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**Field Study of Disposed Solid Wastes from
Advanced Coal Processes**

**Annual Report
October 1, 1992 - September 30, 1993**

October 1993

Work Performed Under Contract No.: DE-AC21-86MC22118

For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
Morgantown, West Virginia

By
Radian Corporation
Austin, Texas

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**For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
P.O. Box 880
Morgantown, West Virginia 26507-0880**

**By
Radian Corporation
P.O. Box 201088
Austin, Texas 78720-1088**

October 1993

1.0 BACKGROUND AND CONTRACTUAL ITEMS

Radian Corporation and the North Dakota Energy and Environmental Research Center (EERC) are funded to develop information to be used by private industry and government agencies for managing solid wastes produced by advanced coal combustion processes. This information will be developed by conducting several field studies on disposed wastes from these processes. Data will be collected to characterize these wastes and their interactions with the environments in which they are disposed.

Three sites were selected for the field studies: Colorado Ute's fluidized bed combustion (FBC) unit in Nucla, Colorado; Ohio Edison's limestone injection multistage burner (LIMB) retrofit in Lorain, Ohio; and Freeman United's mine site in central Illinois with wastes supplied by the nearby Midwest Grain FBC unit.

During the past year, field monitoring and sampling of the three landfill test cases constructed in 1989 were completed. Monitoring continued at Test Case Four. Two cells for Test Case Five were constructed in Illinois. Radian also began work on the Task 4 Design Manual.

2.0 WORK ACCOMPLISHED OCTOBER 1992 TO SEPTEMBER 1993

A site-by-site summary of the October 1992 to September 1993 results is provided below.

2.1 Colorado Ute Test Case

Monitoring was completed at this site in June 1992. No groundwater or pore-water samples were recovered; only two surface runoff samples were collected.

The Final Site Report was started in October and the first draft was submitted to DOE in December. This report summarized all data collected from the test site over a three-year monitoring period. The draft Final Site Report will be completed as a final document and data delivered in electronic format pending receipt of comments on the draft document from DOE.

DOE/METC decided to continue testing at the Colorado site beyond the three-year study period. Monitoring will be done on an annual basis and will be restricted to in situ permeability measurement and core sample collection for determination of physical, mineralogical, and chemical properties. Radian submitted a Year 4 Budget to DOE in March 1993 for continued annual monitoring. A contract modification for annual monitoring was prepared and submitted to DOE in July.

The Tri-State Generating and Transmitting Company met in May to give formal approval for the Colorado Year 4 monitoring. This approval was granted in July. Radian prepared and submitted a letter to the Tri-State Generating and Transmitting Company in August informing them of the Year 4 sampling plans and requesting site access.

Year 4 monitoring will begin following approval of the contract modification and approval of site access.

2.2 Ohio Edison Test Cases

Monitoring at this site was completed in August 1992. Data was compiled for the Final Site Report. A draft of the report will be submitted to DOE/METC following completion of peer review.

DOE/METC decided in November to also continue testing at this site beyond the three-year study period. Monitoring will be done on an annual basis. Radian submitted a Year 4 Budget to DOE in March 1993 for continued annual monitoring. A contract modi-

fication for annual monitoring was prepared and submitted to DOE in July. Year 4 monitoring is pending approval of the contract modification, and completion of NEPA permitting of the site by DOE.

The 1992-1993 Ohio site review meeting was held May 27 in Morgantown with results of the three-year field monitoring effort presented. Funding for completing the current scope of work and for an additional year of monitoring was discussed. An outline of the Engineering Design Manual was presented to Jerry Harness for his review.

2.3 Freeman United Test Cases

The fifth set of water samples was collected in August 1992, as were the annual core samples. The sixth set of quarterly water sampling was conducted early in November 1992. Quarterly water samples were also collected in February, May, and August. The second annual set of core samples was also collected in May. The samples were analyzed and the data reported in the Quarterly Technical Progress Reports. The data was loaded into the project database.

A meeting was held October 5 with Illinois state regulators and other parties involved in construction of the new test cells.

A site review meeting was held May 25 to discuss cell construction and data from the first Illinois test case. Following the meeting the group traveled to the test cell location in Canton, Illinois to inspect the ash handling and mixing equipment assembled at the site for construction of the Test Case 5 test cells.

Construction of the Test Case 5 cells, planned for late fall of 1992, was delayed because of permit complications. A permit modification was finally approved in March 1993 by the Illinois Department of Mines and Minerals for construction of the Test Case 5 cells. Radian immediately began preparing for construction of the cells. Construc-

tion started in May and was completed in June. Core samples were collected in August and analyzed in September.

The mixing equipment used for both cells was identical. Only the moisture content of the ash material was different with the two mixes. The thickness of both cells was reduced from 8 feet to 5 feet. This was due to the inadequate supply of material from the SILCO-Duck Creek Station. The north cell, with the more fluid material, set very quickly. Therefore, a berm was not needed around the cell. However, the west end of the cell was covered with soil to prevent erosion per the project plans.

A materials testing program was instituted with construction of the Test Case 5 cells in June. Work continues on the testing program. Initial results were reported in the August quarterly report. All the material samples outlined in the revised test plan were collected. Early sample results indicate we have successfully demonstrated that duplication of laboratory results is possible in a pilot scale situation.

2.4 Design Manual

A kickoff meeting was held at Radian in April for work on Task 4, preparation of the engineering design manual. Radian completed the outline for the manual and submitted it to DOE for comments in July. DOE quickly reviewed the outline and returned comments to Radian.

2.5 Other Issues

Quarterly progress reports were submitted in October, January, April, and August. These reports included all analytical results from sampling at the sites.

A short video tape of activities involved in the field investigation was completed in July. A copy of the video was sent to Jerry Harness in August.

Radian's expenditures reached 75% of the contract value early in 1993. A formal notification was submitted to DOE in April. A revised Cost to Complete Report was also submitted to DOE in April. DOE requested that the format of the Cost to Complete report be revised. The report was revised and resubmitted in July. DOE revised its interpretation of the contract value. It now says the \$250,000 in co-funding from the Illinois Center for Research on Sulfur in Coal is not inclusive of the \$4,202,499 contract value.

Radian attended a workshop on ettringite at the University of Kentucky in September.

3.0 WORK SCHEDULED FOR OCTOBER 1993 THROUGH SEPTEMBER 1994

A draft Final Site Report for the LIMB test cases will be submitted to DOE for review. The Report will be finalized following receipt of DOE comments.

The contract modification for Year 4 monitoring in Ohio will be finalized and monitoring will begin when funding is secured.

The draft Final Site Report for the Colorado test case will be finalized following receipt of DOE comments.

The contract modification for Year 4 monitoring in Colorado will be finalized and monitoring begun when funding is secured and site access granted from the Tri-State Generating and Transmitting Company.

The three-year monitoring period will be completed at the Test Case 4 in Illinois. The draft Final Site Report will be prepared and finalized following receipt of DOE comments. Possible Year 4 monitoring at Test Case 4 will be discussed.

Work will continue on monitoring and the materials testing program for Test Case 5 in Illinois.

Work will continue on development of design guidelines based on results from the Colorado and Ohio test cases, and preliminary results from the two Illinois test cases.

4.0 ISSUES

The schedule for the overall project has continued to slip from originally planned dates. Delays this past year were mainly due to the required permit modification for the Illinois Test Case 5 cells.

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