



Plains CO₂ Reduction (PCOR) Partnership Energy & Environmental Research Center (EERC)

Plains CO₂ Reduction (PCOR) Partnership Monthly Update August 1–31, 2012

PHASE III ACTIVITIES

Task 1 – Regional Characterization (Wesley D. Peck)

Highlights

- Continued to acquire updated cumulative oil production numbers for the fields and pools in the U.S. portion of the PCOR Partnership region, including Montana and South Dakota.
- Continued discussing options for the characterization of a third target area (Deliverable [D] 7, due September 2014).
- Initiated the collection of data for the Pine oil field (the south unit) along the Cedar Creek Anticline in southeastern Montana.
- Contacted the Montana Oil and Gas Commission with a request to obtain a custom data set of formation-level oil, gas, and water production for the oil fields in the PCOR Partnership region.
- Continued the annual update of the source attributes in the PCOR Partnership region (D1, due September 2012).
- Performed and completed a detailed quality assurance/quality control review of the CO₂ sources database.
- Continued gathering Bell Creek data for upload to the demonstration project reporting system (D10, due September 2012) located on the Decision Support System (DSS, © 2007–2012 EERC Foundation®).
- Continued Rival oil field characterization efforts, including the following activities:
 - Worked on the Petrel model to incorporate missing wells.
 - Continued capacity pressure analysis.
 - Continued work on the drill stem test review and static pressure analysis.
 - Ran pressure–volume–temperature (PVT) analysis using available data.
 - Ran water saturation models.

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

Highlights

- Participated in a Regional Carbon Sequestration Partnership Outreach Working Group (OWG) meeting held August 20, 2012, in Pittsburgh, Pennsylvania.
- Presented a poster entitled “Regional and Project-Based CCUS Outreach – The PCOR Partnership Experience” on August 21, 2012, at the U.S. Department of Energy (DOE) Carbon Storage R&D Project Review Meeting held in Pittsburgh, Pennsylvania.

- Spent 2 days (August 7–8, 2012) filming water and soil sampling activities with Prairie Public Broadcasting (PPB) at the Bell Creek site for use in the Bell Creek Test Site 30-minute documentary (D21, due November 2014).
- Met with PPB staff on August 15, 2012, to review budgets, deliverables, and filming schedules for Program Year 6.
- Spent a day (August 24) filming laboratory activities at the Energy & Environmental Research Center (EERC) laboratory activities for use in the upcoming Bell Creek documentary (D21, due November 2014).
- Spent 3 days (August 27–29, 2012) filming with PPB at the Aquistore project near Estevan, Saskatchewan, Canada, and initiated discussions with SaskPower to film at the Boundry Dam project site.
- Continued planning for a PPB filming trip to the Bell Creek site on September 3, 2012, to capture the 3-D seismic survey acquisition activities.
- Continued planning for a PPB filming trip to the Bell Creek site in mid-to-late September 2012 to capture the Greencore Pipeline construction.
- Continued preparation of a value-added video short focused on smart casing installation for carbon capture and storage (CCS) reservoir monitoring.
- Discussed on August 30, 2012, the OWG paper and poster to be presented on message mapping at the upcoming 11th International Conference on Greenhouse Gas Technologies (GHGT-11) scheduled for November 18–22, 2012, in Kyoto, Japan.
- Prepared draft public Web site update pages for “Meet the Partnership” and new video clips taken from the “Global Energy and Carbon: Tracking our Footprint” documentary.
- Added a “Partner News” section to the public Web site, announcing the launch of a National Indian Carbon Coalition (NICC) carbon management Web site for Indian Country. The NICC is a joint project of the Indian Land Tenure Foundation (a member of the PCOR Partnership) and the Intertribal Agriculture Council.
- Continued efforts to develop and populate the outreach tracking database including requests for additional data from PPB and the Lignite Energy Council.

