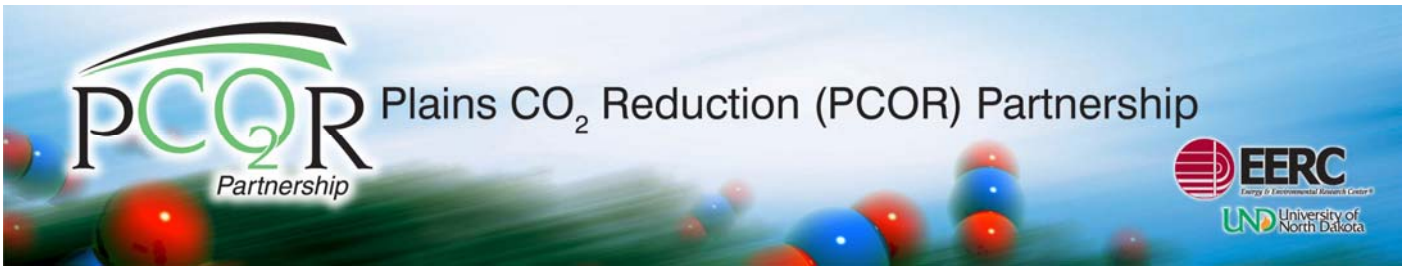

Plains CO_2 Reduction (PCOR) Partnership Monthly Update
February 1–29, 2008

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 is now available on the home page of the "Partners-Only" Web site.
- 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 to be the host location.
- No deliverables/milestones are due for February 2008.
- Work has begun on Deliverable D22: Task 8 – Web site update, which is due in March.

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

Highlights

- Continued evaluation of oil fields in the 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.
- Incorporated data from geophysical logs for 100 wells in the Billings Anticline–Dickinson and Nesson Anticline areas into the baseline characterization database. These well logs provide additional detailed information on geological properties in the oil fields under consideration and have been used to develop more detailed petrophysical models of the study areas being considered. Most efforts in this regard were focused on the Billings Anticline–Dickinson area.

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

Highlights

- Injection of acid gas has continued through February 2008.
- 4 kilograms of perfluorocarbon tracer was injected on February 26, 2008. This tracer was designed to mimic the injected acid gas and will be used to insure that leakage is not occurring outside of the pinnacle structure. Fluid samples collected will be analyzed for the presence or absence of this tracer.

- Mineralogical and petrographic evaluations on a section of core that encompasses the cap rock and reservoir have been initiated. This evaluation will be utilized in geochemical modeling work.
- A new series of pore volume compressibility tests has been initiated on existing core from the Zama Field. These tests will give us an indication of the maximum injection thresholds this rock can withstand that will in turn be used to populate geomechanical models.

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

Highlights

- Work continues with creating the Petrel model of the reservoir.
- An updated fact sheet for the project is in review.
- An initial report on the project progress prepared for the underground injection control permitting process is in review.
- Discussions continue with CO_2 and CO_2 service providers.

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

Highlights

- The carbon-tracking system (Oracle-based database) is complete and is currently being tested. This system tracks and displays geographic information system (GIS) working components of the Ducks Unlimited, Inc. (DU), carbon credit program.
- DU continues to make progress with respect to its carbon credit program. It has currently secured over 6900 acres of private grasslands, with an initial goal set at 30,000 acres.
- 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 before and after restoration and will examine the GWP of nitrogen fertilizers on the soil.
- A draft topical report entitled "Market Development for Terrestrial Sequestration on Private Lands" is currently being reviewed internally.
- Other state and regional GHG or cap-and-trade program rules and policies and the U.S. Department of Energy (DOE) Guidelines for Aggregators and Terrestrial Offset Providers are being evaluated.
- Updating the DU–PCOR Partnership terrestrial project Web site continues.
- Working on characterization inputs and the terrestrial portion of the Decision Support System (DSS, ©2007 EERC Foundation).

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

Highlights

- Continued work on the Gas Analysis Web Application and Spatial Database Engine database alterations to meet the product requirements. Reviewed the site with the Geologic Working Group (GWG) at the EERC and will be making graph alterations based on suggestions from the team.

