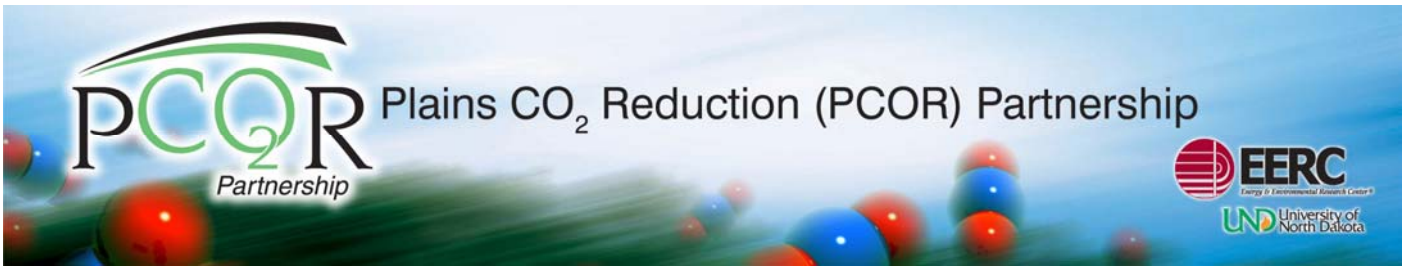

Plains CO_2 Reduction (PCOR) Partnership Monthly Update
January 1–31, 2008

PHASE II ACTIVITIES

Task 1 – Project Management and Reporting (Edward N. Steadman/John A. Harju)

Highlights

- The second edition of the PCOR Partnership Regional Atlas continues to be distributed to current and potential partners as well as other interested parties. We also will have the Atlas available on the "Partners Only" and public Web site in February.
- Preparations for the 2008 PCOR Partnership Annual Meeting continue. The date and location are not yet decided, but we have had discussions with partners in Minnesota and Missouri about being the host location.
- The deliverable entitled "D3: Task 1 – Quarterly Progress Report/Milestone Quarterly Report," was submitted to the Department of Energy (DOE) for approval on January 31, 2008.

Task 2 – Field Validation Test at a Williston Basin Oil Field, North Dakota (James A. Sorensen)

Highlights

- Continued evaluation of oil fields in Williston Basin that may be suitable candidates to host the injection and monitoring, mitigation, and verification (MMV) activities. Efforts are focused on developing baseline characterization data for fields in the Cedar Creek Anticline area, the Billings Anticline-Dickinson area, and along the Nesson Anticline.
- Obtained geophysical logs for 100 wells in the Billings Anticline-Dickinson and Nesson Anticline areas. These well logs will provide additional detailed information on geological properties in the oil fields under consideration, supporting baseline characterization activities such as the creation of petrophysical models.

Task 3 – Field Validation Test at Zama, Alberta, Canada (Steven A. Smith)

Highlights

- Injection is ongoing; a cumulative total of 218 million cubic feet (approximately 12,000 tons) of gas has been injected. Injection rates throughout this reporting period were maintained at approximately 1 million cubic feet per day. Currently, no oil or gas has been produced from the structure, and the field operator is investigating techniques to remedy this situation. Figure 1 illustrates the injection profile from inception.

