



## **Plains CO<sub>2</sub> Reduction (PCOR) Partnership Monthly Update May 1–31, 2012**

### **PHASE III ACTIVITIES**

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

##### **Highlights**

- The PCOR Partnership Atlas, 4th Edition, is scheduled to arrive the first full week in June. There was a slight delay (approximately 1 week) because of a change to the bindery specifications.
- Continued to acquire updated cumulative oil production numbers for the fields and pools in the U.S. portion of the PCOR Partnership region. This effort includes gathering reservoir values such as original oil in place, porosity, permeability, production acres, etc., that will be used to update CO<sub>2</sub> enhanced oil recovery (EOR) estimates for many fields.
- Began discussing options for the characterization of a third target area (due September 2014).
- Rival oil field characterization efforts continued, including the following activities:
  - Began performing uncertainty and sensitivity analysis on the updated geologic model.
  - Continued work on the drill stem test review.
  - Began planning for a July 2012 meeting with TAQA North.

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

##### **Highlights**

- Held an in-house meeting to begin planning for a value-added video short focused on smart casing installation for carbon capture and storage (CCS) reservoir monitoring.
- Completed review of time code for more than 5 hours of raw footage shot by Prairie Public Broadcasting (PPB) in February 2012 at Fort Nelson and initiated production of a 2-minute scene sampler for the Fort Nelson project review meeting scheduled for June 6 and 7, 2012, in Grand Forks.
- Presented a poster entitled “Using Message Mapping to Enhance CCS Communication” on May 1, 2012, on behalf of the Regional Carbon Sequestration Partnership (RCSP) Outreach Working Group (OWG) at the 11th Annual Carbon Capture, Utilization & Sequestration (CCUS) Conference in Pittsburgh, Pennsylvania.
- Served as moderator of the panel entitled “Best Practices in Public Outreach – What Have We Learned?” on May 1, 2012, during the CCS Public Outreach/Education technical session at the 11th Annual CCUS Conference.

- Submitted an update to the general public outreach PowerPoint presentation (Deliverable [D] 17) on May 31, 2012.
- Continued efforts on an update to the Fort Nelson PowerPoint presentation (D19) due June 30, 2012.
- Continued efforts to update the public Web site (D13) due July 31, 2012.
- Continued preparation of presentations entitled “Foundations of CO<sub>2</sub> and Energy I” and “Foundations of CO<sub>2</sub> and Energy II” for the Teacher Training Institute entitled “The Changing Face of North Dakota” cosponsored by the North Dakota Geographic Alliance and PPB and scheduled for June 4, 2012, in Dickinson, North Dakota.
- Continued preparation of a presentation entitled “Energy and CO<sub>2</sub> Management: Carbon Capture and Storage” to be presented on June 19, 2012, at the Lignite Energy Council’s teacher seminar entitled “2012 Lignite Education Seminar: Energy, Economics & Environment” in Bismarck, North Dakota.
- Continued efforts to develop an outreach materials tracking database.
- Continued to participate in semimonthly conference calls for the Aquistore Project, led by the Petroleum Technology Research Centre (PTRC).
- Continued to participate in monthly conference calls for the OWG.

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

#### Highlights

- In response to a request received from the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL), submitted on May 1, 2012, updated information for inclusion in a best practices manual on monitoring, verification, and accounting (MVA) on the monitoring requirements for both the Bell Creek and Zama projects under the U.S. Environmental Protection Agency’s Class VI and Greenhouse Gas Reporting Rule Subparts RR and UU.
- Continued planning for the 4th Annual Regulatory Roundup meeting to be held July 31 – August 1, 2012, in Deadwood, South Dakota.
- Held several discussions regarding the state of North Dakota’s primacy application for Class VI wells with a representative of the North Dakota Industrial Commission (NDIC).

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

#### Highlights

- Fort Nelson test site activities included the following:
  - Continued efforts on the geochemical report (D41/Milestone 32 [M32]) due June 30, 2012.
  - Presented on May 2, 2012, an “Overview, Status, and Future of the Fort Nelson CCS Project” at the 11th Annual CCUS Conference.
  - Continued building a 1-D Mechanical Earth Model (MEM).
  - Prepared for the upcoming technical and management meetings scheduled for June 6 and 7 with Spectra Energy in Grand Forks. Topics to be discussed include the following:
    - ◆ Geology update
    - ◆ Modeling update