- A poster that was created for the annual meeting and the 2007 Environmental Systems Research Institute (ESRI) GIS Users Conference was accepted to be published as part of the 23rd edition of the ESRI Map Book.
- The next PCOR Partnership GWG meeting has been set for April 17, 2008, and will be held in Minneapolis, Minnesota.
- A draft of the GIS map showing the storage capacity of the Broom Creek Formation in the Washburn region was completed and currently is being reviewed internally.
- The sources database has been updated to reflect corrections made to the latitude/longitude of several sources. The count remains the same.
- Attended a training course on GIS programming using .NET. The next version of the DSS will be using the .NET technology. New features of .NET include features such as easily generating map tips and increased speed.
- Attended the ESRI petroleum user's group meeting. This meeting focused on the application of GIS technology in the petroleum industry.
- A graphics company will be contacted to create a detailed representation of the strata of the Williston Basin. This product will be an integral part of several upcoming PCOR Partnership-related products.
- The Gas Analysis site was reviewed at the GWG meeting.
  - Internally worked on a better method to lead the user in graphing the data.
  - We are working on programming changes as a result of that meeting.
- Compiled the preliminary data needed to produce a draft report on the potential for CO_2 sequestration in the saline formations of southwest Iowa.
- Working to stage the injection modeling runs that will be used to create short documentary clips illustrating the migration of CO_2 saturation in the Broom Creek Formation.
- Several files were received containing earthquake data for North America, and we are in the process of reviewing the data. Initial indications suggest major overlap/duplication of data.

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

Highlights

- A draft of the National Environmental Policy Act (NEPA) document for the Williston Basin Validation Test is nearly complete.
- Continue to follow the developments of various state and regional initiatives.
- Continued analysis of carbon market strategies.
- Continued to follow legislative actions occurring in Congress.
- Review of recent publications relating to regulating CO_2 sequestration and MMV issues continues.

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.
- Provided comments on an abstract for a paper being developed by the members of the Outreach Working Group (OWG) for the May meeting of the OWG.

- Carbon Market documentary
  - Prairie Public Broadcasting (PPB) provided a final version of the documentary on their FTP site on February 7.
  - Worked with PPB to complete revisions, and PPB mailed an updated DVD to the EERC.
  - Internally reviewed the documentary, comments were noted, and PPB was contacted regarding the changes.
- Terrestrial documentary (due to National Energy Technology Laboratory [NETL] April 30, 2008)
  - PPB began working on drafts of the four segments planned for the terrestrial documentary.
  - PPB will have an initial draft of the documentary on the FTP by March 5. The documentary will be a time line based on the interview materials with space for background shots indicated. It will be reviewed internally after that.
- Geologic documentary
  - Internally met to discuss the revised concept based on a narrative/historical approach.
  - The concept was approved, and a revised list of interviews and locations has been updated.
  - Key background articles that were requested internally are being acquired and copied.

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

Highlights

- Met internally to identify possible projects and develop proposals in response to a CO_2 capture technologies request for proposal (RFP) that was made public on February 13. It is hoped that these activities will be beneficial to the PCOR Partnership in terms of learning more about technologies that are under development and that may be available for future technology demonstrations in the region. By attending the meetings, we are hoping to ensure that all of the CO_2 capture projects at the EERC will coordinate well with PCOR Partnership interests.
- Reviewed developing capture technologies and pipeline basics.

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

Highlights

- 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)

Highlights

- Continued to work internally on the PCOR Partnership SharePoint site. The latest meeting hammered out details on how the images will be organized for access through the SharePoint interface.
- Initiated a short documentary clip illustrating the CO_2 plume growth as depicted by the Petrel modeling software.
- Worked on the creation of several new map products that are to be integrated into a second edition of the "Nature in the Balance" documentary.
- Modified the SharePoint site to conform to the suggested changes specified internally. The task of assigning images to the prespecified categories has begun.
- The PCOR Partnership GWG will be meeting in Minneapolis on April 17, 2008.

