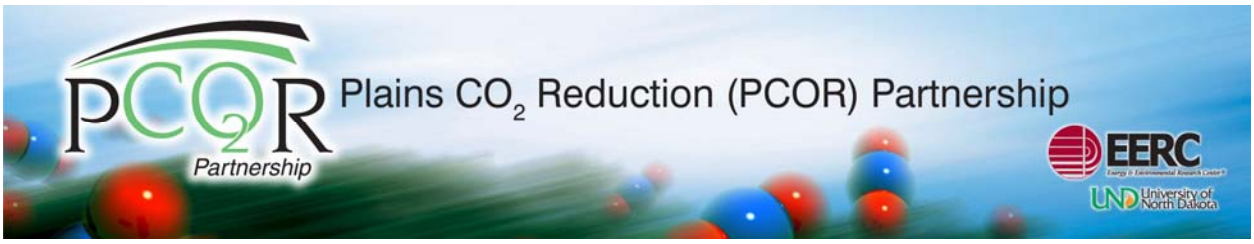

Plains CO_2 Reduction (PCOR) Partnership Monthly Update
June 1 – 30, 2008

PHASE II ACTIVITIES

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

Highlights

- Work is currently being done on a revision to the 2nd edition of the PCOR Partnership Atlas. Distribution will be ready by the PCOR Partnership Annual Meeting in September.
- Preparations for the 2008 PCOR Partnership Annual Meeting continue. The dates will be September 16–18, 2008, in Minneapolis, Minnesota. Two workshops will be conducted the day prior to the Annual Meeting (Carbon Capture and Transport and Carbon Markets).
  - Web site registration is now available.
  - A draft agenda will be available soon.
- No deliverables/milestones were due in June for Phase II.
- Upcoming Phase II Deliverables/Milestones for July
  - Task 1: D3 – Quarterly Report
  - Task 9: D44 – Best Practice Manual: Regional Sequestration Opportunities
- Upcoming Phase II Deliverables/Milestones for August
  - Task 2: M11/D41 – Williston Basin Field Validation Test National Environmental Policy Act (NEPA) Compliance Document Completed
  - Task 2: D40 – Williston Basin Field Validation Test Regulatory Permitting Action Plan

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, along the Nesson Anticline, and the Northeast Flank. Specifically, new well log data have been obtained for wells in the Northeast Flank area. This well log data will be used to support the development of a petrophysical model of the Northeast Flank area.
- Laboratory tests were continued to examine the geochemical interactions between CO_2, saline water, and rocks. Rock examined included carbonate rocks that are representative of reservoir rocks being considered as potential target injection zones for the Williston Basin demonstration. Anhydrites and shales that may act as cap rocks have also been examined. Preliminary results indicate that some changes in mineral composition can and do occur. It is anticipated that a series of these tests, using a variety of rock types, will continue to be

conducted over the summer and fall of 2008, with the primary purpose being the development of rate of reaction data that can be used to refine geochemical models.

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

Highlights

- The existing production well in the pinnacle was briefly shut-in to reperforate the casing in the upper portion of the reservoir. To date, there has been no oil production from the pinnacle as the result of tertiary acid gas injection. This is one step aimed at the mitigation of this issue. Preliminary results appear positive and will be confirmed in the upcoming months.
- A second production well is scheduled to be drilled into the pinnacle in early July (weather permitting). This is also an attempt to reach unswept portions of the pinnacle and increase oil recovery.
- Core will be taken for the lower portion of the reservoir to determine saturations and will be evaluated by the Zama team with regard to potential research activities.
- Cap rock stress tests are being considered in the Muskeg anhydrite while the well is being drilled. This activity will be in addition to the ongoing geomechanical program established during the project and will be a unique opportunity to determine the minimum principle horizontal in situ stress in the cap rock. Results of this type of activity are generally achieved mathematically from laboratory experiments performed on core samples representative of the zone of interest.

