

### **(17) Determination of CO<sub>2</sub> Storage Capacity and ECBM Potential of Lignite Coals**

This three-year effort will seek to develop estimates of the gas content and CO<sub>2</sub> storage capacity of lignite coals in the Fort Union Group of the North Dakota and Montana portions of the Williston Basin and to determine the potential for application of the CO<sub>2</sub>-based ECBM in those coals.

Total project cost: \$500,000

Funding request: \$400,000

Project Lead: University of North Dakota, Energy and Environment Research Center

Project Participants: North Dakota Industrial Commission Oil and Gas Division; the North Dakota Department of Commerce Division of Community Services, State Energy Program; and the Montana Board of Oil and Gas

Start Date: May 23, 2005

End Date: May 23, 2008

#### **1) Project Objective:**

The objectives of the EERC's proposed project are to develop estimates of the gas content and CO<sub>2</sub> storage capacity of lignite coals in the Fort Union Group of the North Dakota and Montana portions of the Williston Basin and to determine the potential for application of CO<sub>2</sub>-based enhanced coalbed methane (ECBM) in those coals.

#### **2) Background:**

Coal-fired power plants in North Dakota and Montana are responsible for over 50% of the CO<sub>2</sub> emitted to the atmosphere in those two states. The expansive lignite coalfields of western North Dakota and eastern Montana are located directly under or in close proximity to several large coal-fired electric power plants. These lignite beds may have the potential to be a significant sink for the CO<sub>2</sub> generated by those power plants.

Currently, CO<sub>2</sub> emissions are not regulated, and there is little-to-no market value associated with the geologic sequestration of CO<sub>2</sub>. Under these market conditions, the only economically viable approach to sequestering CO<sub>2</sub> is to generate a value-added product such as natural gas as part of the sequestration process. In order to determine the nature of that potential, it is necessary to develop estimates of the gas content, CO<sub>2</sub> storage capacity, and applicability of CO<sub>2</sub>-based ECBM technology in coal beds best suited for sequestration. Neither laboratory- nor pilot-scale CO<sub>2</sub> sequestration or CO<sub>2</sub>-based ECBM research projects have been conducted in lignite. Under this project, research will be conducted to assess the natural gas resource potential, CO<sub>2</sub> storage potential, and applicability of ECBM technology in a lignite coal seam from both technical and economic perspectives.

#### **3) Patents:**

No patents or applications for patents related to this project have been filed.

#### **4) Publications/Presentations:**

A presentation entitled “Lignite Field Validation Test in Burke County, North Dakota” was given to the North Dakota Association of Oil and Gas Counties (NDAOGC) at its annual meeting in Williston, North Dakota, on September 27, 2007. The presentation provided NDAOGC with an overview of the goals and objectives of the project and a brief summary of recent and future project-related activities.

#### **5) Progress in Past Quarter and Current Status:**

Well drilling and coal sample collection activities were conducted during the past quarter. Below is a list of specific project activities conducted between July 1 and September 31, 2007:

- Core and cuttings samples of a lignite seam in Burke County were collected in mid-August 2007. The core sample is approximately 10 feet in length and was collected from an exploration well at a depth of approximately 1100 ft. Cuttings samples were collected from four other wells on the same location, located in close proximity (<1000 ft) to the exploration well.
- Laboratory-based tests on portions of the core were initiated to determine gas (methane) content, gas specific gravity, methane and CO<sub>2</sub> sorption isotherms, coal ash and moisture contents, coal density and compressibility, porosity, and permeability.
- Well log data were collected for the wells from which the core and cuttings were collected to determine in situ reservoir conditions.

It is anticipated that the laboratory-based analytical activities will take 3 to 6 months to complete.

Photographs documenting some of the key field-based activities conducted in August 2007 are provided in Figures 1–5 below. A sample of well log data gathered during the field-based activities is also presented in Figure 6.



Figure 1 – Photograph of the drilling rig used to collect the core from the coal seam exploratory well in Burke County, North Dakota. The photograph shows the rig at the location from which the core was collected.



Figure 2 – Photograph of the coal core sample immediately after collection. The sample is being rinsed prior to the initiation of canister testing for gas content analysis.



Figure 3 – Close-up photograph of the lignite coal core collected in Burke County, North Dakota.



Figure 4 – Photograph of the core being prepared for canister testing.



