LRC-VI-25
PROJECT CFBC
THE DESIGN AND OPERATION OF A TEST FACILITY TO GENERATE COMPREHENSIVE, RELIABLE AND ACCESSIBLE DATA FOR UTILTY AND INDUSTRIAL CLIENTS

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PARTICIPANTS

Sponsor	Cost Share
Empire State Electric Energy Research Corporation	$100,000
Northern States Power Company	155,000
Electric Power Research Institute	105,000
Otter Tail Power Company	100,000
ARCO Coal Company	90,000
Consolidated Edison of New York	50,000
Premier Refractories and Chemicals	50,000
U.S. DOE/EERC JSR Program	365,000
Energy & Environmental Research Center	25,000
TU Electric	75,000
BNI Coal, Ltd.	5,000
ND Industrial Commission	50,000
Total	$1,220,000

Project Schedule – 27 Months
Contract Date – 3/12/91
Start Date – 5/88
Completion Date – 1/31/92

Project Deliverables
Monthly Progress Reports ✓
Final Report – 9/21/92 ✓

OBJECTIVE / STATEMENT OF WORK

Project CFBC is a multi-client study to design and operate a circulating fluidized-bed combustion (CFBC) test facility to provide comprehensive, reliable, and accessible data for utility and industrial applications. This project was initiated in May 1988, and scheduled to be completed in April 1991. This project received funding under LRC-I-3 and LRC-II-9. As proposed under LRC-VI-25, this is an expanded program, which will improve the ability of the pilot unit to mimic real-life units. The test matrix has been expanded to include two sorbents and four coals.

STATUS

A CFBC test pilot facility representative of major boiler vendor designs was constructed. A database for use in evaluating future CFBC technology was developed. Five coals were test burned in the unit: North Dakota lignite, Asian lignite, Wyoming subbituminous, Colorado bituminous, and Pennsylvania bituminous. Coal quality did impact the overall performance of the CFBC.

The impact of coal quality on overall operability was assessed by comparing recirculation rates, the primary cyclone collector performance, bottom ash vs. fly ash split, and the coal size distribution of the circulating material resulting from burning the five different coals. The following were evaluated: SO2 emissions and limestone utilization; NOx, N2O, and CO emissions; fly ash collect ability; and solid waste generation. Thermal performance changes resulting from varying coal quality were assessed by comparing heat-transfer coefficients and heat flux, combustion efficiency, and overall boiler efficiency.

The North Dakota lignite used in this study was provided by BNI Coal, Ltd.'s Center, ND mine. The sorbent for the test was New Enterprise limestone. Baseline conditions for the North Dakota tests were:

Average Combustor Temperature	1550 degrees F
Velocity	16 fps
Excess Air	25%
Primary Air: Secondary Air	60:40
Coal Size	-1/4 inch
Limestone Size	-20 mesh

Temperature, load, excess air, and limestone addition was varied in a ten-test program matrix. This data can be used to assist in the design and operation of CFBC systems using North Dakota lignite.

Project CFBC is summarized in "EERC Pilot-Scale CFBC Evaluation Facility Project CFBC Test Results".