reviewed EPA’s extension of the deadline for its Greenhouse Gas Mandatory Reporting Rule (MRR).
- Completed review of an Interstate Oil and Gas Compact Commission (IOGCC) PowerPoint presentation providing an overview of the Pipeline Transportation Task Force (PTTF) final report.
- Completed review of an IOGCC Executive Summary of the PTTF final report.
- Plans for the next PCOR Partnership Regulatory Meeting (June 29–30) are under way. The meeting will follow the IOGCC Midyear Issues Meeting in Bismarck.
- Continued efforts on updating the Regulatory Roundup document. (The current version is available on the partners-only Web site at www2.undeerc.org/website/pcorp/pdfs/RegulatoryRoundup.pdf).
- On January 20, sent an e-mail to the partnership regarding recent EPA activities.
- Attended the 2011 Groundwater Protection Council’s UIC Conference held January 24–26 in Austin, Texas (www.gwpc.org/meetings/uic/uic.htm) and visited with state and federal regulators in attendance.
- Attended the Texas Carbon Capture and Storage Association’s 4th Annual Preconference Workshop on CCS in Austin, Texas.
- Attended a project meeting in February with Denbury Resources Inc. (Denbury) in Plano, Texas, where regulatory issues such as permitting, greenhouse gas reporting, and NEPA analysis were discussed.
- Participated in the Fort Nelson monthly conference calls and discussed the status of permitting activities, British Columbia government participation, and plans for a risk assessment meeting in Grand Forks.
- Prepared and submitted the NEPA questionnaire for the Bell Creek project.
- Reviewed Montana drilling permit guidelines for potential monitoring wells at the Bell Creek project site.

Task 4 – Site Characterization and Modeling

Significant accomplishments for Task 4 for the reporting period included the following:
• Several individuals began developing protocols and training on calibrating and using the gamma ray spectroscope in the EERC’s Applied Geology Lab (AGL).

• Bell Creek test site activities included the following:
  – Continued the cataloging, evaluation, and integration of reservoir characterization data from Denbury for the Bell Creek oil field.
  – Continued the petrophysical testing on Muddy Formation outcrop samples.
  – Continued the creation of key baseline characterization maps based on data provided by Denbury.
  – Continued testing representative outcrop samples of Bell Creek reservoir rock for porosity, permeability, mineralogy, composition, and relative permeability.
  – Submitted Milestone [M] 8: Bell Creek test site wellbore leakage data collection initiated.
  – Submitted D31/M28: Bell Creek test site – geological characterization experimental design package.
  – Continued work on a report of the petrophysical properties and relative permeability results determined from testing representative Bell Creek outcrop samples.
  – Developed a plan for the resaturation of old cores (vintage ~1960s) in order to perform geochemical and geomechanical testing.
  – Contacted the Bureau of Economic Geology (BEG) Houston Research Center and confirmed the existence and location of 71 cores from the field.
  – Met with Denbury on February 16 in Plano, Texas.
  – Continued compilation of approaches and techniques to be outlined in D34: Baseline Hydrogeological Experimental Design Package.
  – Calculated cost estimates for the baseline sampling efforts.
  – Continued development of a near-surface (surface waters, groundwater, and soil gas) testing plan.
  – Reviewed existing groundwater well logs in the Bell Creek Field to determine suitability for sampling.
  – EERC staff and Denbury staff met at BEG to examine, photograph, and visually characterize Bell Creek Field core samples on March 9 and 10. Activities included the following:
    ♦ Viewed eight cores taken from the Phase 1 area (18 boxes of core).
    ♦ Created a WellSight Systems MudLog program to record the core descriptions.
    ♦ Documented locations to take future core plug samples from U.S. Geological Survey (USGS) core stored in Denver, Colorado.
  – EERC staff traveled to Denbury headquarters in Plano, Texas, on March 7–18 to search and review well files, including the following:
    ♦ Located, scanned, and labeled nearly 600 well files maintained on the Bell Creek Field.
    ♦ Worked with Denbury staff to analyze the well files.
  – Continued working on improved petrophysics for the Bell Creek Field, including better correlations and ancient and modern analogs.
  – Completed a report on lab work performed on representative outcrop samples.
• Fort Nelson test site activities included the following:
  – Held the monthly conference calls on January 20, February 24, and March 22 between the EERC and the Spectra team, and updated the activity list.
  – Prepared a 2011 master schedule for key activities and deliverables for the Fort Nelson project and provided it to Spectra for its review.
  – Continued petrological and geochemical analysis work using cuttings and chips from Fort Nelson reservoir and seal formations.
  – Initiated draft outline for near-surface and surficial monitoring, verification, and accounting (MVA) plan for the Fort Nelson project. This outline will provide the framework for a long-term approach to monitoring the potable groundwater sources, vadose zone, soils, and local rivers and streams within a predefined area for the project.
  – Continued geochemical evaluations on cuttings from Spectra’s C-61-E well batch reactor series, including the following:
    ♦ Sample set No. 3 (cuttings): near-wellbore conditions (high-pressure, low-temperature regime):
      - Conducted optical profiler to analyze degree of surface degradation.
      - Conducted x-ray diffraction (XRD).
      - Prepared scanning electron microscope (SEM) mounts.
    ♦ Sample set No. 4 (cuttings): deep reservoir conditions (lower-pressure, high-temperature regime):
      - Removed from high-pressure batch reactor.
      - Photographed and transferred fluids to the AGL for analysis.
  – Performed clipping of static Petrel geologic model for future thermal, geochemical, and geomechanical modeling.
  – Began drafting a report based on all laboratory analyses of cuttings.
  – Continued progress on the analytical activities of the core collected from the exploratory well, including the following:
    ♦ Completed white light photography.
    ♦ Completed preparation of 10 thin sections.
    ♦ Optical examination, description, and interpretation of thin sections are under way.
    ♦ Completed five mercury injection capillary pressure tests.
    ♦ Completed three full-diameter routine core analyses.
    ♦ Completed cap rock integrity test, i.e., exposure to brine and gas intrusion.
    ♦ Completed two batches of acid gas synthesis.
    ♦ Reservoir condition relative permeability (drainage and imbibition) is under way, including the following:
      - Completed preexposure computerized tomography (CT) scan.
      - Completed routine analyses.
      - Actual relative permeability testing is in progress.
    ♦ Hydrogen sulfide (H₂S) and CO₂ solubility experimentation is in progress.
  – Continued petrological and geochemical analysis work using cuttings and chips from Fort Nelson reservoir and seal formations.
– Met with RPS Energy to discuss the status of laboratory work being performed by Weatherford Labs.
– Confirmed the injected gas stream chemistry for the start of cap rock integrity studies.
– Forwarded documents related to the experimental conditions of the ongoing EERC lab work, planned activities for core analyses, and subcontracted lab work time lines to Spectra.
– Removed samples from the batch reactor on January 4. Fourteen vials of cuttings in synthetic brine analogous to in situ formation water from the C-61-E test well were exposed to a mixture of CO2 and H2S for a period of 28 days. Analysis is under way.

