

FY96-XXI-64
LOW-COST METALS ADSORBENTS FROM LIGNITE

CONTRACTOR: Grand Forks Activation Technologies

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PARTICIPANTS

| <u>Sponsor</u> | <u>Cost Share</u> |
|-------------------------------------|-------------------|
| Knife River Corporation | \$ 5,000 |
| Grand Forks Activation Technologies | 22,000 |
| ND Industrial Commission | <u>27,000</u> |
| Total | \$54,000 |

Project Schedule – 9 Months

Contract Date – 11/8/95
Start Date – 11/8/95
Completion Date – 6/24/96

Project Deliverables

Status Report - 1/15/96 ✓
Final Report - 9/27/97 ✓

OBJECTIVE / STATEMENT OF WORK

The objective of this work is to determine the commercial feasibility of using lignite fines for the removal of heavy metal cation contaminants from contaminated water sources. Lignite and calcium sludges will be tested in synthetic and existing wastewater solutions containing heavy metals. Product specifications and process economics are to be developed for a specific remediation site. This project has evolved in part as a result of the following Lignite Research Council projects: FY94-XV-53, LMFS-94-12, LMFS-94-15, FY95-XVIII-57, and FY95-XIX-59.

STATUS

Lignite samples from six size fractions were tested for metal absorbency. The six size fractions were ¼-inch by 4-mesh, 4-mesh by 6-mesh, 6-mesh by 8-mesh, 8-mesh by 10-mesh, 10-mesh by 14-mesh, and minus 14-mesh. The six fractions were tested for metal absorbance with synthetic wastewater solutions containing the metal cations: iron, cadmium, zinc, nickel, and lead. The minus 14-mesh fraction was most effective at removing iron (77 to 0.09ppm), cadmium (107 to 1.9 ppm), zinc (95 to 7 ppm), nickel (93 to 9.2 ppm), and lead (115 ppm to below detection limits).

Using lignite, samples from one mine water stream (pH=6.79) were effectively cleaned. A second mine water stream (pH=2.66) was effectively cleaned using lignite and a calcium sludge. The lignite plus calcium-sludge successfully extracted silver, aluminum, cadmium, copper iron, manganese, and zinc. The use of lignite tends to increase the concentration of sodium, potassium and magnesium.

A concept for removing heavy metal ions from water streams was developed. The concept includes a pH adjustment option and the use of a treatment cell or trench.