



**Plains CO₂ Reduction (PCOR) Partnership Monthly Update
December 1–31, 2010**

PHASE III ACTIVITIES

Task 1 – Regional Characterization (Wesley D. Peck)

Highlights

- Continued work on the compilation and creation of text and data for the next PCOR Partnership Atlas (4th edition).
- Continued regional characterization of additional target horizons, e.g., Red River and Dakota Formations, in the Williston Basin.
- Work is under way to create a value-added report on the known CO₂ storage opportunities for Iowa.
- Progress continues on the detailed assessment of the Rival oil field in north-central North Dakota, including the following:
 - Began creating surfaces in the Petrel model for use in normalization and initial model building.
 - Extended the geologic model area to more accurately reflect the depositional environment.
 - Selected eight additional horizons lying between the Midale and Frobisher anhydrite stratigraphic units in 109 wells from the Rival and surrounding field.
 - Added 54 Black Slough wells to fill in the model's "void" space.
 - Added core analysis from new Black Slough wells.
 - Added bulk density and grain density from the core analysis reports.
 - Added six more Rival and Portal Field wells to the Petrel model and picked tops (115 wells in the Petrel project are being used).
 - Working on an abstract for the American Association of Petroleum Geologists (AAPG) Rocky Mountain Section Meeting on the geology of the Rival Field.
- Efforts conducted as part of the continuing work at the Zama, Alberta, Canada, field site included the following:
 - Acquired new data sets from Apache Canada Ltd. that include core analyses, wireline logs, facies distributions of the pinnacles, etc., and began incorporating this new information into our currently existing static model. A quality assurance/quality control check will be performed upon completion of data entry.
 - Continued discussions with Halliburton in an effort to get the cement for our proposed wellbore integrity work.

- Worked collaboratively with Alberta Innovates – Technology Futures on an abstract to be submitted to 10th Annual Conference on Carbon Capture & Sequestration, scheduled for May 2–5, 2011, Pittsburgh, Pennsylvania.

Task 2 – Public Outreach and Education (Daniel J. Daly)

Highlights

- Participated in several meetings (December 3, 16, and 21) with Prairie Public Broadcasting (PPB) to plan scope of work activities for Budget Period (BP) 4.
- Continued investigation into the potential role of social media in PCOR Partnership outreach activities.
- Continued participation in planning meetings for the next edition of the PCOR Partnership Atlas.
- Fulfilled a request from television station KCLS in Los Angeles for access to the *Reducing Our Carbon Footprint: The Role of Markets* documentary for broadcast in its region.
- Received notification that the National Educational Telecommunications Association, a program service that seeks to enrich public television by delivering one-of-kind documentaries and diverse informational series to every public television station in the country, has scheduled *Global Energy and Carbon: Tracking Our Footprint* for download on January 21, 2011.
- Preparations are under way for a letter and set of instructions to encourage PCOR Partnership partners (outside of the PPB broadcast area) to work with their local public television stations to broadcast the PCOR Partnership documentaries.
- Continued preparation of the Bell Creek test site fact sheet (Deliverable [D]15).

Task 3 – Permitting and NEPA (National Environmental Policy Act) Compliance (Lisa S. Botnen)

Highlights

- Completed review and analysis of the U.S. Environmental Protection Agency's (EPA's) recently finalized *Mandatory Reporting of Greenhouse Gases (GHG): Petroleum and Natural Gas Systems*, also known as Subpart W.
- Continued review and analysis of EPA's recently finalized *Federal Requirements under the Underground Injection Control (UIC) Program for Carbon Dioxide*.
- Participated in an Argus Media Webinar entitled "U.S. Environmental Policy: Through the Eyes of the 112th Congress."
- Participated in an EPA Webinar entitled "GHG Reporting Program Webinar: Subpart W (Petroleum and Natural Gas Systems)."
- Participated in EPA's GHG Reporting Program Webinar: Subparts RR (Geologic Sequestration) and UU (Underground Injection of CO₂).
- Completed another review of the Interstate Oil and Gas Compact Commission (IOGCC) Pipeline Transportation Task Force Final Report.
- Participated in in-house meetings to discuss communication plans for the Bell Creek project.
- Continued to review EPA's GHG Reporting Program Subparts RR (Geologic Sequestration) and UU (Underground Injection of CO₂).

