



## **Plains CO<sub>2</sub> Reduction (PCOR) Partnership Monthly Update May 1–31, 2011**

### **PHASE III ACTIVITIES**

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

##### **Highlights**

- Continued efforts on the revised atlas (4th edition).
- Began updating the sources spreadsheet by replacing 2009 data with 2010 data and double-checking source locations using newer Google Earth maps that are now in focus.
- Efforts are under way to update a geographic information system (GIS) interactive map feature on the partners-only Decision Support System (DSS, © 2007–2011 EERC Foundation).
- For the Rival Field characterization:
  - Created a new Techlog (wellbore software) project with all LAS (digital) files from the Petra database for petrophysical analysis.
  - Gathered baseline input values for Mineral Solver (formation analysis software) from previously computed core plug data.
  - Imported tops from Petrel (seismic to simulation software) into Techlog for zoning purposes.
  - Created cross-plots to compare core versus log porosity and permeability.
  - In the Applied Geology Lab, 28 thin sections were analyzed and photographed.
  - Began preparation of a presentation to be given at the American Association of Petroleum Geologists (AAPG) Rocky Mountain Section (RMS) 2011 Annual Meeting on June 28 in Cheyenne, Wyoming.

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

##### **Highlights**

- Participated in the Weyburn–Midale Outreach Panel call on May 12 to discuss a project display in Weyburn and the use of focus groups to improve the ability of the project to respond to stakeholder issues.
- Received feedback from Denbury Onshore LLC (Denbury) on the initial draft of a Bell Creek test site poster (D25).
- Submitted an update to the general Phase III information (D17) PowerPoint presentation.
- Continued preparation of an update to the Fort Nelson test site (D19) PowerPoint presentation.

- Completed participation in a 3-week online seminar regarding integration of social media into outreach activities.
- Continued efforts with Prairie Public Broadcasting's (PPB's) education services on planning the November 2011 teacher training workshop at the Energy & Environmental Research Center (EERC).
- Participated in the Regional Carbon Sequestration Partnership (RCSP) Outreach Working Group (OWG) monthly conference call on May 19.
- Met with University of North Dakota Education Department personnel on May 20 to discuss potential development of a Web-based game to help students, educators, and the general public learn about CO<sub>2</sub> capture and sequestration (CCS).
- Continued outreach planning efforts for the Aquistore project.
- Continued efforts to create a database to more efficiently track the outreach products.
- Participated in an OWG workshop at the 10th Annual Conference on CCS on May 4.
- Continued preparation of a presentation to be given on June 8 at the North Dakota Petroleum Council's Teacher Seminar scheduled for June 6–9, in Bismarck, North Dakota.
- Continued preparation of a presentation to be given on June 21 at the Lignite Energy Council's 2011 Lignite Education Seminar: Energy, Economics and Environment scheduled for June 20–23, in Bismarck, North Dakota.
- Continued efforts to establish outreach activities in conjunction with Spectra Energy for the Fort Nelson demonstration site.

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

#### Highlights

- Continued development of the revised/updated Regulatory Roundup document.
- Continued plans for the next PCOR Partnership Regulatory Meeting (June 29–30). The meeting will follow the IOGCC (Interstate Oil and Gas Compact Commission) Midyear Issues Meeting in Bismarck.
- Continued discussions with and provided assistance to PCOR Partnership partner, Eagle Operating, with regard to its greenhouse gas reporting requirements.
- Held discussions with Tom Richmond, Montana Board of Oil and Gas, to review regulatory requirements and finalize plans for the proposed monitoring well at Bell Creek.
- Participated in the 2-day meeting at the EERC with visitors from Denbury.
- Reviewed the Bureau of Land Management's procedures for permitting seismic exploration on federal lands.
- Provided input on May 20, to Kathy Hill, Global CCS Institute, on its document entitled "A Review of Existing Best Practice Manuals for Carbon Dioxide Storage and Regulation."
- On May 24, participated in the U.S. Environmental Protection Agency's (EPA's) training Webinar focused on the Greenhouse Gas Reporting Program's Geologic Sequestration of CO<sub>2</sub> (40 Code of Federal Regulations Part 98, Subpart RR).
- On May 26, participated in the North Dakota Pipeline Authority's Webinar entitled "Transporting North Dakota's Natural Gas" that focused on pipeline development in the state.