**Task 5 – Well Drilling and Completion**

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

- Initiated draft outline for near-surface and surficial MVA plan. This outline will provide the framework for a long-term approach to monitoring the potable groundwater sources, vadose zone, soils, and local rivers and streams within a predefined area for the project.
- Participated in Bell Creek project discussions with Denbury in February, including well drilling and utilization of wellbores for MVA activities.
- On March 24, M30 was met with notice to NETL that the baseline MVA was initiated.
- Continued working on the MVA work plan for surface, near-surface, existing wellbores, and deep monitoring activities.
- Created several maps of the Bell Creek Field for use in MVA plan development.
- Began drafting a memo setting forth the PCOR Partnership’s approach to MVA at the Bell Creek site.
- Compiled appendices for inclusion in the MVA plan, specifically:
  - Detailed maps with sample locations (by phase).
  - Creating landowner maps (plats into GIS).
  - Cost estimates.
  - Health and Safety Plan.
  - Detailed existing deep well map.
  - Tables outlining sample analytes.
- Discussed options for drilling a monitoring well in the Bell Creek Field, including drilling mud, logging tools, coring options, core testing, casing options, and seismic options.

**Task 6 – Infrastructure Development**

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

- Prepared D85, “Opportunities and Challenges Associated with CO2 Compression and Transportation During CCS Activities,” which is currently under review.
- Submitted the final approved value-added report entitled “Current Status of CO2 Capture Technology Development and Application.”
Responded to an e-mail request for information about the use of CO₂ captured from a flue gas stream in soda pop. Information about plants that capture their CO₂ and sell it for use in the food-processing industry was prepared and sent.

Addressed a question from a partner regarding estimated acid gas concentrations in coal-fired power plant flue gas.

**Task 7 – CO₂ Procurement**

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

- The following activity occurred in the quarter:
  - A meeting at Denbury headquarters in Plano, Texas, was held on February 16.
  - The transfer of data continued.
  - Dates for a follow-on meeting, likely in Grand Forks in May, are being discussed.

**Task 8 – Transportation and Injection Operations**

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

- Attended several in-house Bell Creek project status meetings.
- Continued preparation with respect to surface facilities design at an EOR injection site.