Task 4 – Site Characterization and Modeling (James A. Sorensen)

Highlights

- Bell Creek test site activities included the following:
 - Initiation of the transfer of reservoir characterization data from Denbury Resources to the Energy & Environmental Research Center's (EERC's) FTP site.
 - Upon transfer, these data will be incorporated into the development of a geologic model for the site.
 - Continued evaluation of outcrop samples that are representative of Bell Creek reservoir rocks. Plans are under way for a series of in-house laboratory tests on three separate facies including:
 - ◆ Making thin sections for optical microscopy.
 - ◆ Performing x-ray diffraction (XRD) on ground samples.
 - ◆ Profilometer for analyzing/validating porosity, pore geometry, and size.
 - ◆ Obtain porosity and permeability measurements.
 - ◆ Conduct CO₂ water relative permeability tests.
 - ◆ Conduct uniaxial and triaxial compression tests.
 - ◆ Perform QEMSCAN analysis for mineralogy of samples.
- Fort Nelson test site activities included the following:
 - Traveled to Calgary, Alberta, Canada, to participate in a quarterly Fort Nelson project meeting with Spectra Energy personnel scheduled for December 2.
 - Initiated development of a sampling and analysis plan for shallow groundwater monitoring of the second exploratory well (shallow groundwater sampling and analysis has been under way for the location of the first exploratory well).
 - Continued laboratory work on two sample sets comprising cuttings from the C-61-E test well drilled in the winter 2008–2009 season.
 - ◆ The first 28-day exposure period has been conducted at conditions representative of the near-wellbore environment during injection (i.e., low temperature/high pressure).
 - ◆ The samples are currently being analyzed using XRD, QEMSCAN, and scanning electron microscopy (SEM).
 - ◆ Thin sections will be prepared for optical investigation.
 - ◆ Fluids used in the experiment are analogous to what is believed to be in the injection formation. These fluids have been analyzed to identify pre/post-exposure changes.
 - Adjusted the surface of the Slave Point Formation in the June 2010 geologic model for better history-matching, with special attention to the Clark Lake A Pool to better understand the regional pressure profile.
 - Obtained a trial version of Paradigm's GoCad and Skua geologic model-building software packages and may acquire license to aid in geologic model development.

Task 5 – Well Drilling and Completion (Steven A. Smith)

Highlights

- Composed a set of condensed notes and a requirements checklist for CO₂ injection projects pertaining to the characterization and monitoring, verification, and accounting (MVA) activities required by EPA's UIC Class VI injection well requirements released on November

20, 2010, and which go into effect January 1, 2011, to ensure all future U.S.-based PCOR Partnership work remains in compliance with EPA regulations, and so that MVA, characterization, and CO₂ injection plans can quickly be designed and evaluated in terms of said regulations.

Task 6 – Infrastructure Development (Melanie D. Jensen)

Highlights

- Continued preparation of D85, “Opportunities and Challenges Associated with CO₂ Compression and Transportation During CCS Activities” (due March 31, 2011).
- Continued a search for information on the breakdown of generation sources of electrical power (e.g., coal-fired, wind, hydro, natural gas-fired, etc.) used (as opposed to generated) in each state.
- Evaluated comments obtained from three external reviewers of the capture technologies overview report and determined a course of action that will be taken with respect to the suggestions.

Task 7 – CO₂ Procurement (John A. Harju)

Highlights

- Continued discussions with Phase III demonstration partners.
- Continued efforts toward securing a cost-share agreement with Denbury Resources.

Task 8 – Transportation and Injection Operations (Melanie D. Jensen)

Highlights

- A meeting was held with appropriate PCOR Partnership personnel to determine a strategy for the task that will provide significant value to Denbury Resources at the Bell Creek site. Areas of potential overlap between this task and Task 6, Infrastructure Development, are being explored to eliminate duplication of effort.
- Began gathering and assimilating background information about surface facility design for CO₂ flooding in enhanced oil recovery (EOR).

Task 9 – Operational Monitoring and Modeling (Charles D. Gorecki)

Highlights

- Bell Creek site activities continued, including the following:
 - Met on December 16, 2010, with an independent consultant who has performed work in the Bell Creek Field in the past.
 - Continued a literature review and analysis of historic injection and production data from the Bell Creek Field.
 - Continued evaluation of the minimum miscible pressure measurements on the Bell Creek crude and CO₂ to help determine the optimum operating pressure for the field.
- Fort Nelson site activities continued, including the following:
 - Reinitialized the case-based model with adjusted surfaces to get a better original gas pool definition.