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

Highlights

- Water analysis results were received from samples taken on North Dakota State Well 36-15. Early reviews of the results indicate that we have yet to get a sample of the formation fluid. Work continues to obtain an accurate formation fluid sample.
- Well development continues on North Dakota State Well 36-16. Since the completion of the acid job, fluid entry has increased. Swabbing will continue on this well to obtain an accurate formation fluid sample.
- Well development activities were initiated on North Dakota State Well 36-9. To date, the well has been swabbed without significant fluid entry. The plan forward is to acidize this well and North Dakota State Wells 36-10 and 36-15C.
- The work plan for well stimulation continues to be developed and revised based on information that is gathered from each well.
- Negotiations are under way with Praxair to supply and inject CO_2 at the site.
- Discussions are ongoing with Pinnacle and Schlumberger with regard to MMV activities.
- Additional water samples have been taken from shallow groundwater wells in the vicinity of the project site. This activity will add to baseline data and bolster efforts to obtain an Environmental Protection Agency (EPA) aquifer exemption for the coal seam targeted for injection.
- Stochastic simulation and deterministic estimation geostatistical methods have been employed to populate the subsurface geologic model with structural, physical, and chemical properties. This model will be used to estimate reservoir capacity with respect to CO_2 storage or sequestration ability.

- Form 4, Sundry Notice, has been submitted to the North Dakota Industrial Commission (NDIC) to document work that has been completed on North Dakota State Well 36-15.
- Measurements of water levels and pressure in the wells continue to be taken on a regular basis.
- Additional gas samples from the wells have been obtained and analyzed.

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

Highlights

- Field activities for the 2008 wetland catchment sampling season continue.
- The third season of grassland sampling initiated on June 12, 2008, in northeastern Montana.
- Outreach materials released include:
  - Ducks Unlimited (DU), Inc., White Paper "Conserving Wetlands and Waterfowl Amid Climate Change."
  - Preserving Prehistoric "Potholes" article in Ecosystem Marketplace
- The carbon-tracking system (Oracle-based database) is complete and is currently being tested.
- A number of PCOR Partnership partners continue to work toward obtaining ISO 14064-2 verification for grassland carbon credits.
- DU continues to make progress with respect to its carbon credit program. It has currently secured over 17,000 acres of private grasslands, with an initial goal set at 30,000 acres. Future projects are in process.
- As part of the wetlands study, an in situ experiment on nitrogen amendments on greenhouse gas (GHG) emissions continues.
- Draft topical report "Market Development for Terrestrial Sequestration on Private Lands" is in final review (EERC).
- Other state and regional GHG or cap-and-trade program rules and policies and the Department of Energy (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/Wes Peck)

Highlights

- DSS Site
  - Working on the second draft of the DSS page layout that will be used for all but the home page.
- Worked on the creation of an application that would automatically bring in carbon sequestration-related news items into the partners-only Web site.

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

Highlights

- Development of Deliverable D40, the NEPA document for the Williston Basin Validation Test, is ongoing.
- Began review of EPA's draft rules for regulating GHG emissions under the Clean Air Act (CAA).
- Form 4, Sundry Notice, has been submitted to NDIC for the Lignite Field Validation Test to document work that has been completed on State of ND Well 36-15.
- Various state, provincial, and regional GHG reduction and carbon capture and storage (CCS) initiatives are being tracked and analyzed.
- 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 8 – Public Outreach and Education (Daniel J. Daly)