**Task 9 – Operational Monitoring and Modeling**

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

- Participated in the RCSP Sim/Risk Working Group conference call on January 18.
- Evaluated Paradigm’s GOCAD and SKUA to determine whether to pursue licenses for geologic modeling.
- Continued optimizing the high-performance computer cluster software, and discussed how it is used to run Computer Modelling Group software, with representatives from Kansas Geological Survey.
- Modeling staff attended Schlumberger’s Petrel Seismic Visualization and Interpretation training course in Houston.
- Attended a 3-day simulation software training session, entitled “CO₂-Based EOR Miscible Flood” with Computer Modelling Group on January 24–26 in Calgary, Alberta, Canada.
- Continued Bell Creek site activities, including the following:
  - Completed the pressure–volume–temperature (PVT) regression on the Bell Creek crude oil and CO₂ to determine minimum miscible pressure, and initiated preparation of a report on the results.
  - Finished tuning the equation of state (EOS) for the Bell Creek Field from the PVT data.
  - Continued testing analogous outcrop samples of Bell Creek reservoir rocks for porosity, permeability, mechanical properties, relative permeability, and mineralogy.
- Began setting up a project management meeting with individuals from Denbury for February 16 in Plano, Texas, to prioritize project goals and efforts.
- Continued work on the report on the “Minimum Miscibility Pressure of the Bell Creek Oil with CO2.”
- Prepared for and presented at the meeting on February 16 in Plano with Denbury.
- Prepared and submitted an abstract to the 10th Annual Conference on CCS in Pittsburgh, Pennsylvania.
- Continued preparation of the report entitled “Site Characterization, Modeling, and Monitoring Plan” (D50).
- Created a Techlog Bell Creek project.
- Loaded LAS files for 98 wells into the Bell Creek Petrel model.
- Created a premade file for each core, including LAS logs and pertinent columns for geologic data.
- Continued review of digital well logs and correlating tops in Petrel for the Phase 1 region of the Bell Creek Field.
- Continued identification of coastal plain channel sand.
- Continued Fort Nelson site activities, including the following:
  - Continued working on history-matching the historic production and injection in the neighboring gas field to validate the model properties and to better understand the regional pressure profile and connectivity.
  - Reviewed the schedule and preliminary table of contents for the 2010 risk assessment update.
  - Received and began incorporating final comments from Spectra on D52 entitled “Site Characterization, Modeling, and Monitoring Plan.”
  - Submitted an abstract based on D52 to the Trondheim CCS Conference scheduled for June in Norway (http://www.sintef.no/Projectweb/TCCS-6/).
  - Spectra reviewed an abstract for submittal to the 10th Annual Conference on CCS.
  - Held a history match and risk assessment meeting in Grand Forks on March 1 and 2.
  - Continued preparation of a report on the 2010 risk assessment activities.
  - Adjusted the geologic model (June 2010 version) to run several “worst-case” scenarios for inclusion in the next risk assessment update.
  - Selected a few alternative well locations.
  - Worked on validation of the Slave Point tops.
  - Performed various calculations on Gas Pool A.
  - Scheduled risk management software training.

**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 project assessment report (D57) for the period October 1, 2009 – September 30, 2010, was submitted in December 2010 and is available on the partners-only Web site at www2.undeerc.org/website/pcorp/ProductsDB/pdfs/ENS_D57_Task12_Dec10.pdf.

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 (September 12–14, 2011) to be held at the Sheraton Denver Downtown Hotel (www.sheratondenverdowntown.com), including sending a “Mark Your Calendar” e-mail blast to the partnership on March 29.
- Activities associated with the IEA Greenhouse Gas R&D Programme Expert Review of the RCSPs included the following:
  - Compiled information and drafted text for inclusion in the two (Bell Creek and Fort Nelson) project information forms (PIFs). Draft PIFs were submitted drafts on January 14, and final PIFs were submitted on February 2.
  - Prepared the PowerPoint presentation. A draft was submitted on February 4, and the final presentation was submitted on February 28.
  - The hour-long presentation was given on March 15, followed by a one-and-one-half-hour question-and-answer session.
- Provided upon request updated information on the PCOR Partnership Phase II and III projects for a Carbon Sequestration Leadership Forum (CSLF) fact sheet on the NETL Sequestration Program.
- Submitted the quarterly progress updates on January 14 to CSLF on both recognized projects, i.e., Fort Nelson CCS Project and Zama Acid Gas EOR, CO₂ Sequestration, and Monitoring project.
- Continued work on the programmatic risk management plan (D88).
- On March 8, submitted the updated project management plan for review and approval.
- On January 19, February 23, and March 21, participated in a teleconference with Spectra’s project lead in preparation for the team’s monthly conference calls held January 20, February 24, and March 22, respectively.
- Held a task leader meeting on January 21. Topics discussed included new partners, upcoming conferences and travel, deliverables, and task leader updates.
- Held a task leader meeting on March 17. Topics discussed included an overview of the presentation to the expert review panel; the upcoming EERC research reorganization; upcoming conferences, meetings, and travel; deliverables; and task leader updates.
On January 28, submitted an abstract to the New Horizons in Oil and Gas Conference that will be held at the South Dakota School of Mines on October 6–7. It was accepted.