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

Highlights

- Held the 4th Annual Regulatory Roundup meeting July 31 – August 1, 2012, in Deadwood, South Dakota.
 - 13 people attended, including three representatives from the EERC and regulators from North Dakota, Montana, and Alberta, Canada. Also present were representatives from the Interstate Oil and Gas Compact Commission (IOGCC); Melzer Consulting; CETER Group; Bliss Consulting; and Premier Oil Recovery, LLC (Figure 1).
 - Presentations were given on the following:
 - Recap of 2011 Regulatory Roundup
 - Discussion of relevant federal activity
 - IOGCC update
 - Provincial/state CCS updates
 - National Enhanced Oil Recovery Initiative

- Posted the presentations to a secure FTP site for the meeting participants to review and download.
- Began preparation of a meeting summary.
- Continued activities associated with the IOGCC Carbon Geologic Storage (CGS) Task Force, including the following:
 - Held a conference call with IOGCC personnel and Kevin Bliss Consulting.
 - Began contacting potential task force participants and experts.
 - Prepared a subcontract agreement for IOGCC support of the CGS Task Force.
 - Began preliminary plans for a task force kickoff meeting during the first week of October 2012.
- Hosted Praxair (partner) at the EERC and provided a tour of the facilities on August 21, 2012.
- With regard to the Lignite Site (Phase II) closure:
 - Continued efforts to monitor the site during the reclamation phase.
 - Continued to review a draft value-added report on closure activities.



Figure 1. Attendees at the 4th Annual Regulatory Roundup held July 31 – August 1, 2012, in Deadwood, South Dakota.

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

Highlights

- Fort Nelson test site activities included the following:
 - Began preparation of a brief project update for use in the next Carbon Sequestration Leadership Forum (CSLF) Strategic Plan Implementation Report (SPIR) due September 6, 2012.

- Prepared a draft paper entitled “Overview, Status, and Future of the Fort Nelson CCS Project” for the upcoming GHGT-11.
- Bell Creek test site activities included the following:
 - Continued work on the fieldwide 3-D geologic model, including the continuation of lithofacies modeling to determine effective and total porosity values.
 - Continued work on the geomechanical model, including working on the 3-D model by incorporating the 1-D model results.
 - Discussed special core analysis work with Core Labs.
 - Submitted four sidewall core and five U.S. Geological Survey core samples for clay typing and mineral mapping through x-ray diffraction, x-ray fluorescence, and scanning electron microscopy analyses.
 - Continued sample selection for a CO₂ exposure study of 14 samples within the Mowry and Muddy Formations.
 - Began picking tops for the geologic model.

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

Highlights

- Continued preparation of a technical presentation about the Bell Creek surface water, groundwater, and soil gas baseline sampling program to be given to the PCOR Partnership Technical Advisory Board (TAB).
- Presented an “Overview of the Bell Creek Combined CO₂ Storage and CO₂ EOR Project” at the 34th International Geological Congress held August 5–10, 2012, in Brisbane, Australia.
- Conducted the fourth round of baseline soil gas and water sampling monitoring, verification, and accounting (MVA) activities on August 5–10, 2012.
- Participated in a pulsed neutron and tracer flood knowledge sharing meeting with Denbury, Schlumberger, and ProTechnics held August 20, 2012, in Plano, Texas.
- Continued work on a value-added preinjection surface water, groundwater, and soil gas baseline MVA sampling and analysis report including results.
- Prepared a draft paper on the Bell Creek project for the upcoming GHGT-11.
- Continued evaluation of well completions throughout the Bell Creek Field.
- Distributed the Event 2 (April 23–29, 2012) landowner packages that included water analysis baseline MVA activities.
- Continued preparation of a mitigation plan under probable scenarios of vertical CO₂ migration.
- Continued deep surface-monitoring activities including an evaluation as to the feasibility of installing two deep groundwater-monitoring wells and planning preinjection baseline logging and seismic acquisitions.
- Continued planning for baseline MVA acquisitions, including seismic and pulsed-neutron well logs.
- Completed the August soil gas, groundwater, and surface water sampling event at the Bell Creek Field.
- Continued incorporating the June–August sampling event data, which will provide a comparison between cool and warm weather samples.

- Downloaded and cleared data archived on the Qorex fiber optic distributed temperature system and Promore pressure temperature gauge systems installed in the 0506OW well.

Task 6 – Infrastructure Development (Melanie D. Jensen)

Highlights

- Completed review of the interactive capture technology tree on the partners-only DSS test Web site. The programming team fixed typographical errors and broken links.
- The capture technology tree will be featured at the PCOR Partnership Annual Meeting in the “New for 2012” PCOR Partnership exhibit booth.
- Prepared a draft paper for the upcoming GHGT-11 on the phased approach to building a CO₂ pipeline network.

Task 7 – CO₂ Procurement (John A. Harju)

Highlights

- Participated in ongoing project discussions with Denbury.

