



**Plains CO₂ Reduction (PCOR) Partnership Monthly Update
May 1–31, 2014**

PHASE III ACTIVITIES

Task 1 – Regional Characterization (Wesley D. Peck)

Highlights

- Worked on an overview of the basal Cambrian system characterization work for inclusion on the public Web site.
- On May 12, provided information to a representative of Total with regard to permeability heterogeneity in the basal Cambrian.
- Updated the North Dakota and Montana Petra databases with the latest well information (57 new wells in North Dakota; eight new wells in Montana).
- Began gathering data for Canadian oil fields, reservoirs, and wells.
- Updated field/reservoir data for Alberta.
- Answered questions about the Plains CO₂ Reduction (PCOR) Partnership sources database for the person at NATCARB (National Carbon Sequestration Database and Geographic Information System) whose job it is to incorporate all of the Regional Carbon Sequestration Partnership (RCSP) data into a single data set.
- Discussed the similarities and differences between Energy & Environmental Research Center (EERC) and Schlumberger models.
- With regard to the decision support system, updated the oilfield outlines and included pop-ups that include pool data.
- On May 8, participated in the Petroleum Technology Research Centre (PTRC) Science and Engineering Research Committee conference call to discuss the simulation model.
- Began work on posters for the 12th International Conference on Greenhouse Gas Control Technologies (GHGT-12) to be held in October in Austin, Texas.
- Worked on digitizing/editing electric transmission line data sets for Minnesota, North Dakota, and South Dakota for outreach maps.
- Updated North Dakota and Montana well information, including 52 new North Dakota wells and five new Montana wells.
- Updated South Dakota wells, including the addition of three new wells.
- Continued work on the third target area (Deliverable [D]7, due September 2014), the Minnelusa Formation in Wyoming.
- Continued work on several additional value-added reports, including the following:
 - Continued information gathering for a regional characterization report summarizing all past and present efforts.
 - Continued work on the report summarizing methods of original oil in place and CO₂ storage calculations.

- With regard to the **Aquistore** project's static modeling and dynamic predictive simulations effort:
 - Received Aquistore's Eclipse simulation model from PTRC, and began investigating the simulation results they received from a third-party, and comparing them to the model we created.

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

Highlights

- On May 30, submitted D17, general outreach PowerPoint update.
- On May 30, submitted the value-add lignite fact sheet.
- Continued incorporating a recent language change recommended by Denbury Resources, Inc. (Denbury) with regard to the Bell Creek project, i.e., replace “incidental” CO₂ storage with “associated” in fact sheets, posters, etc.
- Provided a video clip citation and permission to include a clip from the terrestrial documentary to an educator in California to use in his new science curriculum.
- Prepared and submitted two abstracts for presentation at the International Workshop on Public Education, Training, and Community Outreach for Carbon Capture, Utilization, and Storage (CCUS) scheduled for July 30–31, 2014, in Decatur, Illinois.
- Provided input to NRCan regarding clean electricity generation activities and carbon capture and storage (CCS).
- On April 28 – May 1, attended the 13th Annual CCUS Conference (CCUS-13) in Pittsburgh.
- On May 8, participated in a conference call to develop an education activity related to SaskPower's Boundary Dam CCS facility.
- On May 9, participated in a conference call regarding development of an Expert Network for CCS educators (in follow-up to meetings at CCUS-13).
- On May 9, met in-house to review a draft “Web site development checklist.”
- On May 15, met to discuss the content for the North Dakota–Minnesota Geographic Alliance Education Seminar scheduled for June 18, 2014.
- On May 13, met to discuss content for the presentation at the Lignite Energy Council Teacher Seminar scheduled for June 17, 2014.
- Received materials in preparation for a May 20, 2014, Aquistore Outreach Advisory Group conference call.
- Continued planning for upcoming teacher education seminars.
- Completed the process of uploading 50 video items (clips and full-length documentaries) to the EERC's YouTube channel (www.youtube.com/user/undeerc/videos?sort=dd&shelf_id=1&view=0).
- Began reviewing a RCSP Outreach Working Group (OWG) draft survey about Web-based outreach.
- On May 6, 13, and 27, held biweekly Task 2 meetings.
- Continued an in-house review of outreach products using a standard, industry-accepted framework.
- Continued updates/revisions to the value-added terrestrial, McGregor, and Zama Phase II site fact sheets.