Submitted two abstracts for the upcoming 10th Annual Conference on CCS in Pittsburgh (www.carbonsq.com) for the following “hot topics”: The U.S.–Canadian CCS Collaboration and Regional Carbon Sequestration Partnerships – Large-Scale Field Testing. Both were accepted.

Attended the Canadian Institute’s 5th Annual CCS Conference in Calgary.

Attended the Basal Cambrian kickoff meeting with Alberta Innovates – Technology Futures (AITF) in Calgary.

Received an invitation to attend the next NACAP (North American Carbon Atlas Partnership) meeting scheduled for April 5 and 6 in Morgantown, West Virginia.

Presented at the European CCS Demonstration Project Network meeting in Brindisi, Italy, on February 16.


Participated in the 4-Kingdoms CCS Initiative Technical Workshop held February 28, and presented on both the Fort Nelson and Zama projects at the CSLF Storage and Monitoring Projects Interactive Workshop held March 1 and 2, in Al Khobar, Saudi Arabia.

Deliverables and milestones completed in January include the following:
- December monthly update
- Task 4: M8 – Bell Creek Test Site Wellbore Leakage Data Collection Initiated
- Task 4: D31 – Bell Creek Site Geological Characterization Experimental Design Package
- Task 4: M28 – Bell Creek Geological Experimental Design Package Completed

Deliverables completed in February include the following:
- January monthly update
- Task 2: D15 – Bell Creek Fact Sheet

Deliverables completed in March include the following:
- February monthly update
- Task 1: D10 – Demonstration Project Reporting System Update
- Task 2: D18 – Bell Creek Test Site PowerPoint Presentation
- Task 2: D26 – Fort Nelson Test Site Poster
- Task 3: D28 – Environmental Questionnaire – Bell Creek Test Site
- Task 5: M30 – Bell Creek Test Site Baseline MVA will be initiated
- Task 6: D85 – Report – Opportunities and Challenges Associated with CO₂ Compression and Transportation During CCS Activities
- Task 14: M23 – Monthly WWG Conference Call Held

Deliverables and milestones due in April include the following:
- March monthly update
- Task 13: D88 – Programmatic Risk Management Plan
- Task 14: M23 – Monthly WWG Conference Call Held
Task 14 – RCSP Water Working Group Coordination

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

- Participated in the RCSP WWG conference calls on January 19 and March 22. The February conference call was canceled.
- Continued preparations for a presentation at the 2011 American Water Resources Association Spring Specialty Conference in April.
- Continued work on the Nexus of Water and CCS – Technology Gaps document.
- Continued planning the WWG annual meeting, including selection of date and location, as well as preparation of an agenda. The annual meeting will be held on May 5, 2011, 1:00–5:00 p.m., in conjunction with the 10th Annual Conference on Carbon Capture & Sequestration in Pittsburgh.

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


Task 15 – Further Characterization of the Zama Acid Gas EOR, CO\textsubscript{2} Storage, and Monitoring Project

Significant accomplishments for Task 15 for the reporting period included the following:

- On February 24, received Modification No. 19 to DOE Award No. DE-FC26-05NT42592, approving relocation of Subtask 1.4 – Further Characterization of the Zama Acid Gas EOR, CO\textsubscript{2} Storage, and Monitoring Project to a new task (Task 15) under the same title. No overall budget modifications were required. The time line remains the same; i.e., work was initiated in July 2010 and would continue through April 2012.
- Used the current version of the static geological model to estimate storage capacity for the Zama F Pool.
- Continued a search for cement, rock, and steel samples representative of those found at Zama for use in laboratory experiments.
- Continued discussions with Natural Resources Canada to establish laboratory experiments dedicated to effects of impurities (flue gas) on reservoir materials.
- Spoke with RPS Energy regarding the wellbore integrity work and the availability of obtaining core representative of the cap rock in the system.
- Applied DOE methodology for EOR to the pore volume generated from the modeling exercise, and obtained a recovery factor using historical production data.
- Also generated an estimate for the entire Zama Field using the F pool as an analogue for the rest of the pinnacles. This evaluation will be ongoing and updated in subsequent reports.
• Presented on the Zama project to the Second France/European Union–Canada Workshop on CCS held on March 30 and 31 in Paris.
• Acquired 20 steel coupons representative of oil field casing material, and initiated a 28-day batch reaction using CO₂ and H₂S.
• Initiated preexposure optical profiling that will be compared to postexposure measurements in an effort to gauge whether degradation has occurred.

