



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

Plains CO₂ Reduction (PCOR) Partnership Monthly Update July 1–31, 2013

PHASE III ACTIVITIES

Task 1 – Regional Characterization (Wesley D. Peck)

Highlights

- Continued reviewing and updating the attribute data for the CO₂ sources database (Deliverable [D] 1, due September 2013), including the following:
 - Continued work on verification of older sources.
 - Continued updating the Canadian sources.
- Continued work on the Nebraska characterization value-added report.
- Continued efforts to characterize additional saline formations for carbon dioxide (CO₂) storage, including the following:
 - Continued compilation of formation evaluations for six formations found in the PCOR Partnership region, namely the Broom Creek, Inyan Kara, Leduc, Minnelusa, Mission Canyon, and Winnipegosis Formations (Fms).
 - Continued data collection for characterization of the Inyan Kara and Broom Creek Fms.
- Continued activities to update the content on the partners-only Decision Support System (DSS), including the following:
 - Began updating the following Web pages:
 - ♦ “Keep Me Informed”
 - ♦ “EERC Contacts”
 - ♦ “PCOR Partnership”
 - Continued to add descriptions for the atlas images for addition to the “Image Gallery.”
- With regard to the Aquistore project static modeling and dynamic predictive simulations effort:
 - Continued review of the observation well and injection well suites of data, e.g., logs, sidewall core analyses, and drilling reports.
 - Reviewed the North Dakota Industrial Commission (NDIC) and Saskatchewan Oil and Gas databases for additional wells penetrating the Precambrian in the vicinity of the project.
 - Continued work on the static model, including creating surfaces for the following formations: Red River, Icebox, Black Island, Deadwood, and Precambrian.
 - Participated in the Petroleum Technology Research Centre (PTRC) SERC (Science and Engineering Research Council) and Risk Assessment Meeting, and Aquistore Annual Sponsors’ meeting, held July 9–12, 2013, in Regina, Saskatchewan.

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

Highlights

- Continued gathering “site-specific” community outreach information for the Bell Creek project.
- Began work to assess feedback from 70 librarians representing four types of libraries in the PCOR Partnership region (i.e., public, K–12, university, and government).
- Continued assessing results from a survey of partner-related Web sites in order to determine how partners are sharing carbon capture and storage (CCS)-related information.
- Began work on the Aquistore fact sheet and poster (D94 and D95, due September 2013).
- Continued collaborative efforts with Prairie Public Broadcasting (PPB), including the following:
 - Continued to work with PPB on the four segments of the educator presentation video to be used at teacher training seminars and on the Web.
 - Continued to work with PPB on editing the PDM (permanent downhole monitoring) value-added video (using footage collected from Bell Creek Well 05-06 OW).
- Received and assessed quarterly tracking data from the Lignite Energy Council, PPB, and the EERC Marketing department.
- Participated in an in-house meeting on July 8, 2013, to discuss the use of Google Analytics as a research tool for analyzing Web use.
- Continued Web research efforts using Google Analytics for the PCOR Partnership Web site (www.undeerc.org/pcor).
- On July 19, 2013, discussed the upcoming Bell Creek documentary on July 19, 2013, including storyline and interview candidates.
- On July 22, 2013, provided information on July 22, 2013, to PTRC for use in its monthly Aquistore Outreach Advisory Panel conference call.
- In preparation for the upcoming U.S. Department of Energy (DOE) Carbon Storage R&D Project Review Meeting (DOE meeting), the following activities were performed:
 - Submitted an abstract for a poster entitled “PCOR Partnership Outreach – A Decade of Achievement” on July 3, 2013.
 - Received an acceptance notification for the poster on July 19, 2013.
 - Began work on the poster and accompanying teaser slide.

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

Highlights

- Hosted the 5th Annual Regulatory Roundup scheduled for July 30–31, 2013, in Deadwood, South Dakota (Figure 1). Representatives from the following entities were present:
 - Alberta Energy
 - Interstate Oil and Gas Compact Commission (IOGCC)
 - North Dakota Pipeline Authority
 - NDIC Oil and Gas Division
 - Saskatchewan Geological Survey
 - South Dakota Geological Survey
 - Bliss Consulting

- Melzer Consulting
- Premier Oil Recovery, LLC
- The CETER Group
- EERC
- Participated in a conference call with North America 2050: A Partnership for Progress (NA2050) Sequestration Working Group to discuss needed areas of education and outreach (Note: NA2050 facilitates state and provincial efforts to design, promote, and implement cost-effective policies that reduce greenhouse gas emissions and create economic opportunities, <http://na2050.org/sequestration>).
- Began work on the Permitting Review – Update 1 (D6, due September 2013).
- Provided a tour of EERC facilities and reviewed EERC CO₂ capabilities with Kevin Connors, CCS Supervisor, NDIC.
- Continued to review and refine the final IOGCC Carbon Geologic Storage (CGS) Task Force report (D98, due September 2013).



