Plains CO_2 Reduction (PCOR) Partnership Monthly Update
April 1–30, 2012

PHASE III ACTIVITIES

Task 1 – Regional Characterization (Wesley D. Peck)

Highlights

- Continued planning for an update to the oil and gas field storage values for the Plains CO_2 Reduction (PCOR) Partnership region.
- Began acquisition of oil field boundaries in GIS (geographic information system) format as part of the effort to reevaluate the carbon dioxide (CO_2) storage and enhanced oil recovery (EOR) potential of the oil fields in the PCOR Partnership region.
- Began collecting updated attribute data for the oil fields.
- Continued to format characterization data that will be used to populate the NATCARB (the National Carbon Sequestration Database and Geographic Information System) geodatabase.
- Provided comments to the U.S. Department of Energy (DOE) on the latest version of the North America Carbon Storage Atlas on April 13.
- Began finalizing the PCOR Partnership Atlas, 4th Edition; will print copies; and begin distribution prior to the annual meeting.
- Finished compiling GIS data for transmittal to NATCARB's geodatabase of Regional Carbon Sequestration Partnership (RCSP) data.
- Continued modifying the GIS portion of the Partners-Only Web site to add functionality for information on oil fields in the region.
- Continued reviewing the U.S. Environmental Protection Agency's (EPA's) CO_2 source data provided by NATCARB.
- Completed three posters highlighting the Rival Field activities for the upcoming American Association of Petroleum Geologists (AAPG) 2012 Annual Convention and Exhibition scheduled for April 22–25 in Long Beach, California.
- Ordered updated oil field boundaries for Wyoming from the Wyoming Geological Survey.

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

Highlights

- Continued to review film footage taken at the Bell Creek 0506 OW monitoring well.

- Completed review of raw film footage and photos taken by Prairie Public Broadcasting (PPB) during the trip to Fort Nelson, and began developing a short montage of Fort Nelson scenes in preparation of the Fort Nelson documentary.
- Completed a poster on behalf of the RCSP Outreach Working Group (OWG) for the upcoming 11th Annual Carbon Capture, Utilization & Sequestration (CCUS) Conference scheduled for April 30 – May 3 in Pittsburgh, Pennsylvania.
- Completed preparations for leading the outreach best practices panel at the CCUS Conference in early May.
- Reviewed and commented on induced seismicity talking points for the Aquistore open house held on April 11 and provided a copy to Spectra Energy (Spectra).
- Continued discussions regarding support activities in association with Spectra's upcoming community open house (tentatively scheduled for May 10), and shipped 50 atlases to the outreach lead in Calgary, Alberta, Canada.
- Accepted an invitation to present at the Missouri Minerals Education Foundation annual teacher workshop scheduled for July 15–20 in Park Hills, Missouri.
- Continued efforts to compile a "fact book" for the Bell Creek region for local Bell Creek project outreach.
- Finalized the Fort Nelson poster (Deliverable 26 [D26]), and sent to Spectra for final approval on April 4. Received Spectra's approval on April 20.
- Continued to work on the general public outreach PowerPoint presentation (D17) and the Fort Nelson PowerPoint presentation (D19).
- Continued efforts to update the public Web site (D13), and held weekly in-house progress meetings on April 3, 12, 17, and 20.

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

Highlights

- Continued in-depth analysis of EPA's Mandatory Greenhouse Gas Reporting Rule Subpart RR.
- Continued planning for the 4th Annual Regulatory Roundup meeting to be held this summer in Deadwood, South Dakota.
- Continued to gather input on the lessons learned from key field projects completed during Phase II and progress made during Phase III for inclusion in the Monitoring, Verification, and Accounting (MVA) best practice manual (due May 1).
- Provided information on pore space ownership/acquisition to Bob Kane on April 18.
- Continued review of EPA's draft guidance document for testing and monitoring Class VI wells.
- Continued in-house review of the Phase II lignite site closure report.
- Secured Praxair, Inc., as a paid partner on April 12.

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

Highlights

- Fort Nelson test site activities included the following:

  - Continued efforts on the geochemical report (D41/Milestone 32 [M32]). An extension request to June 30, 2012, was granted by DOE.
  - Uploaded a presentation entitled "Overview, Status, and Future of the Fort Nelson CCS Project" to the CCUS conference Web site on April 20.
  - Continued development of the latest updated version of the static geologic model.
  - Continued work on geomechanical modeling.
  - Hosted the monthly management conference call with Spectra on April 27. Topics discussed included the following:
    - Spectra's upcoming community meeting in Fort Nelson.
    - Plans for the quarterly meeting in Grand Forks in June.
    - Pending deliverables.
    - Modeling and MVA plan updates.
  - Held an in-house project update meeting on April 4. Topics discussed included the following:
    - Summary of the Pittsburgh meeting with DOE and Spectra.
    - Status of the modeling activities.
    - Status of the geochemical report.
    - Potential future technical meetings in Grand Forks with Spectra.
- Bell Creek test site activities included the following:
  - An abstract entitled "Subsurface Core and Analogous Outcrop Characterization of the Muddy/Newcastle Formation for the Bell Creek Oil Field, Powder River County, Montana" was submitted for the 2012 AAPG Rocky Mountain Section Meeting scheduled for September 9–12 in Grand Junction, Colorado.
  - Continued work on geomechanical modeling.
  - Continued work on stochastic surface modeling of Bell Creek sand.
  - Continued Energy & Environmental Research Center (EERC) laboratory testing on sidewall cores from the 0506 OW monitoring well, including the following activities:
    - Completed 18 thin sections and began analysis.
    - Completed Dean Stark extraction on 33 of 47 intervals.
    - Completed x-ray diffraction for nine prioritized samples and analysis.
    - Completed porosity and bulk volume tests for 47 intervals.
    - Continued permeability measurements.
  - Full-diameter (slabbed) core will be tested at an external laboratory.
  - Continued development of a scope of work for additional samples collected from the U.S. Geological Survey Core Research Center in Denver, Colorado.