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

• Apache Corporation is currently planning to divest certain conventional properties in Canada, including its EOR project in the Zama field located in Alberta. Because of Apache’s corporate planning strategies and personnel redistribution, efforts to initiate the seismic profiles, logging suites, and MVA activities have been delayed. Once the divestiture of the EOR project is finalized, the EERC is optimistic that the new site owner will authorize the PCOR Partnership’s continuing MVA efforts.

Task 16 – Characterization of the Basal Cambrian System

Significant accomplishments for Task 16 for the reporting period included the following:

• On February 24, received Modification No. 19 to DOE Award No. DE-FC26-05NT42592, approving a new task (Task 16) for an expanded characterization of the Basal Cambrian System.
• Tested an outcrop sample of the Deadwood Formation (Fm) and acquired porosity, permeability, and mechanical properties; relative permeability (CO₂ and water); and mineralogy.
• Initiated preparation of a report and poster on the characterization study results of the CO₂ storage potential of the Deadwood Fm.
• Initiated a case study of the Deadwood Fm for inclusion in a peer-reviewed Society of Petroleum Engineers article about storage resource estimation.
• Traveled to Calgary to participate in a technical briefing/steering committee meeting.
• Traveled to Ottawa, Canada, on February 8–11 to visit with representatives from Natural Resources Canada, Canmet Energy, and the National Research Council of Canada. Specific topics discussed included overviews of each specific organization, storage of CO₂ streams containing impurities, development of laboratory programs researching this topic, high-temperature and -pressure XRD capabilities of the National Research Council, and capture technologies being investigated by Canmet. The trip also included facility tours of each organization.
• Assigned “themes” and “theme leaders” for the project, and scheduled ongoing in-house meetings to discuss scheduling, budgeting, and technical aspects of the project.
• Continued planning the next meeting of the technical and steering committees at NETL headquarters in Pittsburgh on May 25.
PHASE III COST STATUS

The approved BP4 (Modification No. 19) 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 3 and Table 4.

Table 3. Phase III Budget – BP4

<table>
<thead>
<tr>
<th>Organization</th>
<th>Approved Budget, $</th>
<th>Actual Costs Incurred, $</th>
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</thead>
<tbody>
<tr>
<td>DOE Share – Cash</td>
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<td>8,104,703</td>
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<tr>
<td>Nonfederal Share – Cash</td>
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<td>553,160</td>
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<tr>
<td>Nonfederal Share – In-Kind</td>
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<td>16,539,019</td>
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<tr>
<td>Total</td>
<td>75,483,042</td>
<td>25,196,882</td>
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</table>

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, Years 3 and 4).

Figure 3. PCOR Partnership Phase III, BP4 – Years 3 and 4 funding (cash only).
<table>
<thead>
<tr>
<th>Table 4. BP4 – Years 3 and 4 Spending Plan</th>
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<tbody>
<tr>
<td><strong>Baseline Reporting Quarter</strong></td>
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<tr>
<td><strong>Baseline Cost Plan</strong></td>
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<td>Federal Share</td>
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<tr>
<td>NonFederal Share</td>
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<td><strong>Total Planned</strong></td>
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<tr>
<td><strong>Actual Incurred Cost</strong></td>
</tr>
<tr>
<td>Federal Share</td>
</tr>
<tr>
<td>NonFederal Share</td>
</tr>
<tr>
<td><strong>Total Incurred Cost</strong></td>
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<tr>
<td><strong>Variance</strong></td>
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<tr>
<td>NonFederal Share</td>
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<td><strong>Total Variance</strong></td>
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### Table 5. Phase III Milestones and Deliverables

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

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<tr>
<td>D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report</td>
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<td>D24: Task 2 – PCOR Partnership Region Sequestration General Poster</td>
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<td><strong>Year 2 – Quarter 3 (April–June 2009)</strong></td>
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<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
<td>4/30/09</td>
<td>4/15/09</td>
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<td>D2: Task 1 – First Target Area Completed</td>
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<td>D16: Task 2 – Fort Nelson Test Site Fact Sheet</td>
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<td>M24: Task 14 – WWG Annual Meeting Held</td>
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<td>5/07/09</td>
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<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
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<td>6/25/09</td>
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<td><strong>Year 2 – Quarter 4 (July–September 2009)</strong></td>
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Continued . . .
Table 5. Phase III Milestones and Deliverables (continued)