- ◆ MVA/Bayesian approach update
- ◆ Status of Canadian government funding and related business-case agreements
- ◆ Public outreach update
- ◆ Overview of British Columbia Oil and Gas Commission meeting and regulatory update
- ◆ Overview of Winter 2012–2013 activities
- ◆ Project master schedule review
- Bell Creek test site activities included the following:
  - Presented on May 1, 2012, a poster entitled “Overview of the Bell Creek Combined CO<sub>2</sub> Storage and CO<sub>2</sub> EOR Project” at the 11th Annual CCUS Conference.
  - Continued work on the 1-D MEM.
  - Continued review of seismic data.
  - Continued building the updated geologic model.
  - Worked on preliminary petrophysics in Techlog software.
  - Began preparations for building a lithofacies model based on the core reviewed.
  - Continued Energy & Environmental Research Center (EERC) Applied Geology Laboratory (AGL) testing on nine priority sidewall core samples from the 0506 OW monitoring well, including the following activities:
    - ◆ Completed all thin sections and continued analysis.
    - ◆ Completed Dean–Stark extraction for all viable samples (33 of 47 intervals).
    - ◆ Completed x-ray diffraction (XRD) for all nine prioritized samples and analysis.
    - ◆ Completed porosity and bulk volume tests for all viable samples.
    - ◆ Completed all permeability-to-water calculations.
  - Continued AGL analyses on additional samples collected from the U.S. Geological Survey Core Research Center in Denver, Colorado, including the following activities:
    - ◆ Started thin-section preparation (three sets).
    - ◆ Submitted 20 of 20 samples for point count scanning electron microscopy (SEM) analysis. 12 of 20 scans completed.
    - ◆ Submitted 22 samples for XRD analysis.
    - ◆ Dean–Stark extraction completed on core plugs.
    - ◆ Began porosity, bulk volume, and skeletal density measurements on core plugs.
  - Continued planning for AGL petrographic analysis on the full-diameter (slabbed) core.

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

### Highlights

- Met with Schlumberger Carbon Services to discuss potential downhole seismic acquisitions for CO<sub>2</sub> monitoring.
- Continued review of MVA work ongoing at other regional CCS projects.
- Submitted a survey on May 17, 2012, regarding the Bell Creek CO<sub>2</sub> Project to Victor Der, on behalf of the Global CCS Institute, for input into its annual CCS status report.
- Began preparations for a joint Denbury Onshore LLC (Denbury) – EERC update meeting scheduled for June 25 and 26, 2012, in Grand Forks. Topics to be discussed include core analyses and modeling and simulation and MVA work plans for the Phase 1 injection area.
- Continued baseline MVA activities including surface-monitoring events as follows:

- [Note: Field Event 1 (held November 1–9 and November 28 – December 2, 2011) is complete.]
- Field Event 2 (held April 23–29, 2012): data acquisition and analysis are complete, and interpretation is in progress; began development of landowner water analyses packages.
- Field Event 3 (June 18 planned): continued preparations.
- Continued drafting a value-added preinjection surface water, groundwater, and soil gas baseline MVA sampling and analysis report including results.
- Continued deep surface monitoring activities including an evaluation as to the feasibility of installing two deep groundwater-monitoring wells.
- Attended the 20th Annual Williston Basin Petroleum Conference (WBPC) held May 21–24, 2012, in Bismarck, North Dakota, and spoke with various oil and gas service companies about potential CO<sub>2</sub>-monitoring technology applications and deployment logistics.

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

#### Highlights

- Continued work on the phased pipeline network approach report (D84) due June 30, 2012.
- Continued review of the interactive capture technology tree on the partners-only Decision Support System © 2007–2012 EERC Foundation® test Web site.
- Attended the 11th Annual CCUS Conference.
- Answered a partner's questions regarding costs associated with CCUS.
- Made plans to attend the upcoming NETL CO<sub>2</sub> Capture Technology Meeting scheduled for July 9–13, 2012, in Pittsburgh, Pennsylvania.
- Made plans to present at the upcoming AIChE (American Institute of Chemical Engineers) Annual Meeting scheduled for October 28 – November 2, 2012, in Pittsburgh, Pennsylvania.

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

#### Highlights

- Participated in ongoing project discussions with Denbury including meetings at its headquarters on May 10 and 11, 2012.

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

#### Highlights

- Continued development of a list of questions for Denbury regarding the Bell Creek infrastructure in order to help streamline the collection of information.

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

#### Highlights

- Continued a literature review of software integration for geomechanical modeling and simulation.
- Continued Fort Nelson site activities, including the following:
  - Continued development of the two-track deep geological system MVA plan.

- Continued revisions to the MVA plan for surface and shallow subsurface based on recent discussions with Spectra Energy, recent observations of the terrain during a site visit in early March, and lessons learned from Bell Creek soil gas-sampling activities.
- Continued planning efforts with Spectra Energy to hold a technical meeting in Grand Forks, North Dakota, on June 6 and 7, 2012.
- Continued Bell Creek site activities, including the following:
  - Continued work on the small, detailed models around our monitoring well.
  - Continued checking details of the model properties and parameters for history matching.
  - Began preparation of abstracts for the Society of Petroleum Engineers Reservoir Simulation Symposium scheduled for February 2013 in The Woodlands, Texas, and the International Petroleum Technology Conference scheduled for March 2013 in Beijing, China.
  - Continued efforts to improve the results of the 1-D simulation of slim-tube experiments.
  - Continued work tuning numerical settings for speeding up the predictive simulations.
  - Continued preparation of a presentation entitled “The Use of CMG’s GEM and CMOST for Modeling CO<sub>2</sub> Storage and CO<sub>2</sub> EOR for the PCOR Partnership Program” for the Computer Modelling Group (CMG) Technical Symposium to be held in Calgary, Alberta, Canada, June 19–21, 2012.

