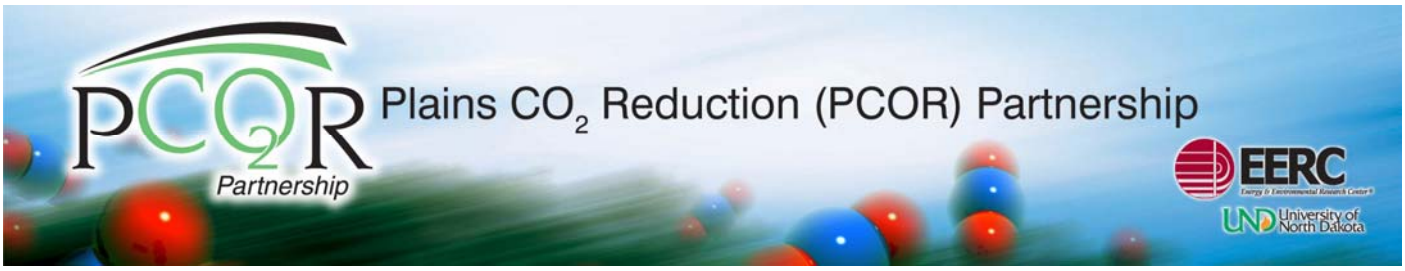

Plains CO_2 Reduction (PCOR) Partnership Monthly Update
March 1–31, 2008

PHASE II ACTIVITIES

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

Highlights

- Preparations for the 2008 PCOR Partnership Annual Meeting continue. St. Louis, Missouri, will be the host location. The tentative dates are September 15–17, 2008.
- On March 18, 2008, the PCOR Partnership provided images on our field tests for inclusion in an upcoming article in *Popular Science*.
- The PCOR Partnership testified at a hearing on the challenges to rapid deployment of carbon capture and storage (CCS) technologies on March 26, 2008, in Bismarck, North Dakota.
- On March 31, 2008, the deliverable D22: Task 8 – Web Site Update was submitted.
- Work has begun on the following deliverables and milestones, which are due April 30, 2008:
  - D3: Task 1 – Quarterly Progress Report
  - M10/D39: Task 8 – Documentary: Terrestrial CO_2 Sequestration
  - D40: Task 2 – Williston Basin Field Validation Test Regulatory Permitting Action Plan
- Huntsman Corporation joined Phase II of the PCOR Partnership on March 27, 2008. We are now at 86 partners.

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

Highlights

- Evaluation of oil fields in Williston Basin that may be suitable candidates to host the injection and monitoring, mitigation, and verification (MMV) activities continued. 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.
- Laboratory tests were initiated to examine the effects that CO_2 under deep reservoir pressure and temperature injection conditions can have on cores of carbonate rocks. The rock cores will be examined before and after injection using a Positron Absorption Tomography technique to quantify changes in porosity, and possibly permeability, caused by the injection. It is anticipated that a series of these tests, using a variety of injection conditions and rock types, will be conducted over the spring and summer of 2008.

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

Highlights

- All of the sample collection equipment is in the field for the first round of fluid sampling to analyze for Tracer. Initial sampling has occurred, with the next event to take place 6 months from the injection date. These activities will be coordinated with the field office, and samples will be sent to Core Laboratory for analysis.
- Static gradient tests of the Slave Point Formation are currently being done in the field. This activity will identify the type of fluid in the sampling wellbore.
- Pressure analysis and modeling are ongoing and scheduled to be completed by the beginning of April. This activity will be used to identify whether pressure spikes (should they occur) in the monitoring well can be attributed to leakage from the reservoir.

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

Highlights

- Amendment to the Energy & Environmental Research Center (EERC) easement from North Dakota State Land Department has been obtained. This allows for getting single-phase electricity on the test site.
- A contract with Praxair as a CO_2 and CO_2 service provider is being reviewed.
- An updated fact sheet for the project is currently under way.
- A single-phase electric line has been run to the site, and Burke Divide is waiting on the electricians.
- Consultations with Monte Besler as a field engineer are in progress.

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

Highlights

- The terrestrial team is preparing for the second wetland sampling season; field activities will begin in April.
- Preparations are continuing for the third grassland sampling season; field activities will begin in late May.
- 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 7700 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.
- Draft topical report “Market Development for Terrestrial Sequestration on Private Lands” is currently under internal review.

- The PCOR Partnership is evaluating other state and regional GHG or cap-and-trade program rules, policies, and Department of Energy (DOE) Guidelines for Aggregators and Terrestrial Offset Providers.
- The DU–PCOR Partnership terrestrial project Web site is still being updated.
- Characterization inputs and the terrestrial portion of the Decision Support System (DSS, © 2007 EERC Foundation) are being worked on.

