Plains CO_2 Reduction (PCOR) Partnership Monthly Update
January 1–31, 2011

PHASE III ACTIVITIES

Task 1 – Regional Characterization (Wesley D. Peck)

Highlights

- Continued efforts on the next version of the PCOR Partnership Atlas.
- Continued drafting a report on the CO_2 storage potential in the state of Iowa.
- Continued maintenance of the information stored on the Partners–Only Web site.
- Secured updated licenses for NeuraLog.
- Continued efforts on the characterization of the Deadwood Formation (Fm) in the Williston Basin, including the following:
  - Tested an outcrop sample of the Deadwood Fm and acquired porosity, permeability, mechanical properties; relative permeability (CO_2 and water); and mineralogy.
  - Initiated preparation of a report and poster on the characterization study results of the CO_2 storage potential of the Deadwood Fm.
  - Initiated a case study of the Deadwood Fm for inclusion in a peer-reviewed Society of Petroleum Engineers (SPE) article about storage resource estimation.
- Progress continued on the detailed assessment of the Rival oil field in north-central North Dakota, including the following:
  - Added newly created digitized logs or logs located from missing intervals.
  - Continued digitization of 50+ Black Slough logs that will further extend the study area.
  - Continued core-to-log calibration, annotation of core photos including horizons, and the adjustment of horizons in Petrel according to core microfacies and sequences, where the top of the sequences is denoted by a thin shale layer and fractures are associated with chicken-wire anhydrite.
  - Continued creation of structural surfaces with trends for input into the model and for trend analysis normalization.
  - Imported 3-D seismic information received from TAQA North Ltd. (TAQA).
  - Participated in conference calls on January 10, 17, and 24 with TAQA, where it was determined that TAQA would provide well files for the Rival Field horizontals and several vertical wells in the Lignite Field as well as convert vintage 1960s neutron log data into the Neutron Porosity Hydrogen Index and research the revitalization of vintage cores.

  - Submitted an abstract for the Rocky Mountain Section of the American Association of Petroleum Geologists 60th Annual Meeting scheduled for June 2011 in Cheyenne, Wyoming (www.rms-aapg.org/2011_meeting).
- Efforts conducted as part of the continuing work at the Zama, Alberta, Canada, field site included the following:
  - Explored a potential new software package using the existing geological model.
  - Continued a search for cement, rock, and steel samples representative of those found at Zama for use in laboratory experiments.
  - Continued discussions with Natural Resources Canada to establish laboratory experiments dedicated to effects of impurities (flue gas) on reservoir materials.

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

Highlights

- Continued preparation of a fact sheet for the Bell Creek test site and a fact sheet intended for landowner outreach discussing the status of carbon markets and carbon management.
- Participated in the Weyburn–Midale Outreach Panel discussions regarding actions to respond to the news of the alleged release of sequestered CO_2 at the site.
- Participated in the Regional Carbon Sequestration Partnership Outreach Working Group (OWG) conference call on January 20.
- Accepted an invitation to help prepare a paper to be submitted by the OWG to the 10th Annual Carbon Capture & Sequestration Conference scheduled for May in Pittsburgh, Pennsylvania (www.carbonsq.com).
- Completed an in-house quarterly outreach tracking report for fall 2010.
- As a result of efforts by Prairie Public Broadcasting (PPB), an electronic broadcast-quality copy of the documentary *Global Energy and Carbon: Tracking Our Footprint* was made available to the National Educational Television Association, which, on January 21, made the documentary available by satellite feed to the 350 public television stations across the continent.
- On January 14, an e-mail was sent to all the PCOR Partnership members residing outside of the PPB region, first inquiring whether they would be interested in contacting their local public television station to request the broadcast of *Global Energy and Carbon* and then providing the contact information if they were interested. Twenty members agreed to contact their local public television station.
- On January 26, met with PPB's education group to initiate planning for a multiyear effort to provide teachers in North Dakota and the region with classroom activities built around the documentary clips, various PCOR Partnership outreach materials, and other DOE-approved materials.

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

Highlights

- Continued to review and analyze all of the U.S. Environmental Protection Agency's (EPA's) recently promulgated rules, including *Mandatory Reporting of Greenhouse Gases* and

Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO_2) Geologic Sequestration (GS) Wells.