- Continued efforts to update the public Web site (www.undeerc.org/pcor), including the following:
 - Continued planning for the next update report (D13, due July 2014).
 - On May 9, May 15, and May 28, met in-house.
 - Repaired broken links as identified on an ongoing basis.
 - Resolved Google Analytics page consolidations issues for improved report generation.
- Continued collaborative efforts with Prairie Public Broadcasting (PPB), including the following:
 - Continued editing the value-added four-part education presentation video in conjunction with PPB.
 - On May 21, participated in a conference call.
 - Continued efforts to schedule interviews for the upcoming trip with PPB to Great Britain for filming of the tentatively titled “Coal and the Modern Age” documentary.
 - Provided information about D22 to World Resources Institute to use in discussions regarding potential filming locations in China.
 - Responded to a request from the Japan Broadcasting Corporation (via Denbury) for available pipeline and enhance oil recovery (EOR) footage, with a conference call that included their U.S. representatives and personnel from PPB in which policies and options were described (it should be noted that we have not heard back from them with a specific request for footage).

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

Highlights

- Continued planning the 6th Annual Regulatory Roundup meeting scheduled for June 24 and 25, 2014, in Deadwood, South Dakota.
- On May 8, participated in the C2ES (Center for Climate and Energy Solutions) Webinar series entitled “Water for Energy and Energy for Water: An Overview of Water/Energy Issues from National and Federal Perspectives” (www.c2es.org/science-impacts/adaptation/water-energy-webinar-series).
- Reviewed comments from the U.S. Department of Energy (DOE) on the Interstate Oil and Gas Compact Commission (IOGCC) Operational and Postoperational Liability Report. Had discussions with key staff and DOE regarding the comments. Will talk again with DOE the week of June 9, 2014.

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

Highlights

- **Bell Creek** test site activities included the following:
 - Continued work on Bell Creek characterization.
 - Continued work on the CO₂–rock–groundwater exposure report (value-added).
 - On May 29, held a meeting to discuss lab work.
 - Core Labs acquired new samples for the entry pressure work.
 - Continued work on Milestone (M) 45, First Full Repeat of Pulsed-Neutron Logging (PNL) Campaign Completed, due June 2014.

- Verified data for the 748 wells within the Bell Creek Field for structural top interpretation.
- Continued action items from the PNL review.
- Continued preparing for the 3-D mechanical earth model (MEM) and geomechanical modeling and simulations, including preparing the available logs in the wells (total of seven wells will be used) for inclusion.
- Worked on updating the properties in 1-D MEM and 3-D MEM in Techlog and Petrel.
- Applied Geology Laboratory activities included the following:
 - ◆ With regard to the 33-14R core (collected April 2013):
 - 46 thin sections arrived from Wagner Petrophysics. Photography and analysis are nearing completion.
 - On May 13, held an in-house meeting.
 - ◆ With regard to the 56-14R full-core plugs (collected March 2013):
 - Began work on the 56-14R full-core plugs.

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

Highlights

- Completed the internal reference document entitled “Baseline Surface and Near-Surface Soil Gas and Water Monitoring at the Bell Creek Oil Field.”
- Submitted D44, Drilling and Completion Activities Report, due June 2014.

Task 6 – Infrastructure Development (Melanie D. Jensen)

Highlights

- Continued work on a journal article (about the attenuation of variable CO₂ sources for use in EOR) for submission to *Energy & Environmental Science*. (www.rsc.org/publishing/journals/ee/about.asp).
- Researched additional CO₂ capture technologies for the updated technology overview.
- Provided requested information to a PCOR Partnership partner.

