



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

### Plains CO<sub>2</sub> Reduction (PCOR) Partnership Monthly Update November 1–30, 2012

#### **PHASE III ACTIVITIES**

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

###### **Highlights**

- Traveled to the Billings office of the Montana Board of Oil and Gas to collect well file information on wells in the Pennel and Pine oil fields on October 30 – November 2, 2012.
- Continued review of updates to the latest edition of PCOR Partnership Atlas (Deliverable [D] 81, update due August 2013).
- Began creating a large-scale map of the Pine oil field and Cedar Creek Anticline.
- Continued updating the Decision Support System (DSS, © 2007–2012 Energy & Environmental Research Center [EERC] Foundation<sup>®</sup>) with new oil fields, wells, and gas plants.
- Presented information on the Pine–Pennel oil fields to a Denbury Onshore, LLC (Denbury), visitor on November 13, 2012.

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

###### **Highlights**

- Continued testing the outreach database.
- Prairie Public Broadcasting (PPB) filmed casing activities at the Aquistore project site in Estevan, Saskatchewan.
- Continued updating the Phase III general fact sheet (D14) due February 2013.
- Continued updating the Lignite Field validation site fact sheet (value-added).
- Held a discussion with Spectra Energy Transmission (Spectra) management on November 29 regarding its review of D19, Fort Nelson PowerPoint presentation.
- Provided outreach and education information for the annual assessment report.
- Attended and presented at the 11th International Conference on Greenhouse Gas Control Technologies (GHGT-11) in Kyoto, Japan, November 18–22, 2012.
- Continued preparation of a value-added video short, including a script revision and film edit, focused on smart casing installation or permanent downhole monitoring for carbon capture and storage (CCS) reservoir monitoring.

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

#### Highlights

- Continued activities associated with the Interstate Oil and Gas Compact Commission (IOGCC) Carbon Geologic Storage (CGS) Task Force, including the following:
  - Coordinated CGS Task Force activities with Kevin Bliss Consulting, and continued planning for the December 2012 subgroup meeting/conference call.
  - Identified the operational and postoperational liability subcommittee members.
  - Held the first subgroup meeting on November 8, 2012.
- Hosted a visitor from Denbury on November 13, and provided an overview of PCOR Partnership activities and a tour of the EERC facilities.
- With regard to the Lignite site (Phase II) closure:
  - Continued efforts to monitor the site during the reclamation phase.
  - Continued to modify a draft value-added report on closure activities.

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

#### Highlights

- Fort Nelson test site activities included the following:
  - Participated in a conference call with Spectra on November 6, 2012. Topics discussed included potential path(s) forward, Spectra's upcoming visit to the EERC, and the order of priority for Spectra's review of pending deliverables (including D67, D65, D19, and D41).
  - Participated in several conference calls regarding the Fort Nelson CCS Project.
  - Continued wrap-up of geomechanical modeling.
  - Attended and presented a poster at GHGT-11 Conference in Kyoto, Japan, November 18–22, 2012.
- Bell Creek test site activities included the following:
  - Continued work on the Geomechanical Final Report (D32) due February 28, 2013.
  - Continued building a facies object model.
  - Continued work on the 3-D mechanical earth model.
  - Continued to discuss special core analysis (SCAL) work with Core Labs and made plans for a short meeting on December 5 (during a flight layover) in Houston, Texas
  - Completed final adjustments to the petrophysical properties of the fieldwide model.
  - Began sensitivity analysis in Petrel.
  - Developed a depofacies model using historic and recently acquired core data.
  - Participated in several reservoir saturation tool (RST) log review conference calls with Schlumberger and Denbury.
  - Began planning for an RST log review meeting on December 3–4, 2012, at Denbury's headquarters.
  - Discussed experimental permeability measurements with EERC lab personnel.
  - Staff participated in the Society of Petroleum Engineers (SPE) Forum Series on Novel Techniques for Reservoir Modeling in Santa Fe, New Mexico, November 4–9, 2012.