- Completed review of an Interstate Oil and Gas Compact Commission (IOGCC) PowerPoint presentation providing an overview of the Pipeline Transportation Task Force (PTTF) final report.
- Completed review of an IOGCC Executive Summary of the PTTF final report.
- Continued efforts on updating the Regulatory Roundup document.
- On January 20, sent an e-mail to the partnership regarding recent EPA activities.
- Attended the 2011 Groundwater Protection Council's UIC Conference held January 24–26 in Austin, Texas (www.gwpc.org/meetings/uic/uic.htm) and visited with state and federal regulators in attendance.

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

Highlights

- Bell Creek test site activities included the following:
  - Continued the cataloging, evaluation, and integration of reservoir characterization data from Denbury Resources for the Bell Creek oil field.
  - Continued the petrophysical testing on Muddy Formation outcrop samples.
  - Continued the creation of key baseline characterization maps based on data provided by Denbury.
  - Continued testing representative outcrop samples of Bell Creek reservoir rock for porosity, permeability, mineralogy, composition, and relative permeability.
  - Contacted the Bureau of Economic Geology (BEG) and confirmed the existence and location of 71 cores from the field. A visit to the BEG core library in the spring is tentatively planned.
  - Submitted Milestone [M] 8: Bell Creek test site wellbore leakage data collection initiated.
  - Submitted Deliverable [D] 31/M28: Bell Creek test site – geological characterization experimental design package.
  - Initiated planning for a visit to Denbury's headquarters in mid-February to compile data.
- Fort Nelson test site activities included the following:
  - Removed samples from the batch reactor on January 4. Fourteen vials of cuttings in synthetic brine analogous to in situ formation water from the C-61-E test well were exposed to a mixture of CO_2 and H_2S for a period of 28 days. Analysis is under way.

Task 5 – Well Drilling and Completion (Steven A. Smith)

Highlights

- Nothing to note at this time.

Task 6 – Infrastructure Development (Melanie D. Jensen)

Highlights

- Continued preparation of D85, "Opportunities and Challenges Associated with CO_2 Compression and Transportation During CCS Activities" (due March 31, 2011).

- Continued preparation of the capture technologies overview report, including the addition of an appendix containing summary tables of the technologies. The report is currently undergoing final in-house review.

Task 7 – CO_2 Procurement (John A. Harju)

Highlights

- Continued discussions with Phase III demonstration partners.
- Continued efforts toward securing a cost-share agreement with Denbury Resources.

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

Highlights

- Reviewed Chapter 5 (Surface Facilities Design) of the SPE monograph *Practical Aspects of CO_2 Flooding*.

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

Highlights

- Participated in the Regional Carbon Sequestration Partnership (RCSP) Sim/Risk Working Group conference call on January 18.
- Evaluated Paradigm's GOCAD and SKUA to determine whether to pursue licenses for geologic modeling.
- Continued optimizing the high-performance computer cluster software and discussed how it is used to run Computer Modelling Group software with representatives from Kansas Geological Survey.
- Continued Bell Creek site activities, including the following:
  - Completed the pressure-volume-temperature regression on the Bell Creek crude oil and CO_2 to determine minimum miscible pressure and initiated preparation of a report on the results.
  - Contacted the U.S. Geological Survey Denver Office and located some of the missing cores that were taken from the Bell Creek field. We are still trying to track down other missing cores that may be held by the Bureau of Economic Geology in Austin, Texas.
  - Initiated plans to evaluate the 60+ cores from the Bell Creek field that have been located.
  - Continued testing analogous outcrop samples of Bell Creek reservoir rocks for porosity, permeability, mechanical properties, relative permeability, and mineralogy.
  - Initiated draft outline for near-surface and surficial monitoring, verification, and accounting (MVA) plan. This outline will provide the framework for a long-term approach to monitoring the potable groundwater sources, vadose zone, soils, and local rivers and streams within a predefined area for the project.
  - Began planning for the development of soil gas sampling and groundwater monitoring baseline studies.
  - Began setting up a project management meeting with individuals from Denbury for February 16 in Plano, Texas, to prioritize project goals and efforts.