- On May 25, sent out a reminder e-mail along with a draft agenda to participants of the PCOR Partnership regulatory meeting.
- Attended the Workshop on CO<sub>2</sub> Geologic Sequestration and Water Resources jointly sponsored by the Lawrence Berkeley National Lab Earth Sciences Division (ESD) and EPA, and participated in the theme entitled “Water Quality and Impact Assessment/Risk Prediction.”

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

##### Highlights

- Bell Creek test site activities included the following:
  - Submitted D34: Baseline Hydrogeological Experimental Design Package for concurrent review by Denbury and the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL).
  - Continued efforts on the geologic model, including receiving feedback from Denbury on the model methodology.
  - Planning for an outcrop field trip in Wyoming is under way. A scouting trip will be held on June 20–23, with the actual field trip scheduled for July 11–12.
  - Begin investigation on collection of LIDAR (light detection and ranging) elevation data for the Bell Creek Field.
  - Pursued reduced-price procurement of three 2-D seismic lines previously ordered and licensed by Denbury.
  - Continued efforts with Denbury on creation of the Phase 1 geologic model.
  - Continued review of underpressurized reservoirs as related to the Bell Creek Field.
- Fort Nelson test site activities included the following:
  - Participated in weekly conference calls with Spectra Energy to discuss various issues related to the project.
  - Held an in-house project update meeting on May 23.
  - Held the monthly project management conference call on May 25 between the EERC and the Spectra Energy team.
  - Began planning for the next EERC and Spectra Energy quarterly meeting scheduled for July 21 in Vancouver, British Columbia, Canada.
  - Weatherford Labs continued its geomechanical analytical activities on the core collected from the exploratory well. The analyses are scheduled to be completed on May 31, with results due to the EERC on June 15.
  - RPS Energy Canada is in the process of developing reports on the results of analytical work on the core as well as the results of a wellbore integrity study due to the EERC on May 31.
  - Interpretation of data from analysis of cuttings using x-ray diffraction is ongoing.
  - Initiated analysis of thin sections of the cap rock samples.
  - Continued efforts on the conversion of mercury capillary injection pressure to CO<sub>2</sub> capillary pressure based on literature review findings.
  - Identified approximately 30–40 wells in the Fort Nelson area for the purchase of LAS data (well logs) for use in Version 4 (July 2011) of the geologic model.

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

### Highlights

- Held a joint Denbury–EERC meeting in Grand Forks to discuss monitoring, verification, and accounting (MVA) activities and the proposed monitoring well location, completion and operational issues, and characterization program.
  - The location of the proposed monitoring well was selected along with a preliminary well logging, coring, and core analysis program.
  - Selected a tentative well completion design program (with a finalization date set for June 15, 2011).
  - Work began with procurement to solicit bids on characterization and MVA baseline services, and a follow-up meeting was scheduled for May 26 to finalize a monitoring well authority for expenditures (AFE) and completions program.
  - Tentatively scheduled the spud date for the monitoring well for August/September 2011.
  - The surface MVA program was discussed, and a revised surface-monitoring plan is under development to address site owner concerns.
- A portable gas chromatograph will be ordered (contingent on DOE approval) after Denbury approves the surface MVA baseline program.
- Continued reviewing all well files in the Phase 1 area to assess risk and completions designs.
- Began review of all plugged and abandoned wells in the Phase 1 area to assess the feasibility of reentry and outfitting as additional monitoring wells.
- Received verbal approval from Denbury to run a pulsed neutron log in one of the current production or injection wells adjacent to the proposed monitoring well location in order to determine porosity zones overlying the Muddy Formation to assess the feasibility of pressure monitoring for leakage to overlying permeable zones using pressure gauges mounted outside of the monitoring well casing.
- Plans are under way to visit the site and meet with landowners and Denbury field office staff.