Figure 1. Attendees at the 5th Annual Regulatory Meeting held in Deadwood, South Dakota.

- With regard to the Lignite Field Validation Test site (Phase II) closure:
 - Continued to modify a draft value-added report on closure activities.
 - Continued efforts to monitor the site during the reclamation phase, including a site visit on July 23, 2013.

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

Highlights

- EERC staff participated in five half-day in-house Petrel software training sessions and a 1-hour training session led by Schlumberger.
- Fort Nelson test site activities included the following:

- Continued to work on revisions to the Fort Nelson Test Site – Site Characterization Report (received from Spectra Energy Transmission [Spectra] on February 1, 2013).
- Continued to work on revisions to the Fort Nelson Test Site – Geochemical Report (received from Spectra on February 7, 2013).
- Worked on summarizing the geothermal and geomechanical activities performed.
- Bell Creek test site activities included the following:
 - Continued preparation of an “AAPG (American Association of Petroleum Geologists) Bulletin” journal article.
 - Continued work on the Bell Creek Test Site – Site Characterization Report (D64, due August 2013).
 - Continued revisions to D32, geomechanical report (submitted January 31, 2013), based on Denbury Resources, Inc.’s (Denbury’s) comments.
 - Continued literature review for the mechanical earth model and geomechanical modeling and simulations.
 - Gathered data regarding Muddy zone intervals for all wells in Phases 1, 2, 3, 4, and 8 for use in passive-seismic monitoring exercises.
 - Worked on picking new tops from pulsed-neutron logging (PNL) wells from reservoir to surface.
 - Reviewed the raw log data and seismic data, and conducted a literature review on the interpretation methods.
 - Continued work on the Version 3 static model, including importing the following:
 - ♦ Data from all previous models
 - ♦ PNL logs
 - ♦ Redrill well logs
 - ♦ Core analysis data
 - Submitted the Bell Creek Test Site – Preinjection Geochemical Report (D33/M12) on July 31, 2013.
 - Conducted a literature review for SCAL (special core analysis) work on capillary pressure tests.
 - Reviewed the SCAL work update from Core Laboratories, Inc.
 - Continued work on the in-house relative permeability system.
 - Completed initial evaluation of the thin sections for core collected from Well 56-14R.
 - With regard to the 56-14R sidewall core (21 samples), determined that one sample will be tested for porosity and another for SEM (scanning electron microscopy) mineral mapping (using the thin section).
 - Discussed the full-diameter core work.
 - Continued review and modification of the petrophysical assessment (including 21 well packages) of 81 intervals of core from the U.S. Geological Survey Denver Core Research Center.

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

Highlights

- Continued planning for a guided field trip to an outcrop near Hulett, Wyoming, for Denbury staff scheduled for August 10–15, 2013.
- Continued preparation of a field guide for the Muddy outcrop field trip.

- Finalized the April 2013 sampling results for area landowners, and sent the packages to Denbury on July 18, 2013, for review.
- Traveled to the Hastings Field on July 1–3, 2013, in Houston, Texas, to meet with Denbury personnel regarding seismic activities, and received a facilities tour.
- Began preparation of a poster presentation for the IEA Greenhouse Gas R&D Programme (IEAGHG) Combined Monitoring and Environmental Research of CO₂ Storage meeting scheduled for August 26–30, 2013, in Canberra, Australia.
- Began work on the Injection Experimental Design Package (D42, due October 2013).
- Participated in the weekly update meetings for the Fox Hills Formation groundwater CO₂ – rock exposure testing.
- Continued work on the mitigation plan.
- Continued to process and summarize PDM data from 05-06 OW and production data from the field.
- Reviewed water well logs from WW Drilling, LLC, and Denbury.
- Compiled most recent June 2013 soil gas-sampling data from the handheld field meters as well as the field and laboratory gas chromatograph analyses.
- Began preparing for the next round of soil gas-profiling station/interspaced well sampling.
- Continued revisions to the baseline monitoring, verification, and accounting (MVA) report.
- Held a Bell Creek project update meeting on July 24, 2013. Topics discussed included upcoming activities and key dates; surface and near-surface MVA update; seismic update; outcrop field trip; PNL; documentary update; and upcoming deliverables.
- Prepared a draft mitigation plan.
- Conducted a literature review for wellbore integrity with a focus on case studies in enhanced oil recovery (EOR) applications.