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

<u>Highlights</u>

- Held an in-house Bell Creek project update meeting on April 16.
- Continued interpreting and analyzing the first-round soil gas and water samples.
- Conducted second round of soil gas and water baseline sampling.
- Continued planning for an upcoming well log review meeting with Denbury and Halliburton in Plano, Texas.
- EERC and Denbury staff met with Bell Creek landowners to review water analysis results from the first round of water sampling.

- The CCUS Conference poster entitled "Overview of the Bell Creek Combined CO_2 Storage and CO_2 EOR Project" was approved by Denbury and uploaded to the conference Web site on April 23.
- Participated in Bell Creek risk assessment activities.
- Travelled to the Bell Creek field site for the surface installation of the permanent downhole monitoring system on the 0506OW well. The system is fully operational and acquiring data.
- Staff completed 2 hours of training on both the Promore and Qorex systems.

Task 6 – Infrastructure Development (Melanie D. Jensen)

Highlights

- Continued work on D84, a report entitled "A Phased Approach to Building a Pipeline Network for CO_2 Transport During CCUS." Activities included the following:
  - Continued estimating CO_2 emissions for clusters of sources as well as the storage capacity of geological sinks. Forecasts will be made to assist with determining the pipeline route and capacity needs at various points in the future.
  - Literature searches are being performed on CO_2 pipeline regulatory issues as they apply to network development and cluster and hub pipeline network planning.
  - Continued updating the CO_2 emissions in the PCOR Partnership database to incorporate combustion-related CO_2 emissions data recently made available by EPA. These updated emissions from plant types other than ethanol plants will improve the accuracy of pipeline network planning.
- Provided 20 additional PCOR Partnership atlases for Nebraska Public Power District's (NPPD's) public outreach meetings.
- Prepared an abstract about the phased pipeline network approach discussed in D84 for submission to the AIChE National Meeting to be held in Pittsburgh, Pennsylvania, October 30 – November 2, 2012.
- The Task 6 graduate student applied to the Research Experience in Carbon Sequestration (RECS) Program. The RECS Program is an intensive 10-day program put on by the Southeast Regional Carbon Sequestration Partnership and the Southern Company and sponsored by DOE and DOE's Office of Fossil Energy and National Energy Technology Laboratory. The program combines classroom instruction with group exercises, carbon capture and storage (CCS) site visits, and hands-on activities including geological storage site characterization, CO_2 monitoring, modeling fluid flow in the subsurface, CCS deployment strategies, and communications training. Thirty students are selected each year to attend the RECS program, which will be held this year in June.

Task 7 – CO_2 Procurement (John A. Harju)

Highlights

- Participated in ongoing project discussions with Denbury.

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

Highlights

- Began developing a list of questions for Denbury regarding the Bell Creek infrastructure in order to help streamline the collection of information.

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

Highlights

- Continued a literature review of software integration for geomechanical modeling and simulation.
- Continued Fort Nelson site activities, including the following:
  - Continued working on the existing geomechanical data, constructing and correlating for the mechanical earth model (MEM) in Petrel.
  - Continued development of the two-track deep geological system MVA plan.
  - Continued revisions to the MVA plan for surface and shallow subsurface based on recent discussions with Spectra, recent observations of the terrain during site visit in early March, and lessons learned from Bell Creek soil gas-sampling activities.
  - Continued planning efforts with Spectra to hold a technical meeting in Grand Forks, North Dakota, in early June.
- Continued Bell Creek site activities, including the following:
  - Continued work on history matching.
  - Continued planning for the Bell Creek risk assessment.
  - Continued work on obtaining waterflood history matching for the Bell Creek CO_2 Prophet model.
  - Continued work on the 1-D MEM.
  - Participated in an in-house discussion regarding pore volume compressibility tests.
  - Worked on tuning numerical settings for speeding up simulation.
  - Began checking details of the model properties and parameters for history matching.
  - Prepared a draft presentation entitled "The Use of CMG's GEM and CMOST for Modeling CO_2 Storage and CO_2 EOR for the PCOR Partnership Program" for the Computer Modelling Group (CMG) Technical Symposium to be held in Calgary, Alberta, Canada, June 19–21, 2012.

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 the draft project assessment report (D57) for the period October 1, 2010 – September 30, 2011, on December 29, 2011. The next assessment report is due by December 31, 2012.