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

### Highlights

- Work continued on adapting the capture technologies table (included as an appendix in the value-added capture technologies overview report submitted in March 2011) for the DSS.
- Plans are under way to distribute hard copies of the capture report to the partners.

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

### Highlights

- Participated in ongoing project discussions with Denbury.

## **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

- Participated in a Sim/Risk Group conference call on May 24, where topics discussed included an update on the Sim-SEQ project, and a request for updated modeling status/protocols for each RCSP was made.
- Continued Bell Creek site activities, including the following:
  - Participated in the 10th Annual Conference on CCS, including a presentation on May 3, entitled, “An Integrated Characterization, Modeling, Risk Assessment, and Monitoring Plan for the Fort Nelson CCS Project.”
  - Continued preparation of the report entitled “Site Characterization, Modeling, and Monitoring Plan” (D50).
  - Worked on production, injection, perforation, and stimulation treatment data. Data are ready for the simulation.
  - Conducted a test run of the simulation for the Phase 1 area.
  - Continued to work on the five-spot pattern simulation.
  - History match is under way using the basic geologic model in preparation for simulations to predict reservoir performance.
  - Updated the west–east cross section for an MVA core analysis discussion.
- Continued Fort Nelson site activities, including the following:
  - Participated in the 10th Annual Conference on CCS, including a poster presentation on May 3, entitled “The Plains CO<sub>2</sub> Reduction (PCOR) Partnership’s Phase III Bell Creek Integrated CO<sub>2</sub> EOR and Storage Project.”
  - Continued work on the history matching (pressure in injection and transient regions). Final history matching will be complete by June 3.
  - Continued work on prediction simulation (gas production rate control and water recycle). Preparation of D67 – Simulation Report will be initiated following the predictive simulations.
  - Continued risk assessment activities.

## **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)**

- The project assessment report (D57) for the period October 1, 2010 – September 30, 2011, will be submitted by December 31, 2011. The report for the previous program year is available on the partners-only Web site.  
([www2.undeerc.org/website/pcorp/ProductsDB/pdfs/ENS\\_D57\\_Task12\\_Dec10.pdf](http://www2.undeerc.org/website/pcorp/ProductsDB/pdfs/ENS_D57_Task12_Dec10.pdf))

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

#### Highlights

- Participated in the 10th Annual Conference on CCS, including oral presentation of the following:
  - On May 4, a presentation given by Ed Steadman entitled “The Plains CO<sub>2</sub> Reduction (PCOR) Partnership: A Regional Carbon Sequestration Partnership Conducting Large-Scale Field Tests”
  - On May 4, a presentation given by Ed Steadman entitled “The Plains CO<sub>2</sub> Reduction (PCOR) Partnership: Collaborative United States–Canada Carbon Capture and Storage Demonstration Activities”
- Participated in Bell Creek project meetings on May 10 and 11 with Denbury at the EERC.
- Continued efforts toward populating and updating the partners database which was programmed in-house.
- Began organizing a project facilitation and planning meeting with Spectra Energy on the Fort Nelson project in July 2011.
- Continued planning the PCOR Partnership Annual Meeting and premeeting workshop to be held September 12–14 in Denver, Colorado.
  - Plans are under way for the workshop to be held at the U.S. Geological Survey’s Core Research Center (<http://geology.cr.usgs.gov/crc/>), followed by a visit to the Colorado School of Mines Geology Museum ([www.mines.edu/Geology\\_Museum](http://www.mines.edu/Geology_Museum)).
  - Efforts to secure a media consultant to speak during the annual meeting continued.
  - Sites for the September 13 evening event are under consideration.
- Continued meeting with task leaders and key personnel on budget status and (re)allocation.
- Held a task leader meeting on May 19, where the following topics were discussed: a recap of the Denbury (May 10–11) meeting; the Basal Cambrian (Deadwood Formation) project; upcoming deliverables; and updates on the Bell Creek, Fort Nelson, Aquistore, Rival, and Zama projects.
- Deliverables and milestones completed in May included the following:
  - April monthly update
  - Task 2: D17 – General Phase III Information PowerPoint Presentation (Update)
  - Task 4: D34 – Baseline Hydrogeological Experimental Design Package
  - Task 14: M23 – Monthly Water Working Group (WWG) Conference Call Held
- Deliverables and milestones due in June include the following:
  - May monthly update
  - Task 2: D19 – Fort Nelson Test Site PowerPoint Presentation (Update)
  - Task 13: D58/D59 – Quarterly Progress Report/Milestone Quarterly Report
  - Task 14: M23 – Monthly WWG Conference Call Held