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

Highlights

- Initiated a short document summarizing the CO₂ processing at enhanced oil recovery (EOR) surface facilities.

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

Highlights

- Modeling staff participated in Computer Modelling Group (CMG) simulation software training for PVT (WINPROP) modeling on August 22 and for CO₂ EOR modeling on August 23–24, 2012, in Houston, Texas.
- Continued Fort Nelson site activities, including the following:
 - Held a conference call with Spectra Energy on August 16, 2012. Topics discussed included the following:
 - Spectra Energy status update
 - Outstanding deliverables (D67 [2011], D65/M29, D41/M32, D19)
 - PCOR Partnership Annual Meeting
 - Modeling update
 - Presented a poster entitled “Overview of the Fort Nelson CCS Project” at the 34th International Geological Congress held August 5–10, 2012, in Brisbane, Australia.
 - Addressed questions raised by Spectra Energy regarding the risk assessment simulations and provided additional data.
 - Began work on a draft paper entitled “The Role of Static and Dynamic Modeling in the Fort Nelson CCS Project” for the upcoming GHGT-11.
- Continued Bell Creek site activities, including the following:
 - Continued work on the Phase 1 model prediction.

- Submitted the executive summary for the Bell Creek Test Site – Simulation Report, Update 1 (D66) on August 31, 2012.
- Continued work on prediction of new CO₂ injection scenarios.
- Continued modeling water saturation determination using new approaches.
- Generated the average pressure with bottomhole pressure tests.
- Worked on hysteresis model.

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

- The next assessment report is due by December 31, 2012.

Task 13 – Project Management (Charles D. Gorecki)

Highlights

- Welcomed Air Products and Chemicals, Inc., back as a PCOR Partnership partner!
- Presented on the PCOR Partnership Program at the 34th International Geological Congress held August 5–10, 2012, in Brisbane, Australia.
- Presented an oral update and a triptych poster overview of the PCOR Partnership Program on August 21, 2012, at the DOE Carbon Storage R&D Project Review Meeting held in Pittsburgh, Pennsylvania.
- Began preparations to participate in a panel discussion called “Is There a Business Case for Widespread CO₂ EOR from CO₂ Captured from Energy and Other Industrial Sources?” scheduled for September 5, 2012, as part of the 2012 CCS Binational Conference in Regina, Saskatchewan, Canada.
- Continued planning for the upcoming PCOR Partnership Annual Meeting and Workshop scheduled for September 11–13, 2012, in Milwaukee, Wisconsin. Activities included the following:
 - Held an in-house annual meeting run-through on August 27, 2012.
 - Continued preparation of booth backdrops.
 - Continued preparation of a program time line running from 2003–2012 (10 years).
 - Continued development of the presentations and handouts for the Core Analysis Basics workshop.
 - Sent an e-mail blast to the partnership on August 21, 2012, with information about the hotel room block at the InterContinental Hotel.
 - Sent an e-mail to all annual meeting participants on August 31, 2012, with “Everything You Need to Know” about the upcoming annual meeting and workshop.

- Prepared meeting materials for the PCOR Partnership TAB breakfast meeting scheduled for September 12, 2012, in conjunction with the annual meeting in Milwaukee, Wisconsin.
- Began planning for an interim financial closeout of the Phase II award in order to comply with the University of North Dakota's record retention policy.
- Deliverables and milestones completed in August:
 - July monthly update
 - Task 9: D66 – Bell Creek Test Site – Simulation Report (Update)
 - Task 14: M23 – Monthly Water Working Group (WWG) conference call held

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

Highlights

- Staff presented a poster entitled “IEAGHG Investigation of Extraction of Formation Water from CO₂ Storage” on August 21, 2012, at the DOE Carbon Storage R&D Project Review Meeting held in Pittsburgh, Pennsylvania.
- Distributed two tables describing ongoing or recently completed water and CCS-related research projects to the WWG members on August 15, 2012.
- Held the monthly conference call on August 30, 2012.
- Distributed the notes from the July 24, 2012, conference call on August 17, 2012. There were 11 participants on this call, including three EERC personnel. Topics discussed included the following:
 - Development of data tables related to the research agenda.
 - Discussion of a new fact sheet.
- Prepared a draft paper entitled “IEAGHG Investigation of Extraction of Formation Water from CO₂ Storage” for the upcoming GHGT-11.
- Prepared a draft paper entitled “Four-Site Case Study of Water Extraction from CO₂ Storage Reservoirs” for the upcoming GHGT-11.
- Began development of a new WWG fact sheet for discussion during the September conference call.