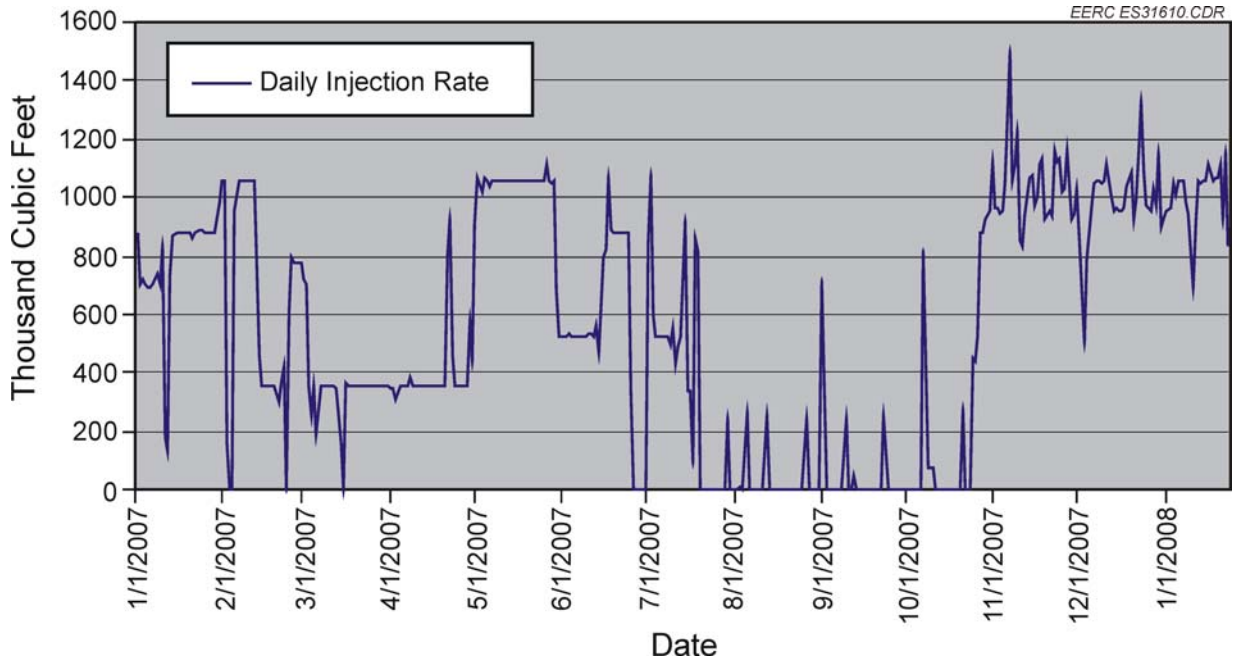

Figure 1. Zama F Pool acid gas injection profile.

- Geological and hydrogeological investigations have been completed. This work provides in-depth knowledge of the Zama region and gives insight into the long-term movement of fluids through this system.
- The design and research plan of an extended leak-off test in the Muskeg Formation cap rock has been initiated. This will give an indication of cap rock thresholds under in situ conditions.
- Geochemical evaluations have been initiated. As part of this work, the core that was obtained in March 2007 is being evaluated and will be used in upcoming modeling activities. Mineralogical and petrographic analysis for core spanning the cap rock and reservoir has been initiated.

Task 4 – Field Validation Test of Lignite Coal in North Dakota (Lisa S. Botnen)

Highlights

- Initial stages of well development are completed.
- Tight-hole status was received for the research project from the North Dakota Industrial Commission (NDIC) Department of Mineral Resources Oil and Gas Division. Because of the extreme interest in this project and the need to report accurate information to our partners and the public, we formally requested that the NDIC Department of Mineral Resources Oil and Gas Division hold the status of this project as confidential for the allotted 6-month time period. At that time, all initial data should be collected and thoughtfully interpreted.
- A meeting was held with Schlumberger in Denver, Colorado, to discuss log interpretation and next steps for the project. Working group conference calls are ongoing.
- A meeting was held to discuss geophysical, field, and laboratory data.

- Preliminary results from data analysis indicate existence of multiple coal seams in the drilled wells, sufficient areal extent of the seams, and existence of low permeability clay layers above and below the target seam. Current state of PCOR Partnership knowledge suggests that the targeted coal seam (at approximately 1100 feet) is the best candidate for CO_2 injection. The next candidate would be the seam at 987 feet.
- A conference call was held with the North Dakota State Geologist and NDIC to discuss a variety of possible field-scale experiments for the test site.
- Measurements of water levels and pressure in the wells have been taken.
- A program of well development has been worked out.
- The application for an underground injection control permit is in progress.
- CO_2 and CO_2 service providers were contacted.
- Operational issues are identified.
- New gas samples from the wells have been obtained and analyzed.
- Creation of the Petrel® model of the reservoir is in progress.