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

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<td>D87: Task 4 – Bell Creek Test Site – Geomechanical Experimental Design Package</td>
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<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
<td>10/31/10</td>
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<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
<td>11/30/10</td>
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<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
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<td><strong>Year 4 – Quarter 2 (January–March 2011)</strong></td>
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<td>M8: Task 4 – Bell Creek Test Site Wellbore Leakage Data Collection Initiated</td>
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<td>D31: Task 4 – Bell Creek Test Site – Geological Characterization Experimental Design Package</td>
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<td>D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report</td>
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<td>M28: Task 4 – Bell Creek Geological Experimental Design Package Completed</td>
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<td>D15: Task 2 – Bell Creek Test Site Fact Sheet</td>
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<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
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<td>D18: Task 2 – Bell Creek Test Site PowerPoint Presentation (Update)</td>
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<td>D26: Task 2 – Fort Nelson Test Site Poster</td>
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<td>D28: Task 3 – Environmental Questionnaire – Bell Creek Test Site</td>
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<td>3/30/11</td>
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<tr>
<td>D85: Task 6 – Report – Opportunities and Challenges Associated with CO₂ Compression and Transportation During CCS Activities</td>
<td>3/31/11</td>
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<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
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Continued . . .
Table 5. Phase III Milestones and Deliverables (continued)

<table>
<thead>
<tr>
<th>Title/Description</th>
<th>Due Date</th>
<th>Actual Completion Date</th>
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<tr>
<td><strong>Year 4 – Quarter 3 (April–June 2011)</strong></td>
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<tr>
<td>M30: Task 5 – Bell Creek Test Site Baseline MVA Initiated</td>
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<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
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<tr>
<td>D88: Task 13 – Programmatic Risk Management Plan</td>
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<tr>
<td>D17: Task 2 – General Phase III Information PowerPoint Presentation (Update)</td>
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<td>D34: Task 4 – Bell Creek Test Site – Baseline Hydrogeological Final Report</td>
<td>5/31/11</td>
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<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
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<tr>
<td>D19: Task 2 – Fort Nelson Test Site PowerPoint Presentation (Update)</td>
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<tr>
<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
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<td>M24: Task 14 – WWG Annual Meeting Held</td>
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<td>M31: Task 9 – Bell Creek Test Site – Site Characterization, Modeling, and Monitoring Plan Completed</td>
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<tr>
<td>D34: Task 4 – Bell Creek Test Site – Baseline Hydrogeological Final Report</td>
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<td><strong>Year 4 – Quarter 4 (July–September 2011)</strong></td>
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<td>D67: Task 9 – Fort Nelson Test Site – Simulation Report</td>
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<td>D29: Task 3 – Permitting Action Plan</td>
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<tr>
<td>D81: Task 1 – Regional Carbon Sequestration Atlas (Update)</td>
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<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
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<td>D66: Task 9 – Bell Creek Test Site – Simulation Report</td>
<td>8/31/11</td>
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<tr>
<td>D1: Task 1 – Review of Source Attributes</td>
<td>9/30/11</td>
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<td>D4: Task 1 – Permitting Review – Two Additional States</td>
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<td>D9: Task 1 – Updated DSS</td>
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<td>D25: Task 2 – Bell Creek Test Site Poster</td>
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<td>D50: Task 9 – Bell Creek Test Site – Site Characterization, Modeling, and Monitoring Plan</td>
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<td>M23: Task 14 – Monthly WWG Conference Call Held</td>
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<td>M31: Task 9 – Bell Creek Test Site – Site Characterization, Modeling, and Monitoring Plan Completed</td>
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<td>M33: Task 16 – Basal Cambrian Baseline Geological Characterization Completed</td>
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Table 6. PCOR Partnership Phase III BP4, Years 3–4 Gantt Chart

<table>
<thead>
<tr>
<th>Task 1: Regional Characterization</th>
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<tbody>
<tr>
<td>1.1 Regional Characterization</td>
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<tr>
<td>1.2 Decision Support System</td>
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<tr>
<td>1.3 Development of a Demonstration Project Reporting System</td>
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<table>
<thead>
<tr>
<th>Task 2: Public Outreach and Education</th>
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<tr>
<td>2.1 Outreach Planning</td>
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<tr>
<td>2.2 Data Acquisition and Management</td>
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<tr>
<td>2.3 Public Website</td>
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<tr>
<td>2.4 Fact Sheets</td>
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<tr>
<td>2.5 PowerPoint Presentations</td>
</tr>
<tr>
<td>2.6 Documentary and Video Products</td>
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<tr>
<td>2.7 Posters</td>
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<tr>
<td>2.8 Additional Outreach Activities</td>
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<table>
<thead>
<tr>
<th>Task 3: Permitting and NEPA Compliance</th>
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<tbody>
<tr>
<td>3.1 Completion of DOE's Environmental Questionnaire</td>
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<tr>
<td>3.2 Assist in Development of EA/EIS</td>
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<tr>
<td>3.3 General Permitting Assistance</td>
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<td>3.4 Development of a Permitting Action Plan</td>
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Budget Period 4 (Years 3 & 4)

