



## Plains CO<sub>2</sub> Reduction (PCOR) Partnership Energy & Environmental Research Center (EERC)

### Plains CO<sub>2</sub> Reduction (PCOR) Partnership Monthly Update February 1–28, 2014

#### PHASE III ACTIVITIES

##### **Task 1 – Regional Characterization (Wesley D. Peck)**

###### Highlights

- Presented “Plains CO<sub>2</sub> Reduction (PCOR) Partnership: Demonstrating CO<sub>2</sub> Storage Solutions” at the Energy, Utility & Environment Conference (EUEC) on February 4, 2014, in Phoenix, Arizona.
- Continued work on the third target area (Deliverable [D]7, due September 2014), the Minnelusa Formation in Wyoming.
- Continued work on several additional value-added reports, including the following:
  - Information gathering for a regional characterization report summarizing all past and present efforts.
  - Report summarizing methods of original oil in place and CO<sub>2</sub> storage calculations.
  - White paper on characterization of the Cedar Creek Anticline.
- Continued activities to update the content on the partners-only Decision Support System, including the following:
  - Checked oilfield data to ensure accuracy.
- With regard to the **Aquistore** project static modeling and dynamic predictive simulations effort:
  - Continued work on D93, Geological Modeling and Simulation Report for the Aquistore Project, due March 2014. **Task 2 – Public Outreach and Education (Daniel J. Daly)**

###### Highlights

- Continued an in-house review of outreach products using a standard, industry-accepted framework.
- Presented at the “Educational Outreach Workshop – Focus on Alberta and Saskatchewan” held at the Canadian Embassy in Washington, D.C., on February 26, 2014.
- Participated in the Global Carbon Capture and Storage Institute’s 3rd Annual Americas Forum on February 27, 2014.
- Continued work on updating the general outreach poster (D24, due March 2014).
- Participated in a Regional Carbon Sequestration Partnership (RCSP) Outreach Working Group conference call on February 20, 2014.
- Continued efforts to prepare and update project-related fact sheets, including the following activities:
  - Continued drafting the four-page value-added Lignite Field Validation Test site overview fact sheet.

- Continued value-added updates/revisions to the other Phase II site fact sheets.
- Continued efforts to update the public Web site ([www.undeerc.org/pcor](http://www.undeerc.org/pcor)), including the following:
  - Continued planning for the next update report (D13, due July 2014).
  - Posted the Aquistore fact sheet on the Web site ([http://undeerc.org/pcor/co2sequestrationprojects/Downloads/FS18\\_Aquistore\\_February\\_2014.pdf](http://undeerc.org/pcor/co2sequestrationprojects/Downloads/FS18_Aquistore_February_2014.pdf)).
  - Continued repair of broken links as identified on an ongoing basis.
- Continued collaborative efforts with Prairie Public Broadcasting (PPB), including the following:
  - Prepared a proposed overview of the Bell Creek documentary (D21) for presentation to Denbury Resources (Denbury) outreach personnel.
  - Produced over 50 DVD copies of the “Installing a Casing-Conveyed Permanent Downhole Monitoring System” in addition to making the 20-minute video piece available to partners online.
  - Continued editing the value-added four-part education presentation video in conjunction with PPB.

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

#### Highlights

- Worked with the Interstate Oil and Gas Compact Commission (IOGCC) on the development of a fact sheet based on the joint report entitled “Guidance for States and Provinces on Operational and Regulation of Carbon Geologic Storage.”
- Continued to review and analyze the latest U.S. Environmental Protection Agency guidance document on Class II well to Class VI well transition and the final rule related to conditionally exclude CO<sub>2</sub> from the Resource Conservation and Recovery Act.
- Began planning for the 6th Annual Regulatory Roundup meeting scheduled for this summer.
- With regard to the Lignite Field Validation Test site (Phase II) closure, continued efforts to monitor the site during the reclamation phase, including a site visit on February 26, 2014.

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

#### Highlights

- Attended a presentation on February 28, 2014, given by a Darcy lecturer on porous media and x-ray tomography and capillary trapping at the University of North Dakota.
- **Fort Nelson** test site activities included the following:
  - Submitted a revised version of the Fort Nelson Test Site – Site Characterization Report on February 12, 2014.
  - Submitted a revised version of the Fort Nelson Test Site – Geochemical Report on February 12, 2014.
  - Notified Spectra Energy Transmission (Spectra) on February 5, 2014, of approval to include a reference to PCOR Partnership funding used to support the Fort Nelson Carbon Capture and Storage Feasibility Project on the Natural Resources Canada Web site.
- **Bell Creek** test site activities included the following:
  - Continued work on the wellbore leakage final report (D36, due March 2014).

