

FY-03-XLIX(49) – 121

“Lignite Fuel Enhancement: Incremental Moisture Reduction Program – Phase II“

CONTRACTOR: Great River Energy, Falkirk Mining Company & Coteau Properties

PRINCIPAL INVESTIGATOR: Mark Ness

PARTICIPANTS

<u>Sponsor</u>	<u>Cost Share</u>
Great River Energy	\$235,626
NDIC	\$235,626
Total Cost	\$471,252

Project Schedule – 7 Months

Contract Date – 9-25-03
Start Date – 9-25-03
Completion Date – 1-15-04
Extended to – 7-15-04
Completed 4-14-05

Project Deliverables

Contract Initiation: ✓
Quarterly Report:
9-30-03 ✓
11-15-03 ✓
Final Report: 7-15-04 ✓

OBJECTIVE / STATEMENT OF WORK

GRE is conducting a Lignite Fuel Enhancement Incremental Moisture Reduction Program. The Program would develop a process that increases the quality and value of N.D. lignite by economically reducing the amount of moisture, sulfur, mercury and ash content. The proposed process would use waste heat from the power production process. Completed Phase I activities consisted of laboratory studies of ash separation and moisture reduction characteristics. The current proposed Phase II project would build and operate a pilot plant fluidized bed dryer to validate previous results of moisture, coal ash, sulfur and mercury reduction. The proposed project would further evaluate the effectiveness of magnetic and air separation technology to further reduce the coal contaminants. Phase II activities will support and focus Phase III activities, which has been funded by the DOE Clean Coal Power Initiative.

STATUS

November 2, 2003 Quarterly Report. Construction of the coal drying pilot plant has been completed. To date, 33 tests have been completed, representing over 100 tons of lignite. Several continuous tests of up to 8-hours duration were conducted. Test data indicate fluid bed heat transfer were better than expected. The tests have achieved high moisture reductions in the tests. Moisture, ash, sulfur and mercury have been segregated in the ash rejects.

February 29, 2004 2nd Quarterly Report. Due to weather related issues in November, 2003, only thirty-eight tests were conducted and 150 tons of ND lignite was dried during the testing period. Modifications to the pilot dryer to enhance material separation and removal are planned for the spring of 2004. An additional 200 to 300 tons of lignite will be run through the dryer in the spring.

Final Report April, 2005 Purpose: 1. To build a 2 ton/hr lignite coal dryer and demonstrate that it can perform as design and provide cost effective drying. 2. To determine if we can make use of segregation characteristics of fluid beds to concentrate and remove ash, sulfur and mercury prior to combustion. Currently North Dakota lignite fired power plants operate at 5 to 8 percent higher net plant heat rate than comparable sub bituminous plants. This is a result of the lower boiler

efficiencies and higher station services that come with burning high moisture coals. To counter this disadvantage and increase the value of lignite as a power plant fuel a lignite drying concept was developed. This concept uses low temperature waste heat off the power plant as the energy source for drying. The drying of lignite improves the boiler efficiency, reduces the station services and reduces emission.

Results: The coal dryer, which was upgraded to 4 ton/hr, dried lignite as predicted using low temperature heat. The unit processed 350 tons of coal and demonstrated its ease of operation and reliability. The drier demonstrated its ability to dry lignite from 38% to less than 10% total moisture. The modified design, which removed nonfluidized material in the 1st stage, worked well and has been incorporated in the commercial design.

Benefits Reducing lignite moisture by 30% can reduce net plant heat rate by 5% and plant emission by up to 50%. Dried lignite can compete with sub bituminous coals as an exportable fuel in some markets.