

**LRC-IX-35  
K-FUEL PROCESSING  
OF NORTH DAKOTA LIGNITE**

**CONTRACTORS:** BNI Coal, Ltd. Minnesota Power

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**PARTICIPANTS**

<u>Sponsor</u>	<u>Proposed Shared Costs</u>	<u>Actual Cost Share</u>
BNI Coal, Ltd./Minnesota Power	\$62,500	\$14,750
ND Industrial Commission	<u>50,000</u>	<u>14,750</u>
Total	\$112,500	\$29,500

**Project Schedule – 6 Months**

Contract Date – 7/16/92  
Start Date – 3/1/92  
Completion Date – 4/1/92

**Project Deliverables**

Phase I Progress Report – 9/15/92 ✓  
Draft Final Report – 12/31/92 ✓  
Final Report – 5/26/93 ✓

**OBJECTIVE / STATEMENT OF WORK**

The ultimate objective of this project was to economically upgrade North Dakota lignite to an export quality boiler fuel. Characterizing beneficiated lignite produced by the K-Fuel B process was an intermediate goal. Phase I work was a pilot-scale testing program to produce and elevate product quality and yield. Phase II was a combustion test program to determine fouling and slagging characteristics of the K-Fuel product. Specific product quality and process objectives of the Phase I study were: moisture reduction of 80%, sulfur reduction of 40% or more, retention of 95% of the total heat content, and a heating value of 11,000 Btu/lb. Specific product quality objectives of the Phase II study were: burnout equal to or greater than raw product, small ash deposition, and sulfur emission less than 1.2 lbs. of SO<sub>2</sub>/MMBtu.

**STATUS**

Two samples of North Dakota lignite from the BNI Center Mine were used in the Phase I study. The two samples had slightly different moisture content and produced different results. One sample, received in drums, exhibited moisture content of 36 weight percent. The second sample, received in a canvas pouch, exhibited a moisture of 31 weight percent.

The high-moisture sample required slightly over 800 Btu from the steam made to produce 1.0 pond of K- Fuel from 1.57 ponds of lignite. The K - Fuel made from the highest-moisture lignite had a heating value of slightly over 10,900 Btu/lb and contained about 5.5 weight percent moisture. Analysis of the high-moisture samples showed an average sulfur content of 1.87 pounds of SO<sub>2</sub> per million Btu.

The low moisture lignite required about 760 Btu from the steam to produce 1.0 pound of K-Fuel from 1.48 pounds of lignite. The material had a heating value of about 11,100 Btu/lb and contained about 5 percent moisture. Analysis of the low-moisture lignite showed average sulfur content of 1.58 pounds of SO<sub>2</sub> per million Btu.

Sulfur analysis of the K-Fuel samples varied greatly. The high variability was attributed to the pyretic sulfur content, sample inhomogeneity and the use of grab-samples for analysis. Median sulfur removal was calculated at 18.5 percent. The K-Fuel product had an average sulfur content of 1.71 pounds of SO<sub>2</sub> per million Btu. The determination of sulfur reduction was complicated by an inability to obtain representative samples and the apparent low level of sulfur reduction.

The sulfur reduction goal of 40% was not met in Phase I. The project was terminated.