- Continued work on the 3-D seismic report (D96, due March 2014).
- Continued preparing for the 3-D mechanical earth model (MEM) and geomechanical modeling and simulations.
- Worked on updating the properties in 1-D MEM and 3-D MEM in Techlog and Petrel.
- Reviewed Bell Creek core samples at the U.S. Geological Survey (USGS) Core Research Center (CRC) and the Colorado School of Mines (CSM) during a trip held February 11–14, 2014.
- Scanned thin-section core samples received from Denbury.
- With regard to Applied Geology Laboratory activities:
  - ◆ With regard to the 33-14R core (collected April 2013):
    - Met in-house on February 4, 2014, to discuss progress.
    - Compared the x-ray diffraction analyses performed in-house with data provided by Core Labs.
    - Completed clay analyses.
    - Awaiting return of the requested 46 thin sections from Wagner Petrophysics.
    - Began computed tomography scanning of replacement samples for mechanical testing.
    - Began core cleaning.
    - Began determining residual fluids on five samples.
  - ◆ With regard to the 56-14R full-core plugs (collected March 2013):
    - Prepared a revised work plan to evaluate differences in gas and fluid permeability and determine if these differences can be attributed to sample mineralogy or morphology.
    - Met to discuss the scope of work on February 3, 2014.

## **Task 5 – Well Drilling and Completion (John A. Hamling)**

### Highlights

- Attended the Society of Petroleum Engineers (SPE) Williston Basin Section meeting and lecture on February 27, 2014, in Williston, North Dakota.
- Continued review and modification of the value-added baseline surface and near-surface monitoring, verification, and accounting report and appendixes.
- Continued work on D44 – Drilling and Completion Activity Report.

## **Task 6 – Infrastructure Development (Melanie D. Jensen)**

### Highlights

- Continued work on a journal article (about the attenuation of variable CO<sub>2</sub> sources for use in enhanced oil recovery) for submission to *Energy & Environmental Science* ([www.rsc.org/publishing/journals/ee/about.asp](http://www.rsc.org/publishing/journals/ee/about.asp)).
- Researched several capture technologies for the update to the existing capture technology overview.
- Collected information to respond to a partner's question.

## Task 7 – CO<sub>2</sub> Procurement (John A. Harju)

- This task ended in Quarter 4 – BP4, Year 6 (September 2013).

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

### Highlights

- Nothing to note at this time.

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

### Highlights

- **Bell Creek** injection-phase site activities included the following:
  - Cumulative CO<sub>2</sub> injection is 429,881 metric tons through January 31, 2014 (Table 1).
  - Continued work on Bell Creek data management activities.
  - Continued building the updated facies model for the fieldwide model.
  - Worked on the Bell Creek simulation to include CO<sub>2</sub> injection and production data.
  - Worked on preparing data for the Phase 2 simulations, including cutting the geomodel.
  - Began work on D66, Simulation Update, due August 2014, including review of various core and wellsite information and correlation with seismic data.
  - Reviewed literature for geochemical simulation.
  - Worked on upgrading to the latest Computer Modelling Group software.
  - Continued work on developing a methodology to allocate pressure response from the permanent downhole monitoring system to individual production/injection wells.
  - Reprocessed the initial seven repeat pulsed-neutron logs utilizing updated processing methodology to refine saturation estimates.
  - Discussed planning for a repeat vertical seismic profile survey centered on the 05-06OW and 04-03OW wells.

**Table 1. Bell Creek CO<sub>2</sub> Injection Totals for January 2014 (cumulative totals May 2013 to January 2014)**

	January 2014 Injection
Total, Mscf	1,347,888
Total, U.S. tons*	77,097
Total, metric tons*	70,009
Cumulative Total, Mscf <sup>+</sup>	8,276,498
Cumulative Total, U.S. tons* <sup>+</sup>	473,403
Cumulative Total, metric tons* <sup>+</sup>	429,881

Source: Montana Board of Oil and Gas [MBOG] database.

\* There is an approximately 2–3-month lag in posting of injection/production volumes to the MBOG database. This was calculated utilizing a conversion of 17.483 Mscf/U.S.ton and 19.253 Mscf/metric ton.

<sup>+</sup> Cumulative totals are for the period from May 2013 to the month listed.

- Continued injection-phase sampling work, including the following:
  - ◆ Collected and archived the most recent Fox Hills Formation groundwater-monitoring well field parameter data from the January 2014 sampling month.
  - ◆ Completed data input (133 samples) for the January 2014 soil gas results (from handheld meter and Micro Quad gas chromatograph), and began quality assessment/quality control measures.
  - ◆ Traveled to the Bell Creek Field for the February 2014 near-surface monthly event, sampling ten soil gas profile stations and two Fox Hills Formation groundwater-monitoring wells.
  - ◆ Initiated planning of construction of the SQL database to house and access near-surface monitoring data.
  - ◆ Initiated evaluation of creating an interactive map product to facilitate improved access and interpretation for team members and stakeholders.
- **Fort Nelson** site activities included the following:
  - Continued work on the Best Practices Manual – Fort Nelson Feasibility Study (D100, due June 2014).

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

- This task is anticipated to be initiated in Quarter 1 – Budget Period (BP) 5, 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

- Submitted D57, the annual assessment report for Program Year 6 (October 1, 2012, to September 30, 2013), on January 31, 2014.

