

Status Report on Oil and Gas Research Program Ongoing Research Projects
June 26, 2007

Plains CO₂ Reduction Partnership Program – Phase II

This is a project submitted by the Energy and Environmental Research Center. Total value of the project is \$21,487,892 with \$500,000 provided from the Oil and Gas Research Fund. Phase II of the CO₂ Plains Reduction Partnership will include, among other tasks, field-based demonstration projects that focus on injecting CO₂ into geologic formations for the dual purpose of CO₂ sequestration and enhanced hydrocarbon production. The primary objectives of these activities are twofold: 1) to develop data sets that verify the ability of the target formations to store CO₂ and produce hydrocarbons and 2) to develop a mechanism by which carbon credits can be monetized for CO₂ sequestered in geologic formations.

March 1, 2006

Contract signed. A report for the work done through December 31, 2005 has been received. Development of the NEPA document for the Beaver Lodge Field validation test has been initiated. Literature search for documents and data specifically related to the Beaver Lodge Field and development of an experimental design package for the Beaver Lodge Field validation test have been initiated. In regards to the Zama Demonstration Field Validation Test, the draft Experimental Design Package has been completed and is in review. Subcontractors have been obtained and contract negotiations are under way. Baseline fluid samples are being collected for initial characterization work and injection of acid gas is scheduled for February or March.

November 20, 2006

Two quarterly reports have been received for the work completed from January 1, 2006 through September 30, 2006. Work continued on the NEPA documents for the Beaver Lodge Field validation test. Meetings were held with Amerada Hess to resolve details on preliminary information needed for the NEPA documentation. Additional work was done developing a detailed geologic characterization of an area in central North Dakota for the purpose of geologic sequestration of CO₂ from coal-fired power plants in the area. In regards to the Zama Demonstration Field Validation Test, work has focused on meeting preinjection deliverables. The project team has focused their attention on characterization activities related to the injection zone. That has included incorporating data sets from existing sources and creating data where available. The primary focus has been the creation of maps to better describe the geological environment. Testing of core and fluids has begun in order to determine properties that will indicate the reactivity of the system when acid gas is introduced.

April 10, 2007

Regular quarterly reports have been received. Dave Fischer will be providing a more detailed update on this project. The PCOR field validation activities concerned with acid gas injection at Zama field in Alberta have recently been recognized for excellence by the International Carbon Sequestration Leadership Forum. The draft experimental design package has been prepared by the EERC and presented to the field Operator for approval for the Beaver Lodge Field Test in Williams County. The date to begin field activities has yet to be announced by the Operator. The Lignite Field Test in Ward County is scheduled to begin the second quarter of 2007. Five wells, one central producer/injector with four observation wells to be drilled. The center well will core what is considered the primary lignite seam. The center well will be cased

and perforated prior to production testing. Monitoring of reservoir will be conducted in the four observation wells. After a lengthy (possibly longer than 1 year) dewatering/production test, CO₂ will be injected into the center well while monitoring continues in the observation wells.

June 26, 2007

The Contractor will be making a presentation to the Council at their June 26, 2007 meeting. A letter has been sent on behalf of the Council reflecting the Council's support and potential funding of up to \$250,000 per year for the first two years of the Phase III effort.

Cretaceous Gas/Shale-Gas Expansion

This is a project submitted by Continental Resources. Total cost of the project is \$630,120 with \$186,120 provided from the Oil and Gas Research Fund. The purpose of this project is to provide information on how the use of newer well logging technologies could expand current North Dakota shallow gas production and generate interest in Cretaceous gas prospects statewide. The intent of the project is to develop a well logging template to be utilized throughout the state to help in identifying shallow Cretaceous gas reservoirs. The duration of this project is 12 months.

November 20, 2006

The contract has been signed. The first status report was received. Four wells have been drilled through the Eagle Formation. (Only two wells were anticipated under the grant.) Two wells were drilled in the southern portion and two were drilled in the northern portion of the Cedar Hills North Unit. As of the end of August, 2006, two of the wells were completed. Portions of the core is being analyzed to determine gas desorption isotherms. Analysis is also being done on the logs to be incorporated with the core data as it becomes available. All the data has been obtained and is now waiting for analysis. Anticipate next report before the end of the year.

April 10, 2007

Dave Fischer will be providing a more detailed report at the meeting. Four wells were drilled and tested. One well was cored – Rosenthal 1-27. Modern log suite was run for comparison to core and production data. All four wells were fracture treated. Production test results show high water production and small gas volumes; uneconomical unless dewatering works. Ongoing activities include incorporation of the TICORA final analytical results; development and finalization of a log template; performance of numerical simulation to evaluate dewatering economics and putting wells on artificial lift for further field evaluation.