Task 7 – CO₂ Procurement (John A. Harju)

- This task ended in Quarter 4 – Budget Period (BP) 4, Year 6 (September 2013).

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

Highlights

- Discussed approaches for a report about the surface facilities at Bell Creek.

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

Highlights

- **Bell Creek** injection-phase site activities included the following:
 - Cumulative CO₂ injection is 641,376 metric tons through March 31, 2014 (Table 1).
 - On May 6–8, collected produced oil samples from three wells.

Table 1. Bell Creek CO₂ Injection Totals for March 2014 (cumulative totals May 2013 to March 2014)

	March 2014 Injection
Total, Mscf	1,906,168
Total, U.S. tons*	109,030
Total, metric tons*	99,006
Cumulative Total, Mscf ⁺	12,348,407
Cumulative Total, U.S. tons* ⁺	706,309
Cumulative Total, metric tons* ⁺	641,376

Source: Montana Board of Oil and Gas [MBOG] database.

* There is an approximately 2–3-month lag in posting of injection/production volumes to the MBOG database. This was calculated utilizing a conversion of 17.483 Mscf/U.S.ton and 19.253 Mscf/metric ton.

⁺ Cumulative totals are for the period from May 2013 to the month listed.

- Met in-house to discuss future geomechanical modeling efforts and time lines.
- On May 13 and 30, held modeling–simulation team meetings.
- On May 7, held the monthly Bell Creek group update meeting.
- Met to discuss near-surface MVA sampling frequency for the second year of operational monitoring at Bell Creek.
- Continued tuning the Phase 2 history match model.
- Prepared all of the materials, including templates to be used during the hands-on exercises (these templates can be used for actual simulation and history-matching projects) for the Computer Modelling Group Ltd. (CMG) and CMOST™ internal training. This training consisted of two half-days (May 7–8, 2014). Approximately ten people attended this training.
- Cancelled monthly surface and near-surface sampling for May because of weather. This has been rescheduled to June.
- Worked with the in-house geophysicists on the 3-D seismic data, specifically on the time-to-depth conversion.
- Will proceed with development of an interactive map/database product for viewing near-surface monitoring results.
- Hosted a WebEx meeting on May 27, 2014, with Denbury regarding potential miscibility testing at Bell Creek.
- Imported 3-D seismic data based on Springen Ranch horizon.
- Finalized the data management policy and standard operating procedure; on May 15, held an in-house training meeting on May 15 and reviewed new procedures; and transferred all of the data to the new system (where the server is housed off-site and backed up for security).
- Continued work on M46, 1 Year of Injection Completed, due June 2014.
- Continued work on D66, Simulation Update, due August 2014.
- Worked on the additional simulation cases requested by Denbury.
- Discussed vertical seismic profile invoices.
- Completed periodic review of near-surface operational monitoring activities.
- Worked on the history match of CO₂ injection.
- Continued building the updated facies model for the fieldwide model.
- Worked on preparing data for the Phase 2 simulations, including cutting the geomodel.

- Continued work on developing a methodology to allocate pressure response from the PDM system to individual production/injection wells.
- Continued injection-phase sampling work, including the following:
 - ◆ Continued planning of construction of the SQL database to house and access near-surface monitoring data.
 - ◆ Continued evaluation of creating an interactive map product to facilitate improved access and interpretation for team members and stakeholders.
- **Fort Nelson** site activities included the following:
 - Continued work on the Best Practices Manual – Fort Nelson Feasibility Study (D100, due June 2014).

Task 10 – Site Closure (to be announced [TBA])

- This task is anticipated to be initiated in Quarter 1 – BP5, 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 for Program Year 6 (October 1, 2012, to September 30, 2013), on January 31, 2014.