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<td>Sep-10</td>
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Summary Task

Activity Bar

Progress Activity Bar

Time Now

Revised Schedule

Deliverable

Milestone

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

<table>
<thead>
<tr>
<th>Summary Task</th>
<th>Activity Bar</th>
<th>Progress Activity Bar</th>
<th>Time Now</th>
<th>Revised Schedule</th>
<th>Deliverable</th>
<th>Milestone</th>
</tr>
</thead>
</table>

| Task 4: Site Characterization and Modeling | | | | | |
| 4.2 Fort Nelson Test Site | | | | | |
| 4.3 Bell Creek Test Site | | | | | |

| Task 5: Well Drilling and Completion | | | | | |
| 5.1 Bell Creek Test Site – Injection Scheme Design | | | | | |
| 5.2 Bell Creek Test Site – Monitoring Scheme Design | | | | | |
| 5.3 Bell Creek Test Site – Baseline MVA Activities | | | | | |

| Task 6: Infrastructure Development | | | | | |
| 6.1 Regional Infrastructure Planning | | | | | |
| 6.2 Project Infrastructure Development | | | | | |
| 6.3 Ramgen Compression Technology Slipstream Test | | | | | |

| Task 7: CO₂ Procurement | | | | | |
| 7.1 Monitoring and Assessment of CO₂ Procurement Issues | | | | | |
| 7.2 Procurement Plan and Agreement Facilitation | | | | | |

| Task 8: Transportation and Injection Operations | | | | | |
| 8.1 Ongoing Monitoring Assessment of Commercial Operations | | | | | |

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

<table>
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<th>Task</th>
<th>Activity</th>
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<th>Year 4</th>
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<td>Jul-11</td>
<td>Aug-11</td>
<td>Sep-11</td>
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**Task 9: Operational Monitoring and Modeling**

- 9.1 Bell Creek Test Site
- 9.2 Fort Nelson Test Site

**Task 12: Project Assessment**

- 12.1 Annual Assessment Report

**Task 13: Project Management**

- 13.1 Perform Project Management

**Task 14: RCSP Water Working Group Coordination**

- 14.1 General Coordination, Support, and Integration
- 14.2 White Paper – Nexus of CCS and Water
- 14.3 WWG Annual Meeting

**Task 15: Further Characterization of Zama Project**

- 15.1 Cement Integrity Studies, Wellbores
- 15.2 Static and Dynamic Modeling
- 15.3 Seismic Survey and Logging Suites
- 15.4 MVA Activities
- 15.5 Acid Gas Phase Behavior and Rock Interactions Studies

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

<table>
<thead>
<tr>
<th>Task 16: Characterization of the Basal Cambrian System</th>
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<tbody>
<tr>
<td><strong>16.1 CO₂ Source Characterization</strong></td>
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<tr>
<td><strong>16.2 Geological Characterization</strong></td>
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<tr>
<td><strong>16.3 Storage Capacity Evaluation</strong></td>
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<tr>
<td><strong>16.4 Storage Integrity</strong></td>
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</tbody>
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#### Task Details

- **D1** Review of Source Attributes
- **D4** Permitting Review – Two Additional States
- **D9** Updated DSS
- **D10** DPRS Update
- **D11** Outreach Plan
- **D13** Public Site Updates
- **D15** Bell Creek (BC) Test Site Fact Sheet
- **D16** Fort Nelson (FN) Test Site Fact Sheet
- **D17** General Phase III Information PowerPoint Presentation
- **D18** BC Test Site PowerPoint Presentation
- **D19** FN Test Site PowerPoint Presentation
- **D20** Video Support to PowerPoint and Web Site
- **D24** PCOR Partnership Region CO₂ Storage General Poster
- **D25** BC Test Site Poster
- **D26** FN Test Site Poster
- **D28** BC Test Site – Environmental Questionnaire
- **D32** Permitting Action Plan
- **D33** BC Test Site – Geological Characterization Experimental Design Package
- **D34** BC Test Site – Baseline Hydrogeological Experimental Design Package
- **D50** BC Test Site – Site Characterization, Modeling, and Monitoring Plan
- **D52** FN Test Site – Site Characterization, Modeling, and Monitoring Plan
- **D57** Project Assessment Annual Report
- **D58** Quarterly Progress Report
- **D59** Milestone Quarterly Report
- **D66** BC Test Site – Simulation Report
- **D81** Regional Carbon Sequestration Atlas (update)
- **D85** Report – Opportunities and Challenges Associated with CO₂ Compression and Transportation During CCS Activities
- **D87** BC Test Site – Geomechanical Experimental Design Package
- **D88** Programmatic Risk Management Plan