#### **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 the draft project assessment report (D57) for the period October 1, 2010 – September 30, 2011, on December 29, 2011. The next assessment report is due by December 31, 2012.

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

##### Highlights

- Continued planning for the upcoming PCOR Partnership Annual Meeting and Workshop scheduled for September 11–13, 2012, in Milwaukee, Wisconsin.
  - A trip to Milwaukee, Wisconsin, was taken by the Regional Characterization lead and the AGL manager in preparation for the annual meeting workshop. During their trip, they visited a local quarry, collected rock samples, and met with a local geologist.
  - The annual meeting Web site went live on May 9, 2012.
  - Sent an e-mail blast to all partners on May 14, 2012, notifying them that registration for the annual meeting and workshop is now open.

- Mailed a postcard to all partners with information about the annual meeting and workshop.
- Presented at the United States–Canada Clean Energy Dialogue 2 Bilateral Meeting on May 15, 2012, and at the MVA/MMV (monitoring, mitigation, and verification) in Large-Scale CO<sub>2</sub> Injection Tests Workshop on May 16–17, 2012, both in Mobile, Alabama.
- Presented before the NDIC Lignite Research Council on May 17, 2012, in Bismarck, North Dakota.
- Attended the WBPC in Bismarck, North Dakota.
- Attended the 11th Annual CCUS Conference.
- Deliverables and milestones completed in May:
  - April monthly update
  - Task 2: D17 – General Phase III Information PowerPoint Presentation (Update)
  - Task 14: M23 – Monthly WWG Conference Call Held
  - Task 14: M24 – WWG Annual Meeting Held
- Deliverables and milestones scheduled for June:
  - May monthly update
  - Task 2: D19 – Fort Nelson Test Site PowerPoint Presentation (Update)
  - Task 6: D84 – Report – A Phased Approach to Building Pipeline Network for CO<sub>2</sub> Transportation During CCS
  - Task 14: M23 – Monthly WWG Conference Call Held

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

##### Highlights

- Held the 4th annual meeting on May 3, 2012, in conjunction with the 11th Annual CCUS Conference. 14 people participated in the meeting and the topics discussed included the following:
  - Update on the combined water, energy, and CCS modeling effort (WECsim).
  - Update on the IEA Greenhouse Gas R&D Programme’s project entitled “Investigation of Extracted Water for CCS.”
  - Regional Water Initiatives and their relation to the WWG.
  - Outreach survey results and their relation to future WWG activities.
- Held the monthly conference call on May 31, 2012. Nine people participated in the conference call. Topics discussed included the following:
  - Development of a prioritized research agenda based on the technology gaps report.
  - Development of new fact sheets based on outreach survey results.
  - Potential meeting to be held in conjunction with the DOE NETL “Carbon Storage R&D Project Review Meeting Developing the Technologies and Building the Infrastructure for CCUS” scheduled for August 21–23, 2012.
- Began preparations to resend the outreach survey results and the technology gap document.
- Submitted a “path forward” memo for in-house review.

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

### Highlights

- Continued history-matching activities on the geologic model using CMG's CMOST and GEM software.
- Continued work on setting CMOST-SA simulation for evaluating the effect of relative permeability curve parameters.
- Received the updated injection and production data for the F Pool from Apache Canada.
- Prepared to receive from Apache Canada similar injection and projection data for the other pinnacles into which acid gas is injected.

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

### Highlights

- Presented on May 2, 2012, the “CO<sub>2</sub> Storage Resource Potential of the Cambro-Ordovician Saline System in the Western Interior of North America” during the 11th Annual CCUS Conference.
- Continued work on the 3-D model for the entire U.S.–Canada project area.
- Began compilation of injection scenarios for the modeling component of the project.
- E-mailed notices for the next joint U.S.–Canada technical meeting currently scheduled to be held on September 13, 2012, following the PCOR Partnership Annual Meeting in Milwaukee, Wisconsin.

### **Travel/Meetings**

- April 23 – May 4, 2012: Traveled to the Bell Creek area for another round of baseline sampling.
- April 27 – May 3, 2012: Attended and presented at the 11th Annual CCUS Conference in Pittsburgh, Pennsylvania.
- May 9–13, 2012: Attended meetings with Denbury management at its headquarters in Plano, Texas.
- May 14–18, 2012: Presented at the US–Canada Clean Energy Dialogue 2 Bilateral Meeting on May 15 and at the MVA/MMV in Large-Scale CO<sub>2</sub> Injection Tests Workshop on May 16–17, both in Mobile, Alabama.
- May 17–18, 2012: Presented before the North Dakota Lignite Research Council on May 17 in Bismarck, North Dakota.
- May 16–18, 2012: Visited potential workshop locations for the Core Analysis Basics Workshop scheduled for September 11, 2012, in Milwaukee, Wisconsin.
- May 21–24, 2012: Attended and hosted an exhibit booth at the WBPC in Bismarck, North Dakota.
- May 22–26, 2012: Attended a Schlumberger training course entitled “Petrel 2011 Geology” in Bakersfield, California.
- May 29, 2012: Visited the Phase II Lignite field validation test site to check on site closure and reclamation status near Kenmare, North Dakota.

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