Highlights

- Updated the tracking report for video activities and e-mailed to Prairie Public Broadcasting (PPB) and the EERC.
- The public Web site update deliverable (D22) was completed March 31, 2008.
  - Site went live.
  - Worked to get updated monthly updates in place.
  - Worked to develop a new concept for the home page featuring images tied to the main headings.
- Geologic Sequestration documentary deliverable (D46) is due September 30, 2008.
  - Traveled with PPB for interviews and site visits in West Texas and New Mexico for Segment A of the geologic sequestration documentary. The following documentaries were obtained:
    - Geologic CO_2 Sources – Oxy facilities (CO_2 production well, CO_2 pipeline station, CO_2 processing and compressor facility) were filmed in the east Bravo Dome area of northeastern New Mexico.
    - Geologic CO_2 Pipelines – the major pipeline facilities for Oxy, Hess, and others were filmed in Denver City, Texas, in addition to the facilities for the Oxy pipeline filmed in the Bravo Dome; aerial footage was obtained.
    - Geologic CO_2 Enhanced Oil Recovery (EOR) – CO_2 EOR components (inlet station for CO_2, injection wells, oil production wells, product processing, and CO_2 recycling facility) were filmed at the Hess Seminole field; a "blood, guts, and feathers" operation was filmed adjacent to the Seminole field, and the largest CO_2 processing/recycle facility was filmed in Denver City. Aerial footage was also obtained.
    - EOR-Related Core – EOR-related core for the Permian Basin was filmed at the University of the Permian Basin.

- History and Operations for EOR in Permian Basin – Melzer Consulting was interviewed to provide voice-over for Bravo Dome and Seminole field footage as well as provide footage for segments on history of EOR in the Permian Basin and the relationship of EOR to CO_2 sequestration activities.

- Participated in the monthly Outreach Working Group conference call on Thursday, June 19, 2008.

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

Highlights

- Completed determination of the amount of replacement power that will be needed to apply capture technology to the various types of regional sources for varying capture levels.
- Determined the cost and power required to capture, dry, and compress CO_2 from the PCOR Partnership region's ethanol plants.
- Reinstalled the newest version of the MIT pipeline routing software in preparation for determining the most likely regional pipeline network routes.
- Prepared a draft comprehensive topical report that summarizes the cost of and effort required to capture, compress, and transport CO_2 within the PCOR Partnership region.

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

Highlights

- The PCOR Partnership will submit a proposal to the International Energy Agency (IEA) GHG Programme Storage Capacity Coefficients request. The proposal is due to IEA on July 11, 2008.
- The draft of World Resources Institute's (WRI's) Sequestration Guidelines was received on May 13 for review. Comments were submitted on June 30, 2008.
- The PCOR Partnership also continued participation in working group conference calls, including the following:
  - Geographic information system
  - Capture and transportation
  - Geologic
  - Outreach

PHASE III ACTIVITIES

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

Highlights

- Worked on the creation of PowerPoint materials related to CO_2 sequestration to be used at an upcoming teacher's education seminar.
- Reviewed and provided comments on screenshots prepared for the DSS Web home page.
- Reviewed and provided comments on the screenshots prepared for the proposed new search functionality of the DSS products.
- Prepared a sample of FAQs to review for possible inclusion on the SharePoint site.
- Attended a half-day seminar on the creation and management of SharePoint sites.
- We are developing a strategy regarding the creation of maps to illustrate potential near-term capture and transportation opportunities for the sources in the PCOR Partnership region.
- Participated in the bimonthly modeling group meeting.
- The license agreement for the new Geocortex software that will be used to enhance the capabilities of the DSS has been submitted to Grants/Contracts for its review.
- Put together several maps to aid in the illustration of potential near-term capture and transportation opportunities for the sources in the PCOR Partnership region.
- Worked on a half-page description of the commercialization opportunities for the PCOR Partnership region. This text was requested by DOE for inclusion into the national atlas.
- The Missouri Department of Natural Resources (Geological Survey) has scanned and burned a copy of its oil/gas well logs to a DVD.
- The Missouri Department of Natural Resources (DNR) gave a presentation at the Missouri Waste Coalition Conference about the PCOR Partnership and how the Missouri DNR is working to contribute information.