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

Highlights

- Work continues on the gas analysis site.
- We developed a method to go securely from the members-only portion of the North Dakota Industrial Commission site to the gas analysis site.
- Problems with the GIS Web mapping application configuration were resolved.
- The PCOR Partnership participated in the Geologic Working Group conference call.
- Monthly updates have been placed on the live Web site.
- The PCOR Partnership participated in a GIS Working Group conference call. The focus of the call was on products that need to be prepared for the National Atlas (hard copy and Web site). The request for information will come from DOE on April 1; the products will be due on June 2.

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

Highlights

- Deliverable D40 – National Environmental Policy Act (NEPA) document for the Williston Basin Validation Test has been started and is still planned for completion on April 30, 2008.
- Developments of various state and regional initiatives continue to be followed.
- Analysis of carbon market strategies continues.
- Legislative actions occurring in Congress continue to be followed.
- Review of recent publications relating to regulating CO_2 sequestration and MMV issues continues.

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

Highlights

- Highlights for the public Web site update (D22) were submitted for review on March 31 and are as follows:
  - New look for Kids Only, Educator, and Documentaries pages
  - New text on the home page
  - Revised images for the Demonstration and Sequestration pages
  - Updates to text on a number of pages to reflect the current number of partners and the status of tests and demonstrations
- *Reducing Our Carbon Footprint: The Role of Markets* documentary

  - Prairie Public Broadcasting (PPB) revised the introduction, finalized cross sections in the animation, and updated the electrical generation animation.
  - The documentary received internal approval, a master has been created, and the master was sent out for closed captioning.
- The jacket sleeve was reviewed and is being finalized. The initial arrangements were made for a production run of 1000 DVDs.
  - Broadcast by PPB is scheduled for April 17, 2008, at 8:30 p.m. Central Standard Time.
- The terrestrial documentary (M10/D39) is due on April 30, 2008.
  - PPB laid an interview track, scratch narration, scratch maps, and credits.
  - EERC internal review resulted in revised interviews and credits and suggestions for revised opening narration and images.
  - The jacket sleeve is at the draft final stage.
- Geologic documentary (D46) is due September 30, 2008.
  - Met with PPB to discuss the narrative/historical approach, interview names, locations, and preliminary schedule.
  - Interviews and field locations will occur from April through June.

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

Highlights

- The difference between the ammonia scrubbing CO_2 capture technologies is being researched.
- The PCOR Partnership attended a CO_2 capture meeting in San Antonio, Texas.
- The PCOR Partnership attended a CO_2 capture meeting in Denver, Colorado.

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

Highlights

- The PCOR Partnership participated in the MMV Working Group conference call on March 19, 2008. As a continuation of the last conference call discussion, the PCOR Partnership, as well as other conference call attendees, presented Phase II hypotheses for our field tests.
- The PCOR Partnership also 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

- Work on revisions/enhancements to the DSS continued.
- A database application was created for internal use to update the terrestrial reference links.
- A presentation for the Williston Basin Symposium is currently being prepared.
- Preparations for the Geology Working Group meeting to be held in Minneapolis, Minnesota, on April 17 are under way.

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

Highlights

- The Phase III Outreach Action Plan (D11) was submitted for review on March 31, 2008.
- The PCOR Partnership attended and presented at the North Dakota Science Teacher Meeting in Minot, North Dakota, March 28, 2008.
- The Outreach Working Group monthly conference call was held.
- The draft final of the jacket sleeve for the second edition of *Nature in the Balance* was prepared: the decision was made to have PPB prepare an additional 500 *Nature in the Balance* DVDs (bringing the total produced to nearly 1500), and final changes were completed for the second edition.