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

### Highlights

- Completed the GHGT-11 poster associated with the paper.
- Attended and presented at the GHGT-11 Conference in Kyoto, Japan, November 18–22, 2012.
- Continued evaluation of well integrity throughout the Bell Creek Field.
- Completed final (fifth-round) baseline soil gas- and water-sampling event at Bell Creek on November 2–9, 2012.
- Continued analysis and data integration of final baseline and soil gas-sampling (Event 5) data.
- Completed pulsed-neutron (PN) baseline logging on ten of 54 wells.
- Planned a PN log review meeting in Plano on December 4, 2012, with Schlumberger and Denbury.
- Continued preparation of a technical presentation about the Bell Creek surface and near-surface Monitoring, Verification, and Accounting (MVA) program to be given to the PCOR Partnership Technical Advisory Board (TAB).
- Attended the Denbury landowner appreciation/new facilities banquet on November 8.
- Distributed Event 3 (June 2012) landowner water analysis packages.
- Continued work on the baseline MVA report, consisting of three sections: 1) site descriptions, 2) sampling protocol, and 3) field and lab analyses.
- Continued preparations for drilling a groundwater-monitoring well in December 2012.
- Continued preparation of a mitigation plan under probable scenarios of vertical CO<sub>2</sub> migration.

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

### Highlights

- Presented a paper on a methodology for phased design of a hypothetical CO<sub>2</sub> pipeline network at the 2012 American Institute of Chemical Engineers (AIChE) Annual Meeting in Pittsburgh, Pennsylvania, on October 29 – November 2.
- Prepared a written version of the presentation given at the AIChE meeting, which will be submitted for publication in *Energy & Fuels* in early December. Pipeline experts were contacted to be peer reviewers for the paper.
- Continued collecting information to use in updating the report entitled “Opportunities and Challenges Associated with CO<sub>2</sub> Compression and Transport During CCS Activities.” This is an update of D85, which the Statement of Project Objectives (SOP) requires to happen biennially to ensure that it remains current. The first version was submitted in March 2011.
- Incorporated EERC management suggestions for improving the capture technology tree.
- Completed work on the GHGT-11 poster associated with the paper on a methodology for the phased design of a hypothetical CO<sub>2</sub> pipeline network.

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

#### Highlights

- Participated in ongoing project discussions with Denbury.
- Traveled to Plano, Texas, to meet with Denbury on November 1, 2012.

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

#### Highlights

- Continued reviewing information about enhanced oil recovery (EOR) injection site surface facilities.

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

#### Highlights

- Continued Fort Nelson site activities, including the following:
  - Completed work on a poster for the GHGT-11 Conference.
  - Attended and presented a poster at the GHGT-11 Conference in Kyoto, Japan, November 18–22, 2012.
- Continued Bell Creek site activities, including the following:
  - Prepared purchase order for PVTsim software.
  - Ran simulation scenarios of different perforations.
  - Worked on flow region determination.
  - Worked on capillary pressure for OWC (oil and water contact) at various conditions for the model.
  - Participated in an in-house monthly modeling and simulation meeting on November 28.
  - Continued work on a Bell Creek subnormal pressure mechanism paper for the 2013 International Petroleum Technology Conference (IPTC) in Beijing.

### **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

- Continued working on the annual assessment report (D57) due December 31, 2012.

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

#### Highlights

- Reviewed the GHGT-11 draft posters.
- Continued work on D57, the annual assessment report, due December 31, 2012.
- Continued work on the updated Project Management Plan (PMP).
- Hosted a WebEx on the Bell Creek Baseline Soil Gas and Water Analysis with Denbury personnel on November 28, 2012.
- Began preparation of a draft agenda for the March 5 and 6, 2013, TAB meeting in Orlando, Florida.
- Began preparation of an agenda for the TAB WebEx on January 3, 2013.
- Discussed in-house the Aquistore scope of work.
- Participated in a conference call with consultant BillyJack Consulting.
- On November 23, sent an e-mail reminder and calendar notice for the March 5 and 6, 2013, meeting to be held at the Caribe Royale Hotel and Convention Center in Orlando.
- Prepared minor updates to several fact sheets.
- EERC staff hosted an exhibit booth at the National Advanced Biofuels Conference on November 27–29, 2012, in Houston and distributed PCOR Partnership materials (along with other EERC materials).
- Deliverables and milestones completed in November:
  - October monthly update
  - Task 14: M23 – Monthly Water Working Group (WWG) conference call held

### **Task 14 – Regional Carbon Sequestration Partnership (RCSP) WWG Coordination (Ryan J. Klapperich)**

#### Highlights

- Finalized first draft of water–CCS nexus-related fact sheet (D99) with Dave Nakles for review by WWG members.
- Distributed the notes from the October 25 conference call on November 15, 2012.
- Held the monthly conference call on November 28, 2012. Topics discussed included development of a WWG research agenda and water resource protection fact sheet draft.
- Received formal approval to waive the December WWG conference call.
- Made a formal request of WWG members to provide feedback on call items if they have not done so.
- Continued reviewing the WWG white paper in preparation for journal article submission.
- Shared information related to WWG outreach activities with the RSCP Outreach Working Group (OWG). The OWG is also working on documents related to water resource protection.
- Participated in the November OWG call (November 15) to discuss an early draft of its water resource “Message Map” and other topics.