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

Highlights

- Continue to work on preparation of the deliverable entitled "D11: Task 2 – Outreach Plan." Submission to DOE for approval is scheduled for March 31, 2008.
- School Outreach
  - Met with a geology teacher at Grand Forks Central High School and discussed collaboration in the use of PCOR Partnership materials in the classroom including the atlas and Nature in the Balance documentary. They are reviewing the materials and will keep in touch.
  - Internally provided a preliminary description of the presentation for the North Dakota Petroleum Council Teacher Seminar that will be in Bismarck, North Dakota, June 11 and 12.
  - Collaboration continues with Red River High School, which is developing materials for the classroom based on PCOR Partnership products and capabilities.
  - Received a speaker registration from Minot Public Schools to give a presentation at the North Dakota Science Teachers convention in Minot, North Dakota, on March 28.
  - Presented to a group of college science students at the campus of Minnesota State University in Moorhead, Minnesota. The talk featured a warm-up on general concepts followed by a presentation on the carbon management activities of the PCOR Partnership. The talk was followed by a question and answer session.

- Outreach Working Group
  - Provided comments on an abstract for a paper being developed by the members of the OWG for the May meeting of the OWG.
- Nature in the Balance
  - Revisions for the inside of the documentary jacket are being reviewed internally.
  - Revised and updated the wetland map to cover North America.
  - Other changes made by PPB to the documentary include partnership regional maps, maps of sources and sinks, maps related to vegetation, a list of partners, and a change to a quote to accurately reflect the current partner situation.
  - 25 DVDs were cut, and four were sent to Canadian partners.
- Measuring the impact of the public Web site
  - Activities were initiated to determine the current situation and determine ways to improve the way we could measure impact.
  - Reviewed the updated EERC Web site with respect to access to the PCOR Partnership Web site and developed recommendations after discussions with others in the OWG.
  - Completed work on a set of suggestions for improving access to the PCOR Partnership public Web site from the EERC site. These will be provided internally for consideration. Other points raised during the discussions will be incorporated as appropriate in future Web updates.

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

Highlights

- The developments of various state and regional initiatives are being tracked and analyzed.
- A draft of the NEPA document for the Williston Basin Test is nearly complete.
- The analysis of carbon market strategies continues.
- Legislative actions occurring in Congress continue to be followed and reviewed for any implications relating to carbon capture and storage.
- Recent publications relating to regulating CO_2 sequestration and MMV issues continue to be reviewed.

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

Highlights

- Development of Baseline Characterization Experimental Design Package for the Williston Basin site continues.
- Regional characterization activities
  - Petrophysical models of the Broom Creek Formation in the Washburn (North Dakota) study area were modified to provide a more detailed accounting of several thin and relatively discontinuous layers of low-permeability rocks that are interbedded in this generally permeable sandstone formation.
  - Dynamic modeling of the injection of approximately 1 million tons per year of CO_2 into the Broom Creek Formation at a location within the Washburn study area over the course of 50 years was conducted. The model was run to encompass an additional 9000 years after injection stopped. Results suggest that such an operation would be technically feasible with a relatively confined plume.

- Completed a petrophysical model of the Red River Formation in the Washburn study area.
- Initiated the development of a petrophysical model of the Newcastle Formation in the Washburn study area.
- Continued development of a petrophysical model of the Rival acid gas injection field in North Dakota.

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

- Collaboration of the PCOR Partnership with two new initiatives at the EERC: development of a CO_2 capture technologies test bed and evaluation of use/reuse/treatment of water from the CO_2 capture plant.
- Made corrections to the draft of the CO_2 source emissions calculation methodology report.
- Verified and/or corrected the latitudes and longitudes for 14 CO_2 sources from the master list of PCOR Partnership sources. The latitudes and longitudes for these sources plotted them in states that were not the same as noted in the master spreadsheet.
- A student is verifying the locations of CO_2 sources using Google Earth.
- Met internally to identify possible projects and develop proposals in response to a CO_2 capture technologies RFP that was made public on February 13. It is hoped that these activities will be beneficial to the PCOR Partnership in terms of learning more about technologies that are under development and that may be available for future technology demonstrations in the region. By attending the meetings we are hoping to ensure that all of the CO_2 capture projects at the EERC will coordinate well with PCOR Partnership interests.
- Reviewed developing capture technologies and pipeline basics.
- Worked on the CO_2 source emission calculation methodologies document.
- Researched the differences between ALSTOM's chilled ammonia scrubbing process and Powerspan's ECO2 process.