Figure 5 – Photograph of the canister-testing apparatus used to initiate gas analysis activities in the field immediately after collection of the lignite core sample.

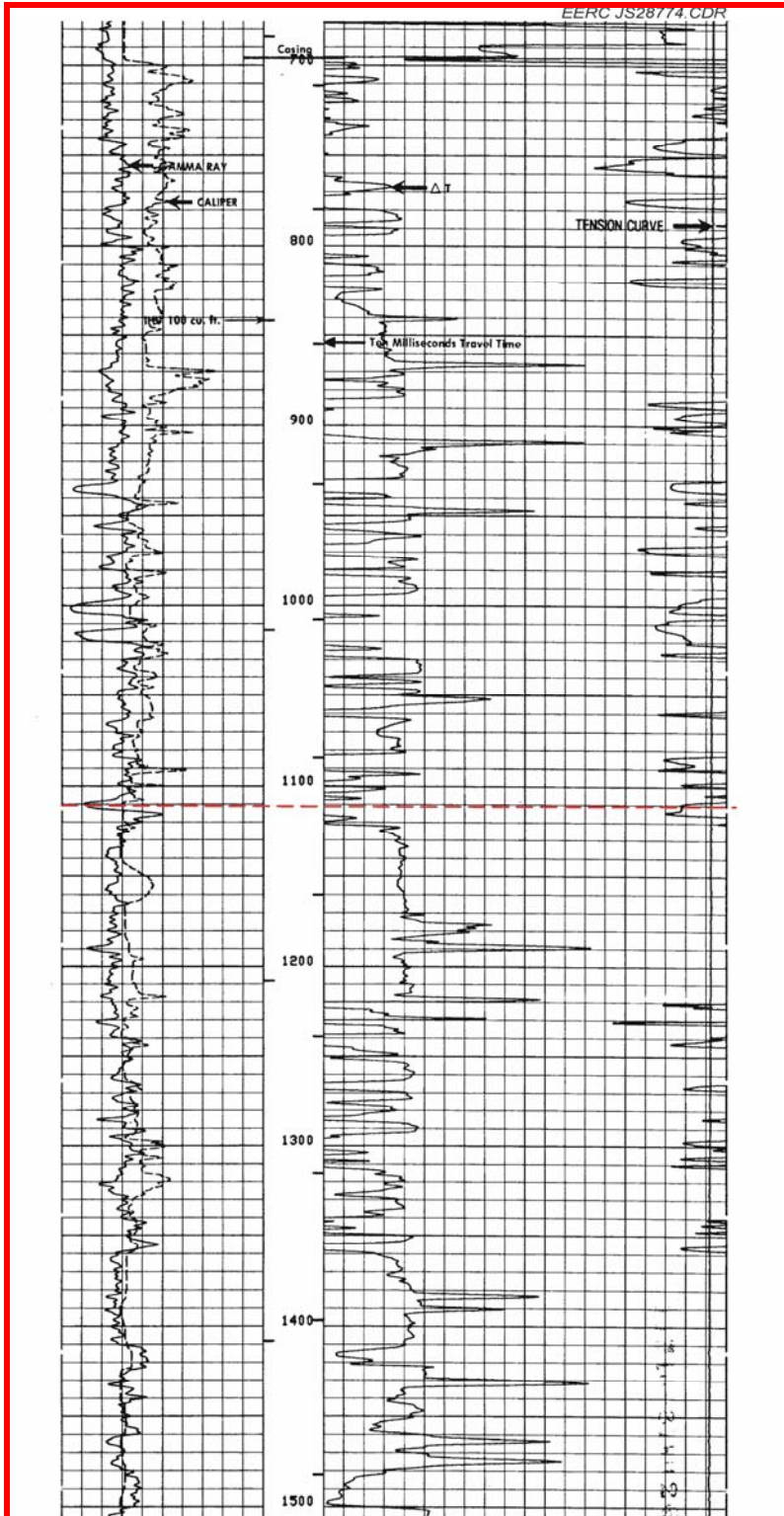


Figure 6 – Portion of a sonic log collected as part of the well-logging activities at the well site. The red dashed line indicates the approximate depth of the coal seam from which the core was collected.

**6) Plans for Next Quarter:**

It is anticipated that analyses of the core and cuttings samples collected in August 2007 will continue to be analyzed during the next quarter.