Task 5 – Terrestrial Validation Test (Barry W. Botnen)

Highlights

- Initial study areas have been chosen (Kidder, Logan, and Stutsman Counties) to begin the economic modeling exercise. Data on soils and land use practices, as well as historic production of various crops, are being assembled. Preparation of cost/return budgets for the area's major crops, as well as for potential bioenergy feedstock crops, is ongoing.
- As part of the wetlands study, an in situ experiment on nitrogen amendments on greenhouse gas (GHG) emissions is being conducted. This experiment will quantify changes in the global warming potential (GWP) of wetlands in the Prairie Pothole Region (PPR) "before" and "after" restoration and will examine the GWP of nitrogen fertilizers on the soil.
- PCOR Partnership partners ground-truthed and processed eight scenes of SPOT satellite imagery in the PPR of North and South Dakota, which relates to the tasks for compiling design criteria and geographic information system (GIS) modeling.
- Progress was made on programming the Oracle-based carbon tracking database.
- Ducks Unlimited, Inc. (DU), continues to make progress with respect to its carbon credit program. It has currently secured over 6000 acres of private grasslands, with an initial goal set at 30,000 acres.
- Work on draft topical reports continues:
  - "Market Development for Terrestrial Sequestration on Private Lands"
  - "The Value of Wetlands in the Prairie Pothole Region of North America"
- Completed 2007 grassland and wetland sampling efforts at North Dakota and South Dakota sites; samples are currently being analyzed. Grassland samples from 2006 have been analyzed, and the results are available.
- Other state and regional GHG or cap-and-trade program rules and policies and DOE Guidelines for Aggregators and Terrestrial Offset Providers are being evaluated.
- The DU–PCOR Partnership terrestrial project Web site is being updated.
- Work on characterization inputs and the terrestrial portion of the Decision Support System (DSS, © 2007 EERC Foundation) continues.

Task 6 – Continued Characterization of Regional Sequestration Opportunities (Erin M. O'Leary)

Highlights

- Development on the Gas Analysis Web Application and database continued.
- Some of the maps created in Petrel® have been exported for use in the GIS system. The resulting CO_2 capacity map for the Broom Creek Formation in the Washburn study area will be incorporated into the DSS when the last few hurdles are overcome.
- An interactive help document for the DDSS using video capture software (Camtasia®) to capture DSS video clips has been started.
- We met with NDIC to discuss the Gas Analysis Web application. There are two more graphs to create and some functionality changes. We expect this to be completed by the first week in February. Students are entering the next set of data sheets sent to us from NDIC.
- The compilation of products created in the assessment of the capacity estimates for the Washburn study area has begun. This compilation will be used in a value-added report.
- We created a flowchart of the permitting process used in the Zama demonstration project. This flowchart will be incorporated into the DSS.
- We conducted a DSS demo for the TransAlta Company of Canada.
- The source count was reduced by one because the same plant in Minnesota was listed twice in the database. The new count of sources is 1545, with an annual CO_2 emission amount of 575,990,507 tons.
- Invoices/earned value management (EVM) documents from subcontractors were received and processed.

Task 7 – Research, Safety, Regulatory, and Permitting Issues (Lisa S. Botnen)

Highlights

- The developments of various state and regional initiatives are being followed.
- Work continues on the underground injection control permit.
- We continued analysis of carbon market strategies.
- We continued review of recent publications relating to regulating CO_2 sequestration and MMV issues.
- Legislative actions occurring in Congress continue to be followed and reviewed for any implications relating to carbon capture and storage (CCS).

Task 8 – Public Outreach and Education (Daniel J. Daly)

Highlights

- Work continues on updates for the public Web site, including the inclusion of educational materials.
- Outreach Working Group
  - Participated in a monthly conference call; the discussion centered on utilizing the lessons learned in the Storytelling Workshop held in December in Pittsburgh. It was agreed that stories would be fleshed out and reviewed by others in the group prior to the February conference call.

