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OXIDATION OF NORTH DAKOTA SCRUBBER SLUDGE FOR SOIL AMENDMENT AND PRODUCTION OF GYPSUM

CONTRACTOR: Energy & Environmental Research Center

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PARTICIPANTS

Sponsor	Cost Share
USDOE	$40,000
Cooperative Power Association	40,000
ND Industrial Commission	40,000
Total	$120,000

Project Schedule -
Contract Date – 9/15/95
Start Date – 9/15/95
Completion Date – 1/31/97

Project Deliverables
Progress Report - 12/1/95 ✓
Phase I Interim Report - 4/1/96 ✓
Progress Report - 6/1/96 ✓
Progress Report – 10/1/96 ✓
Phase II Summary Report – 1/1/97 ✓
Final Report – 6/30/97 ✓

OBJECTIVE / STATEMENT OF WORK

The purpose of this project is to … "determine the technical and economic feasibility of producing a lower-quality agricultural soil amendment and secondarily, a higher-quality gypsum for manufacturing purposes. The scrubber sludge from flue gas desulfurization is produced in high volumes and consists primarily of calcium sulfite in a very wet consistency. The first phase of this work will focus on development of a process to dewater and oxidize the calcium sulfite raw scrubber sludge material. The calcium sulfite material will be converted to calcium sulfate and collected in a granular or pelleted form. Calcium sulfate can be used as an agricultural soil amendment to treat the sodic soils found in North Dakota. If this process is found to be economical, a second phase will be undertaken to develop the oxidation process further to produce a higher-quality gypsum that can be used in manufacturing".

STATUS

Raw flue gas desulfurization (FGD) scrubber sludge from the Coal Creek Station was subjected to forced air oxidation at laboratory and pilot scale operations. Forced air oxidation converted the raw FGD sludge ($CaSO_3 1/2H_2O$) to gypsum ($CaSO_4 2H_2O$). Forced air oxidation was done by injecting air in an aqueous solution while controlling the pH between 4.5 and 5.0 with sulfuric acid.

The following conclusions were reached:

- The production of a high-quality gypsum (+98%) suitable for agricultural use and the production of wallboard was demonstrated using the Coal Creek Station scrubber sludge.
- Potentially problematic impurities, including trace elements and halides, appear to be partitioned to the liquid phase and if present are in trace concentrations in the gypsum.
- Potential market applications for gypsum including agricultural uses and wallboard production were identified.

A preliminary flow sheet and cost estimate was generated for a Coal Creek gypsum plant. A plant producing 210,000 tons of gypsum per year was estimated to have an installed cost of about $3,000,000.