#### **Task 13 – Project Management (Charles D. Gorecki)**

##### Highlights

- On February 10, 2014, a new U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) project manager was assigned to the PCOR Partnership Program, namely Andrea Dunn.
- Submitted the January monthly update of activities on February 14, 2014.
- Participated in a National Risk Assessment Partnership (NRAP) stakeholders meeting held February 4 and 5, 2014, in Washington, D.C.
- Began efforts toward a value-added programmatic risk management plan update (including an updated Bell Creek risk assessment) to be completed by August 2014, including the following:

- Held a conference call on February 7, 2014, with a consultant to discuss an update to the risk management plan.
- Identified potential risks on February 25, 2014, first to the overall program and also to the Bell Creek project.
- Met with DOE personnel to discuss programmatic goals on February 25 and 26, 2014, in Pittsburgh, Pennsylvania.
- Participated in Bell Creek project-specific meetings held February 6, 2014, at Denbury headquarters in Plano, Texas.
- Continued planning for the upcoming Technical Advisory Board (TAB) winter meeting scheduled for March 5 and 6, 2014, in Austin, Texas.
- Received international travel approval on February 25, 2014, for a TAB member to travel from his Perth, Australia, residence to Austin, Texas.
- As part of the 12th International Conference on Greenhouse Control Technologies (GHGT-12) review panel, reviewed several abstracts prior to the February 14, 2014, deadline.
- Continued planning the 2014 PCOR Partnership Annual Membership Meeting scheduled for September 16 and 17, 2014, at the Embassy Suites in downtown Denver, Colorado, including content and programming for the registration Web site.
- Received invitations on February 21, 2014, to present at the 13th Annual Carbon Capture, Utilization & Storage Conference for the following abstracts:
  - “Carbon Dioxide Storage Potential of the Basal Saline System in the Alberta and Williston Basins of North America”
  - “The Plains CO<sub>2</sub> Reduction Partnership’s Adaptive Management Strategy for CO<sub>2</sub> Storage”
  - “Development of a Monitoring, Verification, and Accounting Plan for a Potential CCS Project at Fort Nelson, British Columbia, Canada”
  - “Modeling of Acid Gas Injection for Enhanced Oil Recovery and Long-Term Storage in Devonian-Aged Pinnacle Reefs”
- Held the monthly task leader meeting on February 4, 2014. Topics discussed included updates on the Bell Creek, Fort Nelson, Aquistore, and basal Cambrian projects; a review of upcoming conferences and deliverables; and updates from each task leader present.
- Received international travel approval on February 6, 2014, to attend the upcoming Carbon Sequestration Leadership Forum technical meeting and technology workshop in Seoul, South Korea.
- Deliverables and milestones (M) completed in February:
  - January monthly update
  - Task 14: M23 – Monthly WWG (Water Working Group) Conference Call Held
  - Task 15: D86 – Updated Regional Technology Implementation Plan

#### **Task 14 – RCSP WWG Coordination (Ryan J. Klapperich)**

##### Highlights

- Reviewed and edited notes from the January conference call.
- Distributed notes from the January conference call on February 18, 2014.
- Amended the list of water-related abstracts that were submitted to GHGT-12 by WWG members.
- Held a pre-WWG monthly call on February 26, 2014, with the NETL project manager.

- Scheduled and held the monthly conference call on February 27, 2014. Agenda items included the following:
  - Review of fact sheet subject ideas.
  - Review and discussion of WWG Web site content.
  - Update on GHGT-12 special session.
  - RCSP updates.
- Continued working on materials for Web site content and two proposed fact sheet ideas.

### **Task 15 – Further Characterization of the Zama Acid Gas EOR, CO<sub>2</sub> Storage, and Monitoring Project (Charles D. Gorecki)**

#### Highlights

- Submitted the Updated Regional Technology Implementation Plan for Zama (D86) on February 28, 2014.

### **Task 16 – Characterization of the Basal Cambrian System (Wesley D. Peck)**

#### Highlights

- Continued work on D92, Report – Storage Capacity and Regional Implications for Large-Scale Storage in the Basal Cambrian System, due March 2014.
- With regard to the **Aquistore** project (20 core samples) mineralogical characterization:
  - Completed relative permeability testing on a second core sample.
  - Began updating the summary of lab results.

#### **Travel/Meetings**

- February 2–7, 2014: Presented at EUEC in Phoenix, Arizona.
- February 2–5, 2014: Presented at the NRAP Stakeholders Group meeting in Washington, D.C.
- February 6–7, 2014: Discussed project-related activities with Denbury at its headquarters in Plano, Texas.
- February 9–14, 2014: Traveled to the Bell Creek area for sampling activities.
- February 10–14, 2014: Remotely located staff participated in project-related meetings in Grand Forks, North Dakota.
- February 11–14, 2014: Viewed core samples at USGS CRC and CSM in Denver, Colorado.
- February 23–26, 2014: Met with various DOE NETL staff members in Pittsburgh, Pennsylvania.
- February 25–28, 2014: Presented at the 3rd Annual America's Forum in Washington, D.C.
- February 26, 2014: Inspected the Phase II Lignite Field Validation Test site near Kenmare, North Dakota.
- February 27–28, 2014: Attended the SPE Williston Basin Section meeting in Williston, North Dakota.

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