Task 13 – Project Management (Charles D. Gorecki)

Highlights

- On May 13, welcomed a new partner, Outsource Petrophysics, Inc., to the PCOR Partnership.
- On May 19, submitted April monthly update.
- On May 2, notifications of acceptance were e-mailed by GHGT-12. Thirteen PCOR Partnership-related abstracts received acceptance notifications, i.e., four oral and nine posters. A decision will be made in-house as to which will be accepted to present.
- On May 6, held the monthly task leader meeting. Topics discussed included updates on the Bell Creek, Fort Nelson, Aquistore, and basal Cambrian projects; a review of upcoming conferences and deliverables; and updates from each task leader present.
- Recommended and received authorization to send two students to participate in RECS (Research Experience in Carbon Sequestration) scheduled for June 1–10, 2014, in Birmingham, Alabama.
- On May 8, followed up with a representative of the Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP) about potential membership in the PCOR Partnership and potential synergistic activities.

- Continued planning the 2014 PCOR Partnership Annual Membership Meeting scheduled for September 16 and 17, 2014, at the Embassy Suites in downtown Denver, Colorado, including the following:
 - Continued drafting the preliminary agenda.
 - On May 14, participated in a planning meeting.
 - Worked on a postcard for distribution to all partners.
- On May 27, participated in a conference call with BillyJack Consulting. Topics discussed include upcoming Technical Advisory Board Webinars.
- Began following up on membership invoices for the current project year.
- Continued efforts toward a value-added programmatic risk management plan update (including an updated Bell Creek risk assessment) to be completed by August 2014.
- Deliverables and milestones completed in May:
 - Task 2: D17 – General Phase III Information PowerPoint Presentation (Update 5)
 - Task 14: D101 – Water Working Group (WWG) Web Site Content Update
 - Task 14: M23 – Monthly WWG Conference Call Held

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

Highlights

- Continued to implement suggestions and comments provided by WWG members on the latest fact sheet (D99, due October 2014).
- Scheduled a call with the RCSP OWG to discuss potential collaborative efforts between the two working groups.
- On May 22, participated in the May OWG call to formally invite the OWG to participate in the WWG Annual Meeting.
- On May 30, submitted D101, WWG Web Site Content.
- Began development of an outline for the latest fact sheet (D99) focused on future protection of water resources.
- Began preparing for the upcoming WWG Annual Meeting to be held August 11, 2014, in conjunction with the 2014 Carbon Storage R&D Project Review Meeting in Pittsburgh, Pennsylvania, August 12–14, 2014.
- Scheduled and held the monthly conference call on May 21, 2014. Agenda items included the following:
 - Discuss progress on fact sheet development.
 - Review proposed WWG Web site content.
 - Discuss potential for collaboration with the OWG.
 - Regional partnership updates.
- Distributed the conference call notes from March and April.

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

- This task ended in Quarter 2 – BP4, Year 7 (February 2014).

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

- This task ended in Quarter 2 – BP4, Year 7 (March 2014).

Travel/Meetings

- April 28 – May 1, 2014: Presented at the CCUS-13 Conference in Pittsburgh, Pennsylvania.
- May 5–9, 2014: Traveled to Gillette, Wyoming, for sampling at the Bell Creek oil field.
- May 14–16, 2014: Traveled to Bismarck, North Dakota, for a North Dakota Petroleum Council meeting.
- May 18–21, 2014: Traveled to Biloxi, Mississippi, to attend the IOGCC Midyear Meeting.
- May 18–26, 2014: Traveled to Gillette, Wyoming, for sampling at the Bell Creek oil field.
- May 19–22, 2014: Presented at the Williston Basin Petroleum Conference in Bismarck, North Dakota.
- May 20–23, 2014: Traveled to Miles City, Montana, for sampling at the Bell Creek oil field.
- May 30 – June 5, 2014: Attended the 48th Annual U.S. Rock Mechanics/Geomechanics Symposium and Special Event: The Evolution of Rock Mechanics in the U.S.
- May 31 – June 8, 2014: Traveled to The Woodlands, Texas, to attend the CMG 2014 Technical Symposium.

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ACKNOWLEDGMENT

This material is based upon work supported by DOE NETL under Award No. DE-FC26-05NT42592.

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