

Status Report on Oil and Gas Research Program Ongoing Projects  
April 10, 2007

**North Dakota Petroleum Council and Oil and Gas Education Program**

This is a program submitted by the North Dakota Petroleum Council. Total cost of the program is \$210,000 with the Oil and Gas Research Council providing \$100,000. The purpose of this program is two fold—providing funding for the Teacher Education Seminar and a school-based program called the Energy Career Awareness Partnership which is a year-round program that puts someone in the classrooms across the State on a daily basis to make presentations, conduct seminars and trade-shows and hold training sessions about the energy industry. The expected result of this program is to provide an on-going education effort in North Dakota schools that will eventually expose virtually every North Dakota student to the energy industry. The duration of this project is two years.

November 15, 2005

Contract being drafted.

March 1, 2006

Contract signed and first report received. The three-day Teacher Seminar was held last year and continues to educate teachers about the oil and gas industry. Plans are being made for the 2006 seminars with teachers being recruited at this time. The Energy Career Awareness Partnership (ECAP) continues its work in providing information about the oil and gas industry to students and adults. An effort is being made to reach out to parents to inform them of the great career opportunities in North Dakota's energy industry. The ECAP is also assisting with the rewriting of the Bismarck Public School's Career Education classes to include a focus on the oil and gas industry. This is scheduled to be available to 9<sup>th</sup> grade students in the Bismarck Public School District in the 2006-2007 school year.

November 20, 2006

Second status report received. The 2005/2006 academic year resulted in direct contact with 5,431 individuals for grades four through adult. ECAP is returning annually to classrooms across the state, career, energy and job fair events. ECAP continues to try to engage parents in knowing that there are opportunities in the North Dakota energy industry.

April 10, 2007

Third status report received (June 1, 2006 – December 31, 2006) and has been posted on the OGRP website. NDPC three-day 2006 Teacher Seminar was held June 12-14. Forty-three participants attended with the majority being middle school math and science teachers. Positive evaluations were received from the participants. The Energy Career Awareness Partnership (ECAP) changed for the 2006-2007 year to a half-time contract with the Bismarck School District. With this change the funding for ECAP will be utilized an additional year – through 2007/2008. An amendment is being drafted to the contract to reflect this change. ECAP directly presented to nearly 8,300 students, teachers and parents during the time frame of the report. A detailed list of schools receiving direct ECAP services is available in the third status report along with a list of ECAP's participation in conferences and other activities for young people.

**Contribution of the Petroleum Industry to the North Dakota Economy**

This is a project submitted by the North Dakota Petroleum Council and Dr. Larry Leistriz of NDSU to estimate the contribution of the petroleum industry to the North Dakota economy, measured by indicators such as employment, income, additional gross receipts in various sectors of the state, and

revenues from selected state taxes. In addition the Petroleum Council will develop a communications plan to determine the best use and distribution of the results to a targeted audience of North Dakota policy makers and/or the general public. The total cost of this project is \$40,000 with \$20,000 provided from the Oil and Gas Research Fund

March 1, 2006

Contract has been signed with the contingency that the Petroleum Council seeks involvement from the North Dakota Association of Oil and Gas Producing Counties and the Northern Alliance of Independent Producers. Input has been received from these two entities. Draft Oil Contribution Analysis is due October 1, 2006.

November 20, 2006

North Dakota State University is in the final stages of gathering data from the North Dakota oil industry for the Oil Contribution Analysis. The report based on the Analysis will be done by February 1. Once that report has been completed the next phase of the project regarding the communications plan will begin.

April 10, 2007

The draft report was just recently received and is currently under review. Once that report has been finalized the information will be made available to the Oil and Gas Research Council at their June meeting and a communications plan will be developed. This contract may need to be amended as it does not appear that the work will be completed by June 30, 2007

**Education of Oilfield Fire Safety**

This is a project submitted by the North Dakota Association of Oil and Gas Producing Counties. Total cost of the project is \$216,500 with \$15,000 being provided from the Oil and Gas Research Fund. The purpose of this project is to provide education to 3,000 volunteer and staff firefighters in western and central North Dakota and encourage them to learn more about oilfield fire safety by attending training at the Dickinson-based Williston Basin Oilfield Fire Training Facility that is currently being constructed. In addition this will include providing information to state officials and policy makers about oilfield fire safety and the importance of providing this training.

March 1, 2006

Contract signed. First report is due March 31, 2006

November 20, 2006

Two status reports have been received. Three newsletters of the four authorized in the funding have been distributed to 1,100 western oilfield fire volunteers. Information was also provided in early May at the Williston Basin Petroleum Conference in Minot. The North Dakota Association of Oil and Gas Producing Counties is requesting a no-cost extension to publish additional quarterly newsletters with the funds that remain.

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Oil and Gas Research Council granted the no-cost extension. No quarterly newsletters have been provided at this point because of legislative responsibilities and workload. A no-cost contract extension will be submitted to the North Dakota Association of Oil and Gas Producing Counties in the near future.