Task 6 – Infrastructure Development (Melanie D. Jensen)

Highlights

- Continued information searches needed to update the capture technologies overview document (value-added report, 2011) and its companion interactive DSS Web page.
- Attended the 2013 CO₂ Capture Technology Meeting held July 8–11, 2013, in Pittsburgh, Pennsylvania.

Task 7 – CO₂ Procurement (John A. Harju)

Highlights

- Participated in ongoing project discussions with Denbury.
- Continued planning for the procurement plan and agreement report (D48, due September 2013).

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

Highlights

- Attended the in-house Bell Creek project update meeting on July 24, 2013.

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

Highlights

- Discussed maintenance of the high-performance computing cluster.
- Continued Bell Creek site activities, including the following:
 - Continued work on the Simulation Report, Update 2 (D66, due August 2013).
 - Continued work on predictive simulation of the clipped, larger Phase 1 model.
 - Worked on simulations.
 - Prepared slides of predictive simulation results.
- Continued Fort Nelson site activities, including the following:
 - Continued efforts to compile a report summarizing the activities and lessons learned at the Fort Nelson test site.
 - Discussed the summary report with the CETER Group, Inc. (CETER Group) at the EERC on July 15 and 16, 2013.
 - Continued review of Spectra’s comments on the Fort Nelson Test Site – Simulation Report (D67, originally submitted September 2011). Comments were received February 4–7, 2013, and revisions are under way.

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, on December 28, 2012.

Task 13 – Project Management (Charles D. Gorecki)

Highlights

- Continued planning for a TAB (Technical Advisory Board) WebEx scheduled for August 23, 2013, to discuss the Basal Cambrian project.
- On July 3, 2013, submitted four poster abstracts to the DOE meeting. On July 19, 2013, received notifications of acceptance for all four posters.
- Began work on preparing the posters for the DOE meeting. They are as follows:
 - “PCOR Partnership Outreach – A Decade of Achievement”
 - “Regional Carbon Sequestration Partnership Water Working Group”
 - “Acid Gas Injection for Enhanced Oil Recovery and Long-Term Storage in Zama Pinnacle Reefs”
 - “Large-Scale CO₂ Storage Exploration in a Basal Saline System in Canada and the United States”

- Discussed several items with the DOE National Energy Technology Laboratory (NETL) project manager, including the following: 1) IEAGHG Regional Carbon Sequestration Partnership (RCSP) expert panel review meeting; 2) EERC press release regarding Bell Creek injection initiation; 3) potential for a booth at the DOE meeting; 4) the NETL-led conference call scheduled for July 11, 2013, regarding the upcoming DOE meeting; and 5) status of the Fort Nelson project and potential associated SOPO (statement of project objectives) changes.
- Reviewed task budgets for upcoming federal fiscal year.
- Participated in a DOE NETL technology managers' conference call on July 11, 2013, regarding upcoming meetings and new methodologies.
- Submitted the June monthly update on July 16, 2013.
- Submitted the quarterly progress report on July 31, 2013.
- Met with CETER Group consultants at the EERC on July 15 and 16, 2013, to discuss the upcoming IEAGHG RCSP expert panel review and an update to the programmatic risk assessment.
- Planned a side meeting with DOE NETL prior to the DOE meeting to discuss 1) the PDM video review and 2) the path forward for the Fort Nelson feasibility project.
- Discussed cost-share contributions and reporting in relation to the Bell Creek project.
- Discussed additional references for a depleted oil and gas reservoir production-based methodology.
- Continued preparations for the upcoming annual membership meeting, including the draft agenda and contacting speakers.
- Established new milestones in relation to project progress at the Bell Creek Field. The new milestones are listed in Table 1.
- Conducted the monthly task leader meeting on July 2, 2013. Topics discussed included updates on the Bell Creek, Fort Nelson, Aquistore, and Basal Cambrian projects; upcoming TAB meetings; review of upcoming conferences and deliverables; and updates from each task leader present.
- Participated in a call with BillyJack Consulting Inc. on July 25, 2013. Topics discussed included the upcoming TAB meeting and brief updates on Fort Nelson and Zama.
- Received notifications of acceptance on July 26, 2013, to present at the Carbon Management Technology Conference (October 21–23, 2013) for the following abstracts:
 - “Carbon Sequestration Case Study: Large-Scale Exploration in a Basal Saline System in Canada and the United States”
 - “Characterization and Time-Lapse Monitoring of a Combined CO₂ EOR and CO₂ Storage Project at the Bell Creek Oil Field Utilizing Pulsed Neutron Well Logging”
 - “Regional Carbon Sequestration Partnership Water Working Group White Paper on the Nexus of Water and Carbon Capture and Storage”
- Continued planning for the upcoming PCOR Partnership Annual Membership Meeting scheduled for September 25–26, 2013, in Minneapolis, Minnesota, including preparation of a preliminary meeting agenda.
- Deliverables and milestones completed in July:
 - June monthly update
 - Task 4: D33 – Bell Creek Test Site – Preinjection Geochemical Report
 - Task 13: D58/D59 – Quarterly Progress Report/Milestone Quarterly Report

