FY-XV-53
PHYSICAL CLEANING OF LIGNITE

CONTRACTOR: Energy & Environmental Research Center

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PARTICIPANTS

Sponsor	**Cost Share**
	Phase I
Knife River Coal Mining Company	$15,000
ND Industrial Commission	14,958.45
Total	$29,958.45

Project Schedule – 9 Months
Contract Date – 1/19/94
Start Date – 1/19/94
Completion Date - 9/01/94

Project Deliverables
Status Report – 4/15/94 ✓
Status Report – 7/15/94 ✓
Final Report – 9/1/94 ✓

OBJECTIVE / STATEMENT OF WORK

The goal of this effort is to produce 100-pound samples of coal products with reduced sulfur, moisture, and sodium oxide contents, which improved handling using the cheapest available processes. The effort includes crushing and separating lignite into various size fractions. Subjecting the suitable size fraction to washability, dense media separation magnetic separation, and ion exchange to produce upgrade product. An economic objective of this study is to produce upgraded lignite for less than $0.05/Mbtu processing costs.

STATUS

Initial testing was done on lignite from Knife River Coal Mining's Gascoyne Mine and Beulah Mine. The Gascoyne Mine material did appear to be amenable to physical cleaning while the Beulah Mine lignite was amenable. Approximately 6 tons of run-of-mine lignite from the Beulah Mine was collected, crushed and screened. Three size fractions were produced: 1) oversized material crushed to minus ¼ - inch (Fraction A), 2) 3-mesh by 16-mesh material (Fraction B), and 3) 16-mesh by 0 material (Fraction C). Sieve, proximately, dense-media separations were done on the various size fractions. A short briquetting study of the clean coal fractions was done evaluating various binders. Briquetting was done suing a Komarek-Greaves continuous double-roll press with a maximum throughput of 10,000 lb/hr. The briquetting press incorporated 10-inch diameter by 4-inch wide rolls configured to yield 1 ¼ X 1 ¼ X $^{7}/_{8}$ inch pillow briquettes.

Approximately 1500 pounds of run-of-mine Beulah lignite was pulverized, screened and physically cleaned. About 300 pounds of the physically cleaned lignite was briquetted and dried. Upgraded Beulah Mine lignite produced the following specification: 9.0 weight percent moisture

on an as-received basis (wt % moisture a.r.) 6.0 wt% ash a.r., 0.50 wt% sulfur a.r., 9,754 Btu/lb a.r., and 4.5 wt% Na_2O in the ash.

This project demonstrated the North Dakota lignite from the Beulah Mine could be successfully upgraded by conventional physical coal cleaning methods to produce a low sulfur/high Btu compliant fuel. Conventional coal cleaning methods represents the least-cost option for upgrading North Dakota lignite. The results of this study were used in Project LMFS-94-15 to produce test quantities of material for combustion performance testing.