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

Highlights

- Outreach Working Group
  - Participated in the monthly conference call on Thursday, June 19, 2008.
  - Feedback will be provided for image captions that were previously sent.
- School Outreach
  - Presented at the North Dakota Petroleum Council Teacher Education Seminar in Bismarck on Wednesday, June 11, 2008.
    - Teachers received a PCOR Partnership Education Packet consisting of a statement of PCOR Partnership education resources, an Atlas, DVDs (Nature in the Balance and

Reducing Our Carbon Footprint), fact sheets, and sample classroom worksheets for use with the PCOR Partnership Regional Atlas and Nature in the Balance.
    - The teachers filled out a questionnaire regarding the presentation and their suggestions on products for use in the classroom.
    - Verbal feedback indicated that having a person to provide general background information in combination with a person who could address technical issues was an effective approach.
    - Was informed that the PCOR Partnership would be invited to present at the annual Lignite Energy Council Teacher Education Seminar in Bismarck in June 2009.
    - The Teacher Education Seminar fit the criteria of the draft Outreach Action Plan, which calls for emphasis early in Phase III on presenting to key audiences, including teachers, in Region A (the area of potential geologic sequestration activities).
    - A report on the presentation and the information from the questionnaires was entered into the Outreach Information System.
- Other School Outreach
  - Continue to work on a sample classroom sequestration activity featuring a PowerPoint presentation. An internal meeting with the PCOR Partnership Outreach Team was held to get feedback and plan next steps for the school outreach initiative.
  - The PCOR Partnership Outreach Team reviewed the sample classroom activities developed.
  - Developed an approach to build on for a family of classroom activities that would reflect teacher needs.
  - Populating a focus group of teachers and scheduling a focus group sessions are priority items.
- Outreach Source Book
  - Continued preparation of an Outreach Source Book as a consistent, single source to support outreach activities.
  - Updated the CO_2 emission portion of the book using the 2004 emission data – the most recent data available for the world, the United States, and Canada.
- Outreach Information System
  - Met internally to review progress and to determine next steps.
  - Weekly meetings were scheduled.
  - Continue to focus on school demographics as well as obtain information on select outreach venues in the region.
- Demonstration Web pages on the public Web site deliverable (D12) (due July 30) – a draft set of Web pages are ready to be reviewed internally.
- Use of video in Web pages – met internally to review and prioritize suggested video clips to insert into pages on the public site.
- Publicly available materials – internally met regarding the way publicly available materials would be displayed on the public and Partner's Web sites.
  - A database is being created for the materials; however, the presentation at each site will be tailored to the particular audience. The page for the public site would be part of the February 2009 public Web site update.

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

Highlights

- Various state, provincial, and regional GHG reduction and CCS initiatives are being tracked and analyzed.
- An update to the regulatory section of the DSS is under development.
- Work continues on the NEPA questionnaire for the Williston Basin Test deliverable (D28) due January 31, 2009.
- The analysis of carbon market strategies continues.
- Began review of EPA's draft rules for regulating GHG emissions under the CAA.
- 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

- The EERC, the U.S. Department of Energy, Spectra Energy, and the Office of Senator Byron Dorgan formally announced on June 3 plans to conduct a large-scale CCS project at Fort Nelson, British Columbia.
- Development of an MMV plan for the Fort Nelson demonstration continued. Specifically, discussions were held with Pinnacle Technologies, Apogee Scientific, and Schlumberger Carbon Services with respect to potential technologies and costs for MMV work at Fort Nelson.
- Development of the Baseline Characterization Experimental Design Package for the Williston Basin site continued.
- Attended the IEA GHG Programme Joint Meeting of the Monitoring, Risk Assessment, and Wellbore Integrity Networks in New York, New York. These meetings provided insight regarding state-of-the-art technologies and approaches that are being applied throughout the world with respect to monitoring, risk assessment, and wellbore integrity. They also offered an opportunity to demonstrate to international stakeholders the activities and results of the PCOR Partnership.
- Attended 2008 Meeting of the Western Canadian Sedimentary Basin Geologic Working Group in Winnipeg, Manitoba, Canada. These meetings provide opportunities for the PCOR Partnership to develop and strengthen working relationships with key geological scientists in Canada, especially the Geological Survey of Canada and the BC Geological Survey, both of which will be actively involved in the characterization activities scheduled to be conducted at the Fort Nelson site in British Columbia.
- Regional Characterization Activities
  - Continued development of a petrophysical model of the Mission Canyon Formation in the Washburn Study Area.