- Task 4: M12 – Bell Creek Test Site – Preinjection Geochemical Work Completed
- Task 14: M23 – Monthly Water Working Group (WWG) conference call held

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

Highlights

- Continued work on the next WWG fact sheet (D99-2, due October 31, 2013) focused on water-monitoring technologies.
- Continued planning the upcoming WWG annual meeting (scheduled for August 19, 2013, in Pittsburgh, Pennsylvania) including room setup, e-mail blasts, refreshments, and related items.
- Prepared an invitation to the WWG open house scheduled for August 19, 2013.
- Began work on a poster for the WWG open house.
- Solicited scheduling information for the next monthly conference call.
- Met with CETER Group to review planned WWG efforts.
- Continued to contact WWG members to follow up on their participation at the annual meeting.
- Continued a literature review in support of the methodologies document.
- Distributed the June conference call notes on July 29, 2013.
- Held the monthly conference call on July 25, 2013, and reviewed plans for the open house and annual meeting. Also discussed progress on the monitoring technologies fact sheet and regional partnership updates on water-related activities.

Task 15 – Further Characterization of the Zama Acid Gas EOR, CO₂ Storage, and Monitoring Project (Charles D. Gorecki)

Highlights

- Continued work on the Updated Regional Technology Implementation Plan for Zama (D86, due September 2013).
- Continued activities with regard to the Muskeg L pool, including the following:
 - Worked on structural modeling.
 - Worked on history matching.
 - Recomputed pressure and temperature properties.
 - Worked on case design and analysis.
- Worked on case design and analysis for the G2G pool.

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

Highlights

- Continued in-house review and revisions on the report describing wellbore integrity (D90, due September 2013).
- Continued work on eight additional injection scenarios by varying the rock compressibility and injection strategies to maximum CO₂ injection based on the 25 selected locations.
- Began preparation of characterization and modeling results for use at a TAB WebEx scheduled for August 23, 2013.

- Began work on a poster for the upcoming DOE meeting.
- With regard to the Aquistore project (20 core samples) mineralogical characterization:
 - Completed thin-section analyses.
 - Placed samples in the humidity chamber, prepped for grain density and porosity measurements.
 - Completed porosity measurements.

Travel/Meetings

- July 1–3, 2013: Toured the Hastings oil field and met with Denbury personnel near Pearland, Texas.
- July 7–11, 2013: Attended the 2013 CO₂ Capture Technology Meeting in Pittsburgh, Pennsylvania.
- July 9–12, 2013: Attended the 7th Annual CO₂ Conference in Casper, Wyoming.
- July 9–12, 2013: Participated in the Aquistore Risk Assessment Workshop and SERC meeting in Regina, Saskatchewan, Canada.
- July 23, 2013: Inspected the Phase II Lignite Field Validation Test site near Kenmare, North Dakota.
- July 29–31: Hosted and participated in the 5th Annual Regulatory Meeting in Deadwood, South Dakota.
- July 29 – August 1, 2013: Performed oil and gas sampling at the Bell Creek oil field in southeastern Montana.
- July 31 – August 1, 2013: Toured the Bell Creek oil field in southeastern Montana.

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