

**ANNUAL PROJECT REPORT
AS OF DECEMBER 2000**

1. Project Sponsor
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3. OCDO Grant No. CDO/D-95-19
4. Project Update OR
Final Report X
5. Project Title: Re-use of clean coal technology by-products in the construction of impervious liners
6. Project Term: From: October 1, 1996 To: March 31, 2000
7. Budget:
- | <u>Co-Sponsors Name</u> | <u>Cost Share</u> |
|---------------------------|-------------------|
| OCDO | \$387,669 |
| The Ohio State University | \$412,705 |
| American Electric Power | \$46,400 |
| Dravo Lime | \$28,140 |
| ODNR | \$6,500 |
| TOTAL PROJECT COST | \$881,414 |

I. ABSTRACT

8. OVERVIEW OF PROJECT & OBJECTIVES: The goal of this project is to establish field-verified time-dependent relationships for the structural behavior and permeability of liners constructed from Flue Gas Desulfurization (FGD) material. This goal is being accomplished with a coordinated program of testing and analyzing small-scale laboratory tests, medium-scale field plots and a full-scale demonstration pond. The performance of the FGD material will be monitored for a period of at least three years.

As a result of this project, several critical questions about the structural behavior and environmental effects of constructed FGD facilities will be answered. This should lead to the promotion of the use of Ohio's high sulfur coal by demonstrating re-use alternatives to the present practice of landfilling the FGD material. It is estimated that the direct cost benefit for a medium sized landfill will be \$10 to \$30 million and the long term indirect economic benefit will be the saving of increasingly scarce landfill space. The benefits to the development of agricultural industries in Ohio are particularly important. The productive

use of a portion of the approximately 0.5 million acres of reclaimed strip-mined lands in Eastern and Southeastern Ohio is critical to the economic development of the region.

9. WORK DONE AND CONCLUSIONS: The project work consisted of laboratory testing, small-scale field testing and construction and monitoring of a full-scale pond as follows:

Laboratory Tests: Permeability and strength tests were carried out on compacted FGD samples. The results of the laboratory tests showed that the permeability of many compacted FGD samples was lower than the EPA guidelines for lining waste containment facilities. The laboratory results were used in the design of small-scale field tests and the full-scale pond facility.

Small Scale Field Tests: A series of wetland cells were constructed at the Olentangy River Wetland Research Park located one mile north of the OSU main campus in Columbus. The cells were lined with stabilized FGD collected from American Electric Power's Conesville power station and seeded with appropriate wetland plants. The cells were subjected to simulated agricultural runoff and monitored.

Full Scale Pond / Lagoon: An FGD lined pond was constructed at the Western Branch of The Ohio Agricultural Research & Development Center in South Charleston. Swine manure was added to the pond in Autumn of 1998. Monitoring of the permeability of the liner and quality of the leachate was carried out on a regular basis. This facility will make it possible to study the behavior of FGD material as placed in a field project.

10. PLANS FOR COMING YEAR: N/A

II. HIGHLIGHTS/ACCOMPLISHMENTS

11. Developing economical alternatives to landfilling FGD material is of vital importance to the State of Ohio. The identification of these materials as acceptable safe alternatives to existing supplies of natural clays for liners and in engineered fills could significantly reduce the cost of electric power and help conserve the state's natural resources.

III. ARTICLES/PRESENTATIONS

12.

Wolfe, W.E., Butalia, T.S., Whitlatch, E.E., Mitsch, W., Re-use of Clean Coal Technology By-Products in the Construction of Low Permeability Liners, Final Report for Project CDO/D-95-19, The Ohio State University, December 2000.

Butalia, T.S., and Wolfe, W.E., Performance Assessment of a Flue Gas Desulfurization Material at a Lined Pond Facility, The Use and Disposal of Coal Combustion By-Products at Coal Mines: A Technical Interactive Forum, Morgantown, West Virginia, April 11-12, 2000.

Butalia, T.S, and Wolfe, W.E, Use of Coal Combustion By-Products as Low Permeability Liners for Manure Storage Facilities, Monograph on Animal Waste Management & Containment, American Society of Civil Engineers – Environmental Engineering Division (in peer review).