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

- Merged the information about the configuration and fuel(s) used by each of the Canadian power plants with their emissions into a single spreadsheet that can be accessed by the PCOR Partnership capture task team members. Determined the amount of replacement power that will be needed to apply capture technology to the various types of regional sources for varying capture levels.
- Nearing completion on the first round of location verification for the CO_2 point-source locations using Google Earth. The remaining locations are difficult to discern on Google Earth. These will be dealt with in the next few weeks.
- Continued tracking down the information required to perform an engineering analysis of the ECO_2 process that Basin Electric has chosen for installation at the Antelope Valley Power Station.
- Updated the regional CO_2 emission profile.
- Participated in a conference call with Ramgen Power Systems personnel to discuss the subcontract and presentations that Ramgen will make at both the Annual Meeting and the capture workshop.
- Completed an Excel spreadsheet containing the most current configuration and emission information for all of the Canadian power plants.
- A capture workshop agenda for the 2008 Annual Meeting in September was approved by the PCOR Partnership manager, and speakers were identified.

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.
  - The risk management database research has also begun; initial contact has been made with consulting services.

Task 13 – Project Management (Edward N. Steadman)

Highlights

- On June 3, 2008, the PCOR Partnership sent out a press release on the storage project in British Columbia, Canada.
- The draft of the WRI's Sequestration Guidelines was received on May 13 for review. Comments were submitted on June 30, 2008.
- The following deliverables/milestones were completed in June:
  - Task 3: M3 – Start Environmental Questionnaire for Williston Basin Test Site (submitted to DOE for review on June 27, 2008).
  - Task 4: M6 – Williston Basin Test Site Geochemical Work Initiated (submitted to DOE for review on June 27, 2008).
  - Task 4: M7 – Williston Basin Test Site Geological Characterization Data Collection Initiated (submitted to DOE for review on June 27, 2008).
- Upcoming Phase III Deliverables/Milestones for July
  - Task 2: D12 – Demonstration Web Pages on the Public Site
  - Task 13: D58/D59 – Quarterly Progress Report/Milestone Quarterly Report
- Upcoming Phase III Deliverables/Milestones for August
  - None at this time.

Travel/Meetings for Phases II and III

- June 1–5, 2008: The 33rd International Technical Conference on Coal Utilization & Fuel Systems in Clearwater, Florida
- June 4–6, 2008: Carbon Finance North America 2008 – Risks and opportunities in emissions markets in New York, New York
- 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
- July 7–11, 2008: Meeting with partners to discuss Phase III demo and Zama project in Calgary, Alberta.
- July 8–11, 2008: Computer Modeling Group Ltd. Technical Symposium in Calgary, Alberta.
- August 13–15, 2008: Coal-Gen in Louisville, Kentucky
- September 16–18, 2008: PCOR Partnership Annual Meeting in Minneapolis, Minnesota.
- September 29 – October 2, 2008: Pittsburgh Coal Conference in Pittsburgh, Pennsylvania.
- October 6–8, 2008: Regional Partnerships Annual Review Meeting in Pittsburgh, Pennsylvania.
- November 16–20, 2008: Greenhouse Gas Technology Conference (GHGT-9) in Washington, D.C.
- February 1–4, 2008: EUEC 2009 – Clean Air, Mercury, Global Warming & Renewable Energy in Phoenix, Arizona