Task 15 – Further Characterization of the Zama Acid Gas EOR, CO₂ Storage, and Monitoring Project (James A. Sorensen)

Highlights

- Staff presented a poster entitled “A Simulation Study of Simultaneous Acid Gas EOR and CO₂ Storage at Apache's Zama F Pool” on August 21, 2012, at the DOE Carbon Storage R&D Project Review Meeting held in Pittsburgh, Pennsylvania.
- Began preparation of a brief project update for use in the next CSLF SPIR due September 6, 2012.
- Prepared an outline and draft paper for GHGT-11 on the Zama F Pool simulation study.
- Worked on running several predictive simulation scenarios (EOR and water extraction).

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

Highlights

- Staff presented a poster entitled “CO₂ Storage of the Cambro-Ordovician Saline System in the Northern Great Plains–Prairie Region of North America” on August 21, 2012, at the DOE Carbon Storage R&D Project Review Meeting held in Pittsburgh, Pennsylvania.
- Prepared an outline and draft paper for the upcoming GHGT-11.
- Began development of a report outline for the wellbore integrity investigation.
- Began development of a report outline for the geochemical characterization of the system.
- Continued planning for the Basal Aquifer Technical Committee meeting scheduled for September 13, 2012, in conjunction with the PCOR Partnership Annual Meeting in Milwaukee, Wisconsin. The final agenda was e-mailed to participants on August 31, 2012. Topics to be discussed include the following:
 - Update on EERC activities, including well integrity, 3-D model progress, and injection scenarios.
 - Update on Alberta Innovates–Technology Futures (AITF) activities.
 - Update on Lawrence Berkeley National Laboratory activities.
 - Update on Princeton University activities.
 - Next steps and plans for the next meeting.
- Continued work on the 3-D model of the Cambro-Ordovician saline system.
- Began writing a portion of the report that describes the development of the 3-D model.
- Continued work on the geochemical analysis of the basal Cambro-Ordovician saline system with respect to potential chemical reactions that might be expected with the injection of CO₂.

Travel/Meetings

- July 26 – August 1, 2012: Attended Schlumberger OFM Fundamentals Training in Houston, Texas.
- July 29 – August 1, 2012: Hosted the 4th Annual Regulatory Roundup in Deadwood, South Dakota.
- August 1, 2012: Visited the (Phase II) Lignite site near Kenmare, North Dakota.
- August 1–3, 2012: Presented before the North Dakota Association of Rural Electric Cooperatives members services summer meeting in Hankinson, North Dakota.
- August 1–10, 2012: Presented at the 34th International Geological Congress in Brisbane, Australia.
- August 4–10, 2012: Traveled to the Bell Creek Field with PPB to film water and soil gas baseline sampling activities.
- August 6–17, 2012: Sampling team traveled to the Bell Creek Field for fourth-round baseline sampling.
- August 19–21, 2012: Participated in a log review meeting at Denbury’s headquarters in Plano, Texas.
- August 19–24, 2012: Presented at the DOE Carbon Storage R&D Project Review meeting in Pittsburgh, Pennsylvania.
- August 21–25, 2012: Attended CMG simulation software training in Houston, Texas.
- August 22–25, 2012: Traveled to the Bell Creek Field to download temperature and pressure data at the monitoring well site near Broadus, Montana.

- August 27–31, 2012: Traveled to the Bell Creek Field to attend a seismic acquisition kickoff meeting that Denbury hosted near Broadus, Montana.

EERC DISCLAIMER

LEGAL NOTICE: This research report was prepared by the EERC, an agency of the University of North Dakota, as an account of work sponsored by the U.S. Department of Energy. Because of the research nature of the work performed, neither the EERC nor any of its employees makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement or recommendation by the EERC.

DOE DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government, nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

NDIC DISCLAIMER

This report was prepared by the EERC pursuant to an agreement partially funded by the Industrial Commission of North Dakota, and neither the EERC nor any of its subcontractors nor the North Dakota Industrial Commission nor any person acting on behalf of either:

- (A) Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or
- (B) Assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method, or process disclosed in this report.

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by NDIC. The views and opinions of authors expressed herein do not necessarily state or reflect those of the NDIC.