

FY-05-LI(51)-132

“Lignite Fuel Enhancement: Dry Process Coal Cleaning”

Submitted by: Falkirk Mining Company
Principal Investigator: Richard Weinstein.

PARTICIPANTS

<u>Sponsor</u>	<u>Cost Share</u>
Falkirk Mining Company	\$ 130,000
Coteau Properties	\$ 100,000
NACCo	\$ 100,000
EPRI	\$ 50,000
All Minerals	\$ 150,000
Univ of KY	\$ 32,805
Falkirk (in-kind)	\$ 202,000
DOE	\$ 318,230
NDIC	<u>\$ 250,000</u>
Total Cost	\$ 1,331,035

Project Schedule - 15 Months

Contract Date – 7/1/04
Start Date – 7/1/04
Completion Date – 9/31/05
Contract Extension – 12/31/2005
Second Extension – 2/28/06

Project Deliverables

Contract Signed: 7/1/04√
Quarterly Reports:
9/31/04(√); 12/31/04(√)
3/31/05(√); 6/30/05(√)
Final Report 2/28/06(√)

OBJECTIVE / STATEMENT OF WORK:

The objective of the project is to reduce the cost of electric generation by investigating and documenting the benefits of dry cleaning methods which remove detrimental constituents from lignite coal. Dry cleaning will reduce sulfur, mercury, moisture, ash & other minerals in lignite using air & magnetic separation processes without the use of water.

STATUS

Jul – Sept, 2004 A 5-tph air jig was purchased, installed and followed by shake-down test. Several coal types were processed with excellent mechanical operation of the jig.

Oct – Dec, 2004 Twenty-nine tests were conducted to identify optimization parameters. Four parameters having a major impact of performance were identified. The major parameters include the air jig pulse air frequency, the primary air fan, the secondary air fan and the dirt discharge mechanism actuated by specific gravity.

Jan – Mar, 2005 The air jig apparatus was operated at the Red Hills Mine, located in Mississippi. The coal seams generally run from one to five feet in thickness, with partings between the coal seams that run from nearly all non-coal material to a material that is roughly 40 percent coal. In general, it was difficult to separate the coal from the sub-quality partings since the difference in specific gravity is small.

April – June, 2005 Testing at the Mississippi has been completed with composites of six coal samples processed at the Falkirk Mine. The clean coals have very similar ash compositions on an ash basis. The total mineral concentration was reduced from ~ 13% to about 8%.

Final Report Over 200 distinct tests were conducted on a wide range of coals. The test results demonstrate the Allair jig technology is an economically viable process. Barr Engineering designed and provided a total installed cost (TIC) for an Allair jig plant that processes 230 tons of discarded mine cleanings (opportunity coal) per hour of feed to produce 150 tons of marketable cleaned coal. The design was scaled up to determine the TIC of a 1200 ton per hour plant for cleaning typical run of mine coal. Lastly, a TIC was developed for an Allair jig plant cleaning both typical and opportunity coals. Falkirk and GRE demonstrated the long-term stability of coal that was cleaned with Allair jig technology and then dried utilizing GRE's proprietary coal drying process. This resulted in lignite yielding 8900 BTU. Coal cleaning in combination with low cost drying will produce a product that is comparable to Power River Basin subbituminous coal. This makes North Dakota lignite more competitive for existing North Dakota fuel consumers.