- Carbon Market video
  - Reworked the script to include the interview of DU.
  - Met with Prairie Public Broadcasting (PPB) to ensure that changes have been made to the video and that the time is correct for broadcast.
- Nature in the Balance video
  - In response to the request of Canadian stakeholders, the video is being upgraded with the addition of British Columbia (BC) to maps and logos to the introduction.
- Terrestrial video (due to National Energy Technology Laboratory [NETL] January 31, 2008)
  - On January 28, 2008, DOE approved extending the deadline to April 30, 2008.
  - PPB agreed that April 30 would be workable.
- Geologic video
  - We met internally to discuss the concept, interviews, and locations for the geologic video.
  - We met internally and decided upon a historical/programmatic video that would review the history of geologic sequestration and describe the role of the NETL sequestration program and the sequestration partnerships in the process.
  - We prepared an outline and preliminary script treatment.

Task 9 – Identification of Commercially Available Sequestration Techniques Ready for Large-Scale Deployment (Melanie D. Jensen/Michael L. Jones)

Highlights

- We responded to Excelsior Energy's request for comment on an article in an online gasification magazine about carbon capture and sequestration as it relates to integrated gasification combined-cycle plants.
- The scope of work was written and a budget developed in the appropriate format for the Ramgen subcontract.
- We Incorporated Excelsior Energy's comments and finalized the Mesaba One Carbon Management Plan.
- We addressed questions raised by Minnesota State Geological Survey regarding cement plants in Minnesota, whether the Clay Boswell Power Station was included in the sources database twice, and the true location of the Sherco Power Plant.

Task 10 – Regional Partnership Program Integration (Edward N. Steadman)

Highlights

- Work continues on a regional partnership integration fact sheet to be submitted as a value-added product to DOE in February 2008.
- The PCOR Partnership continued participation in working group conference calls, including the following:
  - GIS
  - Capture and transportation
  - Geologic
  - Outreach

PHASE III ACTIVITIES

Task 1 – Regional Characterization (Erin M. O'Leary)

- The proposal from Missouri will be arriving in the next few days. DOE has approved the scope of work for the proposal.
- We met internally to discuss the direction and functionality of the current draft version of the PCOR Partnership SharePoint site.
  - Nearly all available images have been loaded into the Sharepoint server. We are exploring a means to mass-update the images with selected keywords. The Sharepoint software does not allow for addition or changes of keywords from the user interface.
- Invoices/EVM documents from subcontractors were received and processed.

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

Highlights

- Preparation of the deliverable entitled "D11: Task 2 – Outreach Plan," has began. Submission to DOE for approval is scheduled for March 31, 2008.
- We expanded and updated work plans to support the upcoming work on outreach planning.
- We started developing a collection of stories for use in PCOR Partnership outreach venues and activities. Internally, we are reviewing current PCOR Partnership outreach materials and will be developing a list of recommendations for products.
- School Outreach
  - We are focusing on interaction with the schools, facilitating image storage and retrieval for outreach (including images from PPB, EERC, and other groups), and determining ways to measure the impact of the public Web site.
  - We created a school outreach file in anticipation of discussions with upcoming local teachers.
  - A meeting was held with local biology, geology, and chemistry teachers from Red River High School. The teachers made a number of suggestions for the types of products and activities that they would find most useful from the PCOR Partnership.
  - In collaboration with local teachers, the EERC is developing a set of sample activities for educators that will be available on the public Web site. A Red River High School teacher provided an initial draft of materials that would provide a basis for classroom use of the PCOR Partnership video Nature in the Balance and is also working on a sequestration "case study" that will help student understand the issues for the economical and environmentally sound management of carbon.
  - A geology teacher at Grand Forks Central High School was contacted to schedule a meeting to discuss collaboration in use of PCOR Partnership materials in the classroom.