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 (M3) is nearly complete, and June 30, 2008, is the new submission date.
- The analysis of carbon market strategies continues.
- Legislative actions occurring in Congress continue to be followed and reviewed for any implications relating to CCS.
- 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 continued.
- Group Regional Characterization Activities
  - A petrophysical model of the Red River Formation in the Washburn Study Area was completed, and storage capacity estimates were developed. Results indicated CO_2 storage capacity of the Red River Formation in the Washburn Study Area ranges from approximately 400 million to 1500 million tons (depending on the magnitude of the efficiency factor applied to the calculation, which ranges from 1% to 4%).
  - A petrophysical model of the Newcastle Formation in the Washburn Study Area was completed, and storage capacity estimates were developed. Results indicated CO_2 storage capacity of the Newcastle Formation in the Washburn Study Area ranges from approximately 75 million to 300 million tons (depending on the magnitude of the efficiency factor applied to the calculation, which ranges from 1% to 4%).
  - A petrophysical model of the Inyan Kara Formation in the Washburn Study Area was completed, and storage capacity estimates were developed. Results indicated CO_2 storage capacity of the Inyan Kara Formation in the Washburn Study Area ranges from approximately 1700 million to 6700 million tons (depending on the magnitude of the efficiency factor applied to the calculation, which ranges from 1% to 4%).
  - A petrophysical model of the Broom Creek Formation in the Washburn Study Area was completed, and storage capacity estimates were developed. Results indicated CO_2 storage capacity of the Broom Creek Formation in the Washburn Study Area ranges from approximately 1300 million to 5200 million tons (depending on the magnitude of the efficiency factor applied to the calculation, which ranges from 1% to 4%).
  - The total storage capacity of brine-saturated formations evaluated thus far in the Washburn Study Area has been estimated to range from approximately 3.4 billion tons to 13.6 billion tons, depending on the efficiency factor applied.
  - Development of a petrophysical model of the Mission Canyon Formation in the Washburn Study Area was initiated.
  - Development of a petrophysical model of the Rival acid gas injection field in North Dakota continued.
  - Several abstracts were submitted to GHGT-9 for consideration as papers. Topics include capacity assessments of Washburn area; modeling of the Broom Creek; laboratory experiments and modeling to examine geochemical interactions between rocks, water, and CO_2; characterization of faults in the South Heart area; and examination of the risk of injection-induced seismicity in a North Dakota oil field.

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

- Work continues on verifying regional stationary source locations using Google Earth.
- A current percentage of U.S stationary-source CO_2 emissions that are produced by the states in the U.S. portion of the PCOR Partnership region have been calculated.
- Emission percentages have been calculated for the various source groups.
- Basin Electric selected Powerspan's ECO–ECO2 process as the CO_2 capture process during the Phase III demonstration at Antelope Valley Power Station.
- Ammonia-scrubbing technologies to determine the energy penalty range associated with them are being researched. This information will be used in calculations of replacement power required for the PCOR Partnership region when CO_2 capture is initiated.
- Work began on developing a reasonable CO_2 pipeline network routing for the region.

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)

- 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

- On March 3, 2008, the PCOR Partnership reviewed and submitted comments on the draft Science Protocol: Carbon Storage for Facilitating 21st Century Energy Systems, which was developed for the Regional Carbon Sequestration Partnership Phase III Initiative.
- Preparations for the 2008 PCOR Partnership Annual Meeting continue. St. Louis, Missouri, will be the host location. The tentative dates are September 15–17, 2008.
- The PCOR Partnership attended the Office of Science Basic Energy Sciences Annual Geosciences Symposium, March 12–14, 2008.
- The PCOR Partnership took part in the 2008 Regional Carbon Sequestration Partnerships Peer Review (IEA Greenhouse Gas Review), March 25–28, 2008.
- The Partnership for CO_2 Capture, an 18-month project to examine the feasibility of different CO_2 capture technologies, is being run simultaneously with and will complement various PCOR Partnership activities. The Partnership for CO_2 Capture kickoff meeting took place on March 26, 2008, at the EERC.
- On March 20, 2008, DOE approved a 30-day extension on M3: Start Environmental Questionnaire for Williston Basin Test Site and M4: Williston Basin Test Site Selected, due to a delay in receiving site information from the partner.
- The following milestones were completed in March:
  - M1: Task 1 – Three Target Areas Selected for Detailed Characterization
- The following deliverables were completed in March:
  - D11: Task 2 – Outreach Plan
  - D30: Task 4 – Williston Basin Test Site – Geomechanical Experimental Design Package
- Work has begun on D14: Task 2 – General Phase III Fact Sheet, which is due April 30, 2008.

Travel/Meetings for Phase II and III

- 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 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 26, 2008: Hearing on the challenges to rapid deployment of carbon capture and storage technologies in Bismarck, North Dakota.
- March 25–28, 2008: 2008 Regional Carbon Sequestration Partnerships Peer Review (IEA Greenhouse Gas Review) in Washington, D.C.
- March 25, 2008: Met with Lynn Helms and UIC staff in Bismarck, North Dakota
- 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 (CSLF) in Cape Town, South Africa
- April 14, 2008: Terrestrial team meeting in Bismarck, North Dakota
- April 14–18: CO_2 Enhanced Oil Recovery Conference in Houston, Texas
- 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.