- Numerically tuned the base case simulation for better run time on the history matching.
- Reviewed the groundwater-monitoring report received from Spectra.
- Finished assembly of the high-performance computer cluster, including installation of the necessary firewalls and job schedulers, and continued running history-matching simulations.
- Risk management activities continued, including the following:
 - Participated in a conference call on December 2 with Spectra Energy to discuss the next-round risk assessment.
 - Held a conference call, along with an on-site meeting on December 7, with an independent consultant to continue to discuss next steps for the Fort Nelson project.

Task 10 – Site Closure (to be announced [TBA])

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

Task 11 – Postinjection Monitoring and Modeling (TBA)

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

Task 12 – Project Assessment (Katherine K. Anagnost)

Highlights

- The project assessment report (D57) for the period October 1, 2009 – September 30, 2010, was submitted on December 23, 2010.

Task 13 – Project Management (Edward N. Steadman)

Highlights

- Traveled to Calgary, Alberta, Canada, to meet with Spectra Energy personnel on December 2 to discuss the Fort Nelson project.
- Continued to review various methodologies for the development of a PCOR Partnership programmatic risk assessment.
- Continued efforts on the update to the project management plan.
- Attended 2010 CO₂ Conference Week in Houston and Midland, Texas, December 6–10.
- Held a task leader meeting on December 13 during which the following topics were discussed:
 - Upcoming peer review scheduled for March 14–18, 2011.
 - EERC Proposal No. 2011-0098 (PCOR Partnership Phase III add-on proposal).
 - Upcoming deliverables and conferences.
 - Updates from all the task leaders.
- Held a group meeting on December 14 for all EERC team members working on the PCOR Partnership program (~35 people) during which the following topics were discussed:
 - Update on program activities including the two demonstration sites.
 - Introduction of new team members.
 - Wes Peck provided an overview of the regional characterization task and associated activities.

- Participated in a North Dakota Petroleum Council legislative briefing luncheon.
- Participated in the U.S.–Canada Clean Energy Dialogue: North American Knowledge Sharing Arrangement (NAKSA) meeting hosted by DOE and held in Columbus, Ohio.
- Deliverables and milestones completed in December:
 - November monthly update.
 - Task 12: D57 – project assessment annual report.
 - Task 14: M23 – monthly water working group (WWG) conference call.
- Deliverables and milestones due in January:
 - 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.
 - Task 13: D58/59 – quarterly progress report/milestone quarterly report.

Task 14 – RCSP Water Working Group Coordination (Charles D. Gorecki)

Highlights

- Continued development of a paper based on the white paper on the nexus of CCS and water, WWG Fact Sheet, and road-mapping document that will eventually be submitted to a peer-reviewed journal.
- Work continued on the road-mapping document including the following:
 - The due date for WWG comments was extended to December 17, 2010.
 - Corrections and modification based on the WWG first-round comments will be completed and returned to the WWG for a second-round review by January 14, 2011.
 - The WWG will then have until January 28, 2011, to review and comment.
 - The PCOR Partnership will review the comments and submit a final copy to NETL on February 11, 2011.
- The WWG canned PowerPoint presentation was accepted at the 2011 American Water Resources Association Spring Specialty Conference in April.

Travel/Meetings

- November 29 – December 1, 2010: Participated in the U.S.–Canada Clean Energy Dialogue: NAKSA meeting held in Columbus, Ohio.
- November 29 – December 3, 2010: Participated in the Fort Nelson site quarterly progress meeting in Calgary, Alberta, Canada.
- December 1, 2010: Attended the North Dakota Industrial Commission meeting in Bismarck, North Dakota.
- December 4–10, 2010: Participated in the 8th Annual EOR Carbon Management Workshop in Houston, Texas, and attended the 16th Annual CO₂ Flooding Conference in Midland, Texas.
- December 12–15, 2010: Attended Schlumberger Petrel Fracture Modeling training in Houston, Texas.
- December 16, 2010: Attended an outreach meeting with PPB in Fargo, North Dakota.