#### Key for Milestones (M)

- M8 BC Test Site – Wellbore Leakage Data Collection Initiated
- M9 BC Test Site – Geological Model Development Initiated
- M23 Monthly WWG Conference Call Held
- M24 WWG Annual Meeting Held
- M28 BC Test Site – Geological Characterization Experimental Design Package Completed
- M30 BC Test Site – Baseline MVA Activities Initiated
- M31 BC Test Site – Site Characterization, Modeling, and Monitoring Plan Completed
- M33 Basal Cambrian Baseline Geological Characterization Completed

#### Key for Deliverables (D)

- D29 Permitting Action Plan
- D31 BC Test Site – Geological Characterization Experimental Design Package
- D34 BC Test Site – Baseline Hydrogeological Experimental Design Package
- D50 BC Test Site – Site Characterization, Modeling, and Monitoring Plan
- D52 FN Test Site – Site Characterization, Modeling, and Monitoring Plan
- D57 Project Assessment Annual Report
- D58 Quarterly Progress Report
- D59 Milestone Quarterly Report
- D66 BC Test Site – Simulation Report
- D81 Regional Carbon Sequestration Atlas (update)
- D85 Report – Opportunities and Challenges Associated with CO₂ Compression and Transportation During CCS Activities
- D87 BC Test Site – Geomechanical Experimental Design Package
- D88 Programmatic Risk Management Plan

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PHASE III PRODUCTS OR TECHNOLOGY TRANSFER ACTIVITIES

During the reporting period, there were 15 abstracts accepted for presentation and 11 presentations given at 17 different meetings/conferences. In addition, seven deliverables, five milestones, and a quarterly progress report were completed.

Abstracts – Submitted


Abstracts – Submitted and Accepted for Presentation


Abstracts – Submitted and Rejected

Abstracts – Accepted for Presentation


Presentations, Conference Papers, Posters, and Other Media


**Technical Reports**


Progress Reports, Meeting Minutes, and Project Management Documents


Draft Documents

Daly, D.J., 2011, Bell Creek integrated CO2 EOR and storage project: Plains CO2 Reduction (PCOR) Partnership Phase III draft Task 2 Deliverable D18 General Public Presentation 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.


MEETINGS/TRAVEL

Representatives from the PCOR Partnership participated in and/or presented at the following 17 meetings/conferences and seven training opportunities in this reporting period:

- January 28 – February 6, 2011: Attended a Petrel Seismic Visualization and Interpretation software training course with Schlumberger in Houston, Texas.
- January 30 – February 3, 2011: Participated in the steering committee meeting for the Basal Cambrian System project in Calgary, Alberta, Canada.
- February 8–10, 2011: Attended the Carbon Capture and Storage Association’s 4th Annual Preconference Workshop on CCS in Austin, Texas.
- February 8–11, 2011: Attended meetings with Natural Resources Canada, National Research Council, and others to discuss potential areas of collaboration in Ottawa, Ontario, Canada.
- February 11, 2011: Traveled to PPB’s offices to discuss education outreach activities in Fargo, North Dakota.
- February 12–21, 2011: Attended a 3-day simulation software training session, entitled “CO₂-Based EOR Miscible Flood,” with the Computer Modeling Group in Houston, Texas.
- February 13–18, 2011: Attended a 2-day CMOST and 1-day Wellbore Modeling in STARS simulation training sessions in Calgary, Alberta, Canada.
- February 15–17, 2011: Met with Denbury Resources at its headquarters in Plano, Texas.
- February 16 and 17, 2011: Traveled to locate a hotel and meeting space for the 2011 PCOR Partnership Annual Meeting in Denver, Colorado.
- February 19–24, 2011: Attended a Society of Petroleum Engineers Reservoir Simulation Symposium, as well as a training course on history matching, in The Woodlands, Texas.
• February 25 – March 4, 2011: Presented at the CSLF Storage Projects Interactive Workshop in Al Khobar, Saudi Arabia.
• February 28 – March 2, 2011: Attended Schlumberger’s Petrel Reservoir Engineering simulation software training in Houston, Texas.
• March 6–18, 2011: Traveled to Denbury’s headquarters to search, retrieve, and scan Bell Creek-related documents in Plano, Texas.
• March 7–8, 2011: Participated in an advisor’s meeting and abstract review for the 10th Annual Conference on Carbon Capture and Sequestration in Pittsburgh, Pennsylvania.
• March 7–11, 2011: Attended the 2011 Esri Developer Summit in Palm Springs, California.
• March 8–11, 2011: Reviewed core samples from the Bell Creek Field at the Bureau of Economic Geology in Houston, Texas.
• March 16, 2011: Participated in an education activities meeting at PPB offices in Fargo, North Dakota.

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

REFERENCES

None.