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

#### Highlights

- Completed work on the GHGT-11 poster associated with the paper.

- Staff presented a poster at the GHGT-11 conference in Kyoto, Japan, November 18–22, 2012.
- Worked on building static and dynamic geologic models.
- Worked on minimum miscibility pressure (MMP) modeling for Zama G2G pinnacle.
- Held an in-house Zama project update meeting to discuss project progress with team members on November 29.
- Continued review of relevant published literature and internal technical reports/presentations on the geologic and reservoir characteristics of the Zama subbasin.
- Participated in an in-house meeting to discuss static model development. Worked on problems related to georeferencing the well data in ArcGIS (for the static modeling).
- Discussed possible use of CMOST software for dynamic simulation.

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

### Highlights

- Completed work on the GHGT-11 poster associated with the paper.
- Staff attended and presented a poster at the GHGT-11 Conference entitled “CO<sub>2</sub> Storage Resource Potential of the Cambro–Ordovician Saline System in the Western Interior of North America” in Kyoto, Japan, November 18–22, 2012.
- Continued geochemical modeling runs for the various horizons in several wells in order to investigate the interaction of CO<sub>2</sub> with the host rock.
- Staff traveled to Calgary, Alberta, Canada, to view the core collected from the Aquistore well near Estevan, Saskatchewan, Canada, November 5–8, 2012. Notes and pictures from the core-viewing trip to Calgary are being compiled into a package for the Petroleum Technology Research Centre (PTRC), including notes, descriptions, and interpretations.
- Continued compiling results, including scanning electron microscopy/x-ray diffraction (SEM/XRD) data, from lab work and writing a report.
- Completed writing sections on experimental investigation of CO<sub>2</sub>–brine–reservoir sandstone interactions and geochemical modeling of CO<sub>2</sub>–brine–reservoir sandstone interactions.
- Initiated a literature review for the geochemical modeling report (D89, due March 2013) to ensure that data generated are valid.
- Continued work on the report describing the well bore integrity issues (D90, due September 2013) for wells in the Cambro–Ordovician saline system in the United States.
- Participated in discussions about the various total dissolved solids for the modeling and simulations.

### **Travel/Meetings**

- October 28 – November 2, 2012: Attended and presented at the AIChE Annual Meeting in Pittsburgh, Pennsylvania.
- October 28 – November 3, 2012: Modeling staff participated in Schlumberger software training entitled “Techlog Formation Evaluation Course” in Houston, Texas.
- October 29 – November 2, 2012: Participated in and presented at the IOGCC 2012 Annual Meeting in San Antonio, Texas.

- October 30 – November 2, 2012: Traveled to the Montana Board of Oil and Gas Conservation to collect well data in Billings, Montana.
- November 1, 2012: Traveled to the Lignite Field site to inspect the site in Kenmare, North Dakota.
- November 1–13, 2012: Traveled to the Bell Creek oil field for site work near Gillette, Wyoming.
- November 4–9, 2012: Attended the SPE Novel Techniques for Reservoir Modeling Forum in Santa Fe, New Mexico.
- November 5–6, 2012: Traveled to the Bell Creek oil field to collect data near Miles City, Montana.
- November 5–7, 2012: Participated in meetings with PTRC in Calgary, Alberta.
- November 6–7, 2012: Traveled to the Bell Creek oil field for a site visit near Gillette, Wyoming.
- November 8–9, 2012: Traveled for a hotel site visit for a future PCOR Partnership annual meeting in Minneapolis, Minnesota.
- November 14–24, 2012: Attended and presented at the GHGT-11 Conference in Kyoto, Japan.
- November 15, 2012: Traveled to the Lignite Field site in Kenmare, North Dakota, to inspect the site.
- November 29, 2012: Traveled to the Lignite Field site in Kenmare, North Dakota, to inspect the site.

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