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 – Postinjection 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)

Highlights

- 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. An initial draft has been started for the Risk Assessment Plan.

Task 13 – Project Management (Edward N. Steadman)

Highlights

- 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 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 submitted an abstract on February 7, 2008.
  - Two poster presentations (Phases II and III) will be on exhibit.
  - On February 29, 2008, the PCOR Partnership received a request to review a science protocol document on the Regional Carbon Sequestration Partnerships (RCSP) Phase III Initiative. Comments are due back to DOE on March 6, 2008.
- The PCOR Partnership will be taking part in the 2008 RCSP Peer Review (IEA GHG Review) March 25–28, 2008
  - We are currently preparing the PowerPoint presentation and fact sheets.
- No deliverables/milestones are due for February 2008.

- Work has begun on the following milestones due in March:
  - M1: Task 1 – Three Target Areas Selected for Detailed Characterization
  - M3: Task 3 – Start Environmental Questionnaire for Williston Basin Test Site
  - M4: Task 4 – Williston Basin Test Site Selected
- Work has begun on the following deliverables due in March:
  - D11: Task 2 – Outreach Plan
  - D30: Task 4 – Williston Basin Test Site – Geomechanical Experimental Design Package

Travel/Meetings for Phase II and III

- February 14, 2008: Missouri River Energy Services Board Meeting.
- February 25–27, 2008: ESRI Petroleum User's Group Meeting in Houston, Texas.
- February 26–29, 2008: Attend a training class for developing GIS applications using .NET in GIS Server 9.2 in Phoenix, Arizona.
- February 26–27, 2008: EPA'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 to be held in Arlington, Virginia.
- February 27, 2008: EmPower North Dakota Meeting in Minot, North Dakota.
- February 29, 2008: Industrial Commission Meeting (to vote on PCOR Partnership Phase III funding request) in Bismarck, North Dakota.
- March 2008: Terrestrial Team Meeting in Bismarck, North Dakota.
- March 3–4, 2008: The Edison Foundation's Carbon Capture and Storage: Key Issues and Challenges in Washington, D.C.
- March 11–13, 2008: Coal Ash Professionals Training Course in San Antonio, Texas.
- March 11–14, 2008: Calgary–Zama meeting/Hycal Lab tour .
- March 12–13, 2008: World Resources Institute CCS Stakeholder Workshop in Washington, D.C.
- March 12–14, 2008: Office of Science Basic Energy Sciences Annual Geosciences Symposium in Gaithersburg, Maryland.
- March 18, 2008: North Dakota Climate Change Dialogue in Fargo, North Dakota.
- March 25–28, 2008: 2008 RCSP Peer Review (IEA GHG 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 10–11, 2008: Sixth International Forum on Geologic Sequestration of CO_2 in Deep, Unminable Coal Seams, "Coal – Seq. VI" in Houston, Texas.
- April 13–17, 2008: Carbon Sequestration Leadership Forum in Cape Town, South Africa.
- April 17, 2008: Attend the Geologic Characterization Meeting in Minneapolis, Minnesota.
- 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.
- April 30 – May 1, 2008: Rocky Mountain Coal Mining Institute Section Meeting in Grand Junction, Colorado.
- May 5–8, 2008: 7th Annual Carbon Capture & Sequestration Conference in Pittsburgh, Pennsylvania.
- May 6–8, 2008: 2008 Electric Power Conference in Baltimore, Maryland.

- June 1–5, 2008: The 33rd International Technical Conference on Coal Utilization & Fuel Systems in Clearwater, Florida.
- June 9–12, 2008: Teachers Seminar in Bismarck, North Dakota.
- June 29 – July 2, 2008: 4th International Symposium on Energy, Informatics and Cybernetics: EIC '08 in Orlando, Florida.
- August 13–15, 2008: Coal-Gen in Louisville, Kentucky.
- September 29 – October 2, 2008: Pittsburgh Coal Conference in Pittsburgh, Pennsylvania.
- November 16–20, 2008: Greenhouse Gas Technology Conference (GHGT-9) in Washington, D.C.