

FY00-XXXIV-95
POWDERED ACTIVATED CARBON FROM NORTH DAKOTA
LIGNITE: AN OPTION FOR DISINFECTION BY-PRODUCT
CONTROL IN WATER TREATMENT PLANTS

CONTRACTOR: Energy & Environmental Research Center

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PARTICIPANTS

<u>Sponsor</u>	<u>Cost Share</u>
City of Grand Forks (In-Kind)	\$60,000
Red River Water Management Consortium	\$30,000
American Crystal Sugar	
J.R. Simplot Company	
Northern States Power Company	
ND Industrial Commission	<u>\$30,000</u>
Total Project Costs	\$120,000

Project Schedule -18 Months

Contract Date –9/8/99
Start Date – 9/22/99
Completion Date - 4/30/01

Project Deliverables

Status Report – 3/31/00 ✓
Status Report – 9/30/00 ✓
Final Report – 12/30/01 ✓

OBJECTIVE / STATEMENT OF WORK

The objective of this study is to evaluate the effectiveness of powder activated carbon (PAC) derived from ND lignite to remove naturally occurring organic matter (NOM) from raw water prior to water treatment and chlorination. NOM contributes to the formation of trihalomethanes (THM) and haloacetic acids (HAA) during water treatment and chlorination. In addition, the effectiveness of PAC will be evaluated to improve coagulation during treatment and removal of odor.

STATUS

The effectiveness of five activated carbon samples in removing impurities from four natural water sources were evaluated. Treatment parameters evaluated included the concentration of the PAC, time of exposure and temperature during treatment. The four sources of water were: 1) Red Lake River Water, 2) Park River Water, 3) Mississippi River Water, and 4) Missouri River Water. Darco Norit, Cal-Pacific and Acticarb commercial PAC samples and PAC produced from Knife River Mine, and Freedom Mine North Dakota lignite.

General observations drawn from the results of a regression analysis are:

- Darco Norit is the most effective PAC sorbent; followed in order by Acticarb, Freedom, Knife River, and Cal-Pacific.
- Cal-Pacific was not effective under the conditions evaluated.
- The highest dissolved organic carbon reduction was achieved with PAC concentrations of 100 mg/L.
- Park River water DOC reductions were the highest achieved at lowest temperatures and shortest contact times.

The project indicated that activated carbon produced from North Dakota lignite might be effective in reducing naturally occurring organic matter. Continuous feed processing is warranted to demonstration process and PAC effectiveness and to obtain engineering information requirements for scale up and design.