  - Attended a 3-day simulation software training session, entitled "CO_2–Based EOR Miscible Flood," with Computer Modelling Group on January 24–26 in Calgary, Alberta, Canada.
- Continued Fort Nelson site activities, including the following:
  - Initiated draft outline for near-surface and surficial MVA plan for the Fort Nelson project. This outline will provide the framework for a long-term approach to monitoring the potable groundwater sources, vadose zone, soils, and local rivers and streams within a predefined area for the project.
  - Continued working on history-matching the historic production and injection in the neighboring gas field to validate the model properties and to better understand the regional pressure profile and connectivity.
  - Participated in the monthly conference call on January 20.
  - Tentatively scheduled a history-matching update meeting at the EERC in March to review results with Spectra team members and its outside characterization experts.
  - Began work on a presentation on modeling activities for the IEAGHG Modeling Network meeting scheduled for April 27–29, 2011, in Perth, Australia.
  - Reviewed the schedule and preliminary table of contents for the 2010 risk assessment update.
  - Held a Risk Assessment meeting with Spectra Energy personnel and Nakles Consulting on January 11–12, 2011.

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.

Task 13 – Project Management (Edward N. Steadman)

Highlights

- Welcomed a new partner, Husky Energy Inc., of Calgary, Alberta, Canada (joined January 4, 2011).
- Compiled information and drafted text for inclusion in the two (Bell Creek and Fort Nelson) project information forms (PIFs) required for the upcoming IEAGHG RCSP peer review meeting and submitted drafts on January 14.
- Also began preparation of the peer review PowerPoint presentation (draft due February 4).

- In preparation for the upcoming Spectra Energy risk assessment meeting scheduled for January 11–12 at the EERC, prepared the appropriate confidentiality documents to assure compliance with existing obligations.
- Provided upon request updated information on the PCOR Partnership Phase II and III projects for a Carbon Sequestration Leadership Forum (CSLF) fact sheet on the NETL Sequestration Program.
- Initiated plans to attend and present at the European CCS Demonstration Project Network meeting near Brindisi, Italy, for February 16, 2011.
- Accepted an invitation to present updates on both the Fort Nelson and Zama projects at the CSLF Storage and Monitoring Projects Interactive Workshop scheduled for February 28 – March 3, 2010, in Saudi Arabia.
- Submitted the quarterly progress updates on January 14 to CSLF on both recognized projects, i.e., Fort Nelson CCS Project and Zama Acid Gas EOR, CO_2 Sequestration, and Monitoring project.
- Finalized the schedule and deliverable contents for the PCOR Partnership programmatic risk assessment.
- Continued preparation of the updated project management plan.
- On January 19, participated in a teleconference with Spectra's project lead in preparation for the team's monthly conference call held January 20.
- Held a task leader meeting on January 21. Topics discussed included new partners, upcoming conferences and travel, deliverables, and task leader updates.
- On January 28, submitted an abstract to the New Horizons in Oil and Gas Conference that will be held at the South Dakota School of Mines on October 6–7.
- Deliverables and milestones completed in January include the following:
  - December monthly update
  - Task 4: M8 – Bell Creek test site wellbore leakage data collection initiated
  - Task 4: D31 – Bell Creek site geological characterization experimental design package
  - Task 4: M28 – Bell Creek geological experimental design package completed
  - Task 13: D58/59 – Quarterly progress report/milestone quarterly report

Task 14 – RCSP Water Working Group (WWG) Coordination (Charles D. Gorecki)

Highlights

- Finalized the second draft of the WWG road map document and sent it out for a second round of comments on January 14.
- Participated in the RCSP WWG conference call on January 19.
- Initiated preparation of the WWG canned PowerPoint presentation that was accepted for the 2011 American Water Resources Association Spring Specialty Conference in April.

Travel/Meetings

- January 15–20, 2011: Attended a 2-day CMOST simulation software training course with Computer Modelling Group in Houston, Texas.
- January 24–27, 2011: Attended the 2011 Groundwater Protection Council's UIC Conference in Austin, Texas.

- January 24–27, 2011: Attended a 3-day simulation software training session, entitled "CO_2–based EOR Miscible Flood," with Computer Modelling Group in Calgary, Alberta, Canada.
- January 28 – February 6, 2011: Attended a Petrel Seismic Visualization and Interpretation software training course with Schlumberger in Houston, Texas.
- January 29 – February 5, 2011: Presented at the 14th Annual Energy, Utility, and Environment Conference in Phoenix, Arizona.
- January 30 – February 3, 2011: Attended The Canadian Institute's 5th Annual Carbon Capture and Storage Conference in Calgary, Alberta, Canada.
- January 30 – February 3, 2011: Participated in the steering committee meeting for the basal formation project in Calgary, Alberta, Canada.

DOE DISCLAIMER

NDIC DISCLAIMER

EERC DISCLAIMER

LEGAL NOTICE This research report was prepared by the Energy & Environmental Research Center (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.