June 26, 2007

Dave Fischer will be providing an update at the June 26, 2007 OGRC meeting.

Polymer Gel Treatment: A Remediation for Produced Waters

This is a project submitted by Aeon Energy Corp. Total cost of the project is \$101,000 with \$50,500 provided from the Oil and Gas Research Fund. The purpose of this project is to test the viability of a chemical polymer gel treatment to reduce the volume of produced water from marginally economic wells. Aeon Energy had requested funding to test two wells. The Council authorized funding for testing on one well. The duration of the project is 4 months.

November 20, 2006

The polymer treatment by Aeon Energy began 11/1/06 and was completed 11/4/06. Production prior to the treatment was measured at 1 BOPD with 600 BWPD. A total of 2,412 barrels of polymer were pumped. Although the results of the project are yet to be determined through production, there were some indications that the procedure may have some effect based on 'bled off' tests conducted during the process. The well is currently shut-in prior to the beginning of production testing.

April 10, 2007

Dave Fischer will be providing a more detailed report at the meeting along with his recommendations. Treatment is completed; testing is continuing, results do not look encouraging. February production rates were 3 BO & 2710 BW for 5 days of production. Tiorco has recommended at least 4 months of production prior to assessment. Tiorco believes the produced water is associated with draining the area of the reservoir that has been swept (coned).

June 26, 2007

Dave Fischer will be providing an update at the OGRC meeting on June 26, 2007.

Surface Tiltmeter Study of a Bakken Fracture Stimulation

This is a project submitted by Marathon Oil Company. Total cost of the project is \$240,000 with \$120,000 to be provided from the Oil and Gas Research Fund. The objective of this project is to conduct a surface tiltmeter study of a fracture stimulation on a well in Dunn County. A surface tiltmeter study consists of burying an array of highly sensitive levels, called tiltmeters, in the ground around the target well. These tiltmeters measure minute deflections in the earth's surface that occur during the fracture stimulation. Data from the array will be processed in order to reveal the orientation of the fracture created during the stimulation. This information will allow for better well designs, which will enhance the economic viability of the Bakken play.

April 10, 2007

Because of the delay in drilling the well Marathon Oil Company suggested we delay entering into a contract until closer to the drilling date. A contract should be executed shortly. It is anticipated that the well will spud shortly if it has not already done so the first week of April. Marathon has indicated they will make every attempt to have some results in 2007.

June 26, 2007

The contractor, Marathon Oil Company, will be at the Oil and Gas Research Council meeting to provide an update on this project.

**Vertical Seismic Profiling Test of Seismic Fault and Fracture Detection
in the Bakken Formation**

This is a project submitted by Marathon Oil Company. Total cost of the project is \$300,000 with \$150,000 to be provided from the Oil and Gas Research Fund. The objective of this project is to conduct a vertical seismic profile (VSP) in a well in Dunn County. A VSP study consists of recording seismic data in the vertical portion of the well from the Bakken level up to thousands of feet uphole. The seismic signal is generated by a surface seismic source

(Vibroseis) at one or more locations above the lateral portion of the well. The high resolution seismic image can be correlated to observations in the well and demonstrate the detectability of fractures and faults by the seismic method. This VSP data, along with other well data, will provide the basis for testing the viability of using 3D seismic for fracture and fault detection in the Bakken. This information will allow for better well designs, which will enhance the economic viability of the Bakken play.

April 10, 2007

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June 26, 2007

The contractor, Marathon Oil Company, will be at the Oil and Gas Research Council meeting to provide an update on this project.

Energy and Transmission Needs Study on North Dakota Oil Development

This is a project submitted by Basin Electric Power Cooperative. Total cost of the project is \$201,600 with the Oil and Gas Research Council providing \$49,000. The overall objective of the proposed project is to perform an analysis of oil development activities in the Williston Basin and to determine the implications these activities may hold for power demand and power delivery. The analysis will evaluate oil drilling plans, develop oil pumping load curves for major formations of the Williston Basin, analyze oil recovery techniques, determine pipeline capacity, outline major environmental issues and identify other potential oil development.

June 26, 2007

When the Council recommended approval of the project they had suggested certain reporting requirements. The Industrial Commission approved those conditions. However, Basin Electric Power Cooperative, because of confidentiality agreements, could not provide the data in the format suggested by the Council and Commission. The Commission and Basin are continuing to negotiate the reporting format of the data. A contract has not yet been agreed upon.