Task 13 – Project Management (Charles D. Gorecki)

Highlights

- Continued planning for the upcoming PCOR Partnership Annual Meeting and Workshop scheduled for September 11–13 in Milwaukee, Wisconsin.
  - A trip to Milwaukee, Wisconsin, has been planned in preparation for the annual meeting workshop to visit the reef exposures, collect samples, and meet with a local geologist.
- Welcomed and hosted Bill Jackson, BillyJack Consulting, at the EERC on April 2. Discussions included future work with Apache Canada and the future advisory board plans.
- Hosted C12 Energy, a new partner, at the EERC on April 12.
- Held a group meeting on April 18.
- Visited with a potential speaker from BridgeWorks: The Generations People (www.generations.com) for the annual meeting.
- Hosted the North Dakota State University Geology Club on the afternoon of April 19.
- Received a survey on the Bell Creek CO_2 Project from Victor Der, on behalf of the Global CCS Institute, for input into its annual CCS status report.
- Provided confirmation of presentations at the US–Canada Clean Energy Dialogue 2 Bilateral Meeting on May 15 and at the MVA/MMV in Large-Scale CO_2 Injection Tests Workshop on May 16–17, both in Mobile, Alabama, and coordinated by Bob Wright.
- Provided cost-share valuation information on April 19 for the pending Modification 22 to the award.
- Continued work on the updated project management plan.
- Participated in the Bell Creek risk assessment activities.
- Requested and received foreign travel approval for authorization to attend a conference in Brisbane, Australia.
- Reviewed and updated information on the Phase II injections as requested by DOE (sent information on April 13).
- Travelled to the CCUS Conference in Pittsburgh, Pennsylvania, April 30 – May 3, 2012.
- Completed the Bell Creek poster for the upcoming CCUS Conference.
- Provided additional PCOR Partnership atlases to NPPD for upcoming public information meetings.
- Deliverables and milestones completed in March:
  - March monthly update
  - Task 13: D58/D59 – Quarterly progress report/milestone quarterly report
  - Task 14: M23 – Monthly WWG conference call held

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

Highlights

- The April monthly conference call was waived because of the close proximity of the annual meeting to be held in Pittsburgh, Pennsylvania, May 3, 2012.
- Distributed the March 27 monthly conference call minutes on April 4.
- Began planning for the May monthly conference call.
- Began reviewing WWG Interest Inventory results.
- Continued planning for the annual meeting to be held the afternoon of May 3 following the CCUS Conference in Pittsburgh, Pennsylvania.
- Finalized the guest list for the annual meeting.

Task 15 – Further Characterization of the Zama Acid Gas EOR, CO_2 Storage, and Monitoring Project (James A. Sorensen)

Highlights

- Worked on the conditional static geologic model construction.
- Continued development of a public outreach brochure on the Zama project.
- Continued working on the construction of the dynamic model and running simulations for history match using new conditioned static realizations.
- Continued simulations of injection and production for the F-pool pinnacle to improve original oil in place and storage capacity estimations.
- Continued working with Apache Canada (through BillyJack Consulting) to get updated pinnacle production data.
- Presented a poster entitled “Using Multiple-Point Statistics for Conditioning a Zama Pinnacle Reef Facies Model to Production History” at the AAPG Annual Meeting in Long Beach, California, April 22–25, 2012.
- Finalized and sent a proposed revised scope of work on April 11 for Task 15, including an extension request for D86 (currently due April 30), in light of recent discussions with Apache Canada Ltd.

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

Highlights

- Continued work on the well test for drill stem test analysis.
- Clipped and imported seven logs into Techlog for future petrophysical analysis.
- Attended and presented at the joint U.S. and Canada project meeting in Regina, Saskatchewan, Canada, on April 18.
- Continued the calibration of well logs that will be used to derive the internal heterogeneity of the Cambro-Ordovician saline system.
- Uploaded a presentation on the Cambro-Ordovician saline system to the CCUS Conference Web site on April 20.
- Travelled to the CCUS Conference in Pittsburgh, Pennsylvania, April 30 – May 3, 2012.
- Continued work on the 3-D model for the entire U.S.–Canada project area.
- Continued analysis of the well data for inclusion in a risk assessment matrix.

Travel/Meetings

- April 1–7, 2012: Participated in the Schlumberger Information Solutions Petrel 2011 Fundamentals and Petrel 2011 Geophysics training classes in Houston, Texas.
- April 15–18, 2012: Attended the 18th SPE Improved Oil Recovery Symposium in Tulsa, Oklahoma.
- April 17–19, 2012: Attended and presented at the U.S.–Canada project meeting in Regina, Saskatchewan, Canada.
- April 17–21, 2012: Visited the Bell Creek field site near Miles City, Montana.
- April 17–22, 2012: Participated in FLAC 3-D Modeling Training in Minneapolis, Minnesota.
- April 21–26, 2012: Attended and presented at the AAPG Annual Convention and Exhibition in Long Beach, California.
- April 27 – May 3, 2012: Attended and presented at the CCUS Conference in Pittsburgh, Pennsylvania.

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