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

#### Highlights

- Held WWG Annual Meeting on May 5.
- Discussed the potential for the WWG to advise further development of the NATCARB database and potential for development of client-focused WWG fact sheets.
- Edited and sent out notes on May 11 from monthly conference call held April 21.

- Finalized the internal review of the Technology Gap Assessment document. This document will be sent out for review by the WWG early this week along with notes and follow-up items from the annual meeting.
- Distributed the “Nexus of Water and CCS – Technology Gaps” document to the WWG for review. Comments are due back May 27.
- Reviewed notes from the annual meeting.
- Had e-mail contact with Tim Carr and Maneesh Sharma regarding timing of feedback on brine database items. Plan to distribute database items early next week (along with notes from annual meeting), and have them due back June 6.

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

#### Highlights

- Bill Jackson, Manager, Regulatory and Compliance, Public and Government Affairs, at Apache Canada retired on May 13, 2011.
- Uploaded petrophysical properties into the geologic model.
- Adjusted reservoir properties and began history matching and predictive simulation.
- Continued discussion of information to be included in D86 – an update to the regional technology implementation plan, including this summer’s reservoir simulation work and documentation for the monetization of carbon credits.

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

#### Highlights

- Participated in the 10th Annual Conference on CCS in Pittsburgh, Pennsylvania, including the following:
  - Wes Peck gave an oral presentation on May 4, entitled “Application of the U.S. Department of Energy (DOE) CO<sub>2</sub> Storage Resource Estimation on the Deadwood Formation, Williston Basin”
  - Stefan Bachu gave an oral presentation (coauthored by Wes Peck) on May 4, entitled “the Potential for and Possible Effects of CO<sub>2</sub> Storage in the Basal Aquifer in the Northern Plains – Prairie Region of North America: A Joint United States–Canada Project.”
- Participated in the next meeting of the Joint United States–Canada Basal Aquifer Project’s technical and steering committees at the NETL headquarters in Pittsburgh on May 25.
- Participated in several project planning meetings.
- Continued work on the development of the Basal Cambrian geologic model.
- Worked with procurement personnel to purchase digitized well logs.
- Discussed synergies between the Aquistore project and Basal Cambrian project. Jim Sorensen attended an Aquistore advisory meeting in Chicago. The next Aquistore project geologic heads of state meeting will be held on June 22 in Calgary.
- Initiated work to compile previous works on the groundwater chemistry, recharge areas, and subsurface regional flow.

**Travel/Meetings**

- April 22–30, 2011: Presented at the IEAGHG Joint Modelling and Wellbore Network Meeting in Perth, Australia.
- April 30 – May 3, 2011: Traveled to the 19th Williston Basin Petroleum Conference in Regina, Saskatchewan.
- May 1–5, 2011: Presented at the 10th Annual Conference on CCS in Pittsburgh, Pennsylvania.
- May 15–17, 2011: Participated in an Aquistore Project Science and Engineering Research Committee meeting in Chicago, Illinois.
- May 15–19, 2011: Participated in Schlumberger’s Petrel Reservoir Engineering training in Houston, Texas.
- May 18–19, 2011: Participated in a partner meeting with Eagle Operating in Bismarck, North Dakota.
- May 24–25, 2011: Participated in a United States–Canada Basal Aquifer Project meeting in Pittsburgh, Pennsylvania.
- May 25–26, 2011: Traveled to a meeting with Denbury in Plano, Texas.
- May 31 – June 2, 2011: Attended the 2011 CO<sub>2</sub> Geologic Sequestration & Water Resources workshop in Berkeley, California.



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