### **Plains CO<sub>2</sub> 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 CO<sub>2</sub> Plains Reduction Partnership will include, among other tasks, field-based demonstration projects that focus on injecting CO<sub>2</sub> into geologic formations for the dual purpose of CO<sub>2</sub> 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 CO<sub>2</sub> and produce hydrocarbons and 2) to develop a mechanism by which carbon credits can be monetized for CO<sub>2</sub> 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 CO<sub>2</sub> 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, CO<sub>2</sub> will be injected into the center well while monitoring continues in the observation wells.

### **Research and Survey of Public Perception Program**

This is a program submitted by the Northern Alliance of Independent Producers. Total value of the project is \$210,000 with \$20,000 provided from the Oil and Gas Research Fund. The purpose of this project is to launch a public education program through print and electronic media regarding the oil and gas industry—to educate the public regarding America’s current energy situation; assist consumers in making informed choices; help consumers have realistic expectations regarding energy; assist the public in supporting sound public policy choices; and complement current employment training, and education programs. The funding provided from the Oil and Gas Research Fund is to be focused on the research and survey aspects of this program.

#### March 1, 2006

Draft contract just forwarded to applicant this week.

#### November 20, 2006

Contract has been signed. The launch of the survey was postponed until after the November elections. Field research is now being done and is scheduled for completion by the end of November. Anticipate a report being made to the Council in December, 2006.

#### April 10, 2007

Between November 27 and December 5, 2006, telephone interviews were conducted with 400 North Dakota residents. Detailed tables of the responses were recently provided to the Council along with an Executive Summary. The Executive Summary has been posted on the OGRP website. Portions of the Executive Summary are outlined below:

- In regard to oil and gas development, almost half of residents feel the U.S. energy policy is headed in the wrong direction; a little less than one-third think it is headed in the right direction.
- Respondents strongly agree that the oil industry is important to North Dakota’s economy, the United States needs to decrease its reliance on foreign oil and increase its use of renewable energy, and that we should reduce our consumption of oil by using energy more efficiently. (Residents also feel North Dakota should promote ways to increase its domestic oil and natural gas and in addition, they believe oil and natural gas prices will become more expensive in the next ten years.)
- Residents do not believe oil companies charge fair prices.
- More than half of residents think oil and gas companies should be taxed even if they don’t make a profit.
- The most important facts in gaining public support for changes in North Dakota’s oil and gas taxes to increase oil production in the state would be that increased oil production would increase the number of good energy jobs and would reduce our dependence on foreign energy. (The fact that taxes paid by North Dakota’s oil and gas producers helps to reduce local property taxes was not considered important.)
- Two out of three residents would support changes in oil and gas taxes to increase oil production in the state; one-fifth would not. (Support levels did not change after respondents heard various facts about the oil and gas industry.)

### **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 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.

**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 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. 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).

**Crude Oil Transportation Capacity Study**

This is a project submitted by the Northern Alliance of Independent Producers. Total cost of the project is \$16,000 with \$8,000 to be provided from the Oil and Gas Research Fund. The purpose of this project is to conduct research regarding transportation and infrastructure capacity for Williston Basin crude oil and to identify factors that have influenced or limited the movement of North Dakota product to market so appropriate (regulatory, public policy or otherwise) changes can be

implemented. The engineering firm engaged to conduct this study will provide recommendations of possible responses.

November 20, 2006

This contract is yet unsigned as the applicant is seeking a revision to their application—NAIP is requesting that ALL Consulting be engaged to conduct this study rather than Purvin & Gertz.

April 10, 2007

The Council approved the request of NAIP and ALL Consulting was engaged to conduct the study. The report was just recently provided to the Council. Factors resulting in a discrepancy between a 'negative' Rocky Mountain material balance (available capacity to refine and export) and the pipeline proration and drop in crude oil spot market price late in 2005 and into 2006 were identified and discussed. It was concluded that the primary factor controlling the current price differential was due to transportation constraints. Potential solutions include increased pipeline capacity. Project results should be made available to the newly legislated North Dakota Pipeline Authority. Any further project activities should be overseen and directed by the Authority.

**Study of a North Dakota Crude Oil Quality Equalization System Quality Bank**

This is a project submitted by the North Dakota Petroleum Council. Total cost of the project is \$100,000 with \$50,000 to be provided from the Oil and Gas Research Fund. The objective of this project is to conduct an unbiased study/assessment of North Dakota crude oil to determine whether a quality bank or some form of quality regulation can provide a tool that will create more pipeline capacity to export crude oil to market. Purvin & Gertz Inc. (P&G) were retained by the NDPC to complete the study/assessment. The scope of work is divided into three (3) phases, composed of a number of tasks. The first phase of the work provides a study of the current market environment and the potential impact of quality regulation on pipeline capacity. The second phase of work concentrates on specific issues related to designing and implementing a quality bank. The third phase provides for ad hoc assistance and ongoing advisory or administrative services.

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Phase 1 was subdivided into 2 tasks: - Task 1 – Background Market Analysis and Task 2 – Impact Crude Quality Regulation on Pipeline Capacity. Phase 1 has been completed with the conclusion – traditional quality bank regulations are not likely to increase pipeline capacity. Based on that P&G conclusion, Phase 2 is not necessary at this time. P&G is available for a formal project presentation. A formal P & G presentation should be considered after the implementation of the newly established ND Pipeline Authority. Further project activities should be overseen and directed by the Pipeline Authority.

**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.

**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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