    - We accepted an invitation from the North Dakota Petroleum Council to participate in the Petroleum Council's teacher seminar to be held in June 2008.
    - The meeting with Red River High School was used as a basis for guiding the development of a presentation at the North Dakota State Teachers Conference in Minot in the spring of 2008 and the presentation at the Petroleum Council's teacher seminar scheduled for early June 2008.
- Outreach Working Group
    - We participated in a monthly conference call. The discussion centered on utilizing the lessons learned in the Storytelling Workshop held in December in Pittsburgh. It was agreed that stories would be fleshed out and reviewed by others in the group prior to the February conference call.
- Nature in the Balance
    - All materials developed internally were forwarded to PPB. The changes include Partnership regional maps, maps of sources and sinks, maps related to vegetation, list of partners, and a change to a quote to accurately reflect the current partner situation.

Task 3 – Permitting and NEPA Modeling (Lisa S. Botnen)

Highlights

- The developments of various state and regional initiatives are being tracked and analyzed.
- The analysis of carbon market strategies continues.
- Legislative actions occurring in Congress continue to be followed and reviewed for any implications relating to CCS.
- We continue to review recent publications relating to regulating CO_2 sequestration and MMV issues.
- Preparation of the deliverable entitled "M3: Task 3 – Environmental Questionnaire for Williston Basin Test Site" has begun. Submission to DOE for approval is scheduled for March 31, 2008.

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

Highlights

- Preparation of the milestone entitled "M1: Task 1 – Three Target Areas Selected for Detailed Characterization" has begun. Submission to DOE for approval is scheduled for March 31, 2008.
- Preparation of the milestone entitled "M4: Task 4 – Williston Basin Test Site Selected," has begun. Submission to DOE for approval is scheduled for March 31, 2008.
- Preparation of the deliverable entitled "D30: Task 4 – Williston Basin Test Site – Geomechanical Experimental Design Package" has begun. Submission to DOE for approval is scheduled for March 31, 2008.

Task 5 – Well Drilling and Completion (TBA)

- This task has not begun (Quarter 1 – Budget Period 3; Year 2). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

Task 6 – Infrastructure Development (Melanie D. Jensen)

Highlights

- PCOR Partnership activities will be interfaced with a CO_2 capture technologies test system that will be constructed at the EERC to ensure that the results generated from tests of CO_2 capture technologies can be shared with the PCOR Partnership for the benefit of its partners.
- CO_2 source locations in the sources database are being verified.
- A draft table of contents for a report on CO_2 capture and sequestration from an ethanol plant was prepared. It is hoped that once Abengoa joins the PCOR Partnership we can collaborate on the preparation of a report on this topic as a value-added product for the partners.
- We are gathering updated information about CO_2 capture technologies, especially as they might apply to the Phase III demonstration project in North Dakota.
- We are gathering information about CO_2 pipelines (costs, product specifications, permitting requirements/issues, etc.).
- The budget and supporting documentation for the Ramgen subcontract was prepared.

Task 7 – CO_2 Procurement (John A. Harju)

Highlights

- Numerous discussions with potential CO_2 suppliers have taken place. Because of the sensitive nature of negotiations, specifics cannot be shared at the present time.

Task 8 – Transportation and Injection Operations (TBA)

- This task has not begun (Quarter 1 – Budget Period 4; Year 3). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

Task 9 – Operational Monitoring and Modeling (TBA)

- This task has not begun (Quarter 1 – Budget Period 4; Year 3). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

Task 10 – Site Closure (TBA)

- This task has not begun (Quarter 1 – Budget Period 5; Year 9). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

Task 11 – Post Injection Monitoring and Modeling (TBA)

- This task has not begun (Quarter 1 – Budget Period 5; Year 9). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report.

Task 12 – Project Assessment (Stephanie L. Wolfe)

- This task has not begun (Quarter 1 – Budget Period 3; Year 2). Once activities are initiated, the information will be communicated and detailed in the quarterly progress report. Future activities include the Project Assessment Annual Report due December 31, 2008, and the Risk Assessment Plan due within Budget Period 3 (BP3).

Task 13 – Project Management (Edward N. Steadman)

Highlights

- Preparations were made for a special session of the North Dakota Lignite Research Council to discuss the PCOR Partnership Phase III Proposal. The meeting was held January 24, 2008, in Bismarck, North Dakota.
- Preparations for the 2008 PCOR Partnership Annual Meeting has begun. The date and location are not yet decided, but discussions have been held with partners in Minnesota and Missouri to be the host location.
- The PCOR Partnership will be taking part in the Office of Science Basic Energy Sciences Annual Geosciences Symposium March 12–14, 2008.
- The PCOR Partnership will be taking part in the IEA Greenhouse Gas Review Meeting (the meeting will occur during the week of March 24).
- The deliverable entitled "D58/D59: Task 13 – Quarterly Progress Report/Milestone Quarterly Report" was submitted to DOE for approval on January 31, 2008.

Travel/Meetings

- January 17, 2008: Met with NDIC to discuss the gas analysis Web site and the paper for the Williston Basin Conference in Bismarck, North Dakota
- January 23–31, 2008: Energy Generation Conference in Bismarck, North Dakota
- January 24–25, 2008: Platts Carbon Trading Conference in Houston, Texas
- January 27–30, 2008: 11th Annual Conference on Clean Air, Mercury, Global Warming, and Renewable Energy in Tucson, Arizona
- January 28–29, 2008: Attended a meeting with DU for a grassland/wetland restoration update in Bismarck, North Dakota
- January 30, 2008: Presented at the Energy Generation Conference in Bismarck, North Dakota
- February 25–27, 2008: Attend the Environmental Systems Research Institute GIS Petroleum Users Group meeting in Houston, Texas. This meeting will present a great opportunity to interface with vendors and the petroleum industry from the standpoint of GIS and data management.
- January 2008: Grassland/wetland restoration update meeting in Bismarck, North Dakota
- January 2008: Field site to collect water level data and gas samples from wells in Kenmare, North Dakota
- Feb 14, 2008: Missouri River Energy Services Board Meeting
- February 26–27, 2008: Environmental Protection Agency's second public workshop to discuss the development of proposed regulations for the underground injection of carbon dioxide for geologic sequestration under the Safe Drinking Water Act in Arlington, Virginia
- March 4–3, 2008: The Edison Foundation's Carbon Capture and Storage: Key Issues and Challenges in Washington, D.C.
- March 12–14, 2008: Office of Science Basic Energy Sciences Annual Geosciences Symposium, Courtyard Marriott Gaithersburg Washingtonian Center, Maryland, located northwest of Washington, D.C.
- Week of March 24: IEA Greenhouse Gas Review in Washington, D.C.

- April 6–10, 2008: 235th American Chemical Society (ACS) National Meeting (Advances in CO_2 Management: CO_2 Sequestration, Utilization, Capture and Enhanced Oil Recovery) in New Orleans, Louisiana
- April 10–, 2008: Coal-Sequestration VI Forum in Houston, Texas
- April 13–17, 2008: Carbon Sequestration Leadership Forum (CSLF) in Cape Town, South Africa
- April 20–23, 2008: American Association of Petroleum Geologists in San Antonio, Texas
- April 27–29, 2008: 16th Williston Basin Petroleum Conference & Expo in Minot, North Dakota
- May 5–8, 2008: 7th Annual Carbon Capture & Sequestration Conference in Pittsburgh, Pennsylvania
- June 1–5, 2008: The 33rd International Technical Conference on Coal Utilization & Fuel Systems in Clearwater, Florida
- June 29–July 2, 2008: 4th International Symposium on Energy, Informatics and Cybernetics: EIC '08
- August 13–15, 2008: Coal-Gen in Louisville, Kentucky
- September 29–October 2, 2008: Pittsburgh Coal Conference, Pittsburgh, Pennsylvania
- November 16–20, 2008: Greenhouse Gas Technology Conference (GHGT-9) in Washington, D.C.