



Project Status Report for: August 2001

Project Title: Ultra Low NO_x Integrated System for Coal-Fired Power Plants

Project Number: 91890460 Project Manager: John Marion

Customer Name: U.S. DOE / Performance Projects Project Leader: Charles Maney

GOALS AND OBJECTIVES:

Develop low cost, retrofit NO_x control technologies to address current and anticipated, near term emissions control legislation for existing coal fired utility boilers. Specific goals include:

- Achieve < 0.15 lb/MMBtu NO_x for eastern bituminous coals
- Achieve < 0.10 lb/MMBtu NO_x for western sub-bituminous or lignitic coals
- Achieve economics at least 25% less than SCR-only technology
- Validate NO_x control technology through large (15 MWt) pilot scale demonstration
- Evaluate the engineering feasibility and economics for representative plant cases
- Provide input to develop commercial guidelines for specified equipment
- Provide input to develop a commercialization plan for the resultant technologies

WORK PLANNED FROM PREVIOUS REPORT:

Task 2.4 – Advanced Control System Design

- Finalize flame scanner results.

Task 3.3 – Combustion Testing and Cleanup

- Complete cleanup from the second combustion test period in the BSF.

Task 5 – Engineering Systems Analysis & Economics

- Finalize matrix of test cases and begin the final economic analysis.

Task 7 – Data Compilation and Final Report

- Develop outline of the final project report.



ACCOMPLISHMENTS FOR REPORTING PERIOD:

Task 2.4 – Advanced Control System Design

- *Finalize flame scanner results.*

During the second combustion test period, flame scanner signals were recorded using both UV and IR detectors looking at the top elevation of coal flames on the West side of the BSF. The analog signals from the scanners were recorded on tape and later digitized, saved as data files, and processed. Data was obtained from 28 of the conditions tested in the BSF with data points from both the Powder River Basin (PRB) and high volatile bituminous coals.

The analysis of the flame scanner results is essentially complete. There appears to be a good correlation between the main burner zone stoichiometry and the flame scanner signal. However, it is not clear that there is sufficient data to determine if the flame scanner signals correlate with the local nozzle stoichiometry as was initially proposed. Additional assessment of the applicability of the flame scanner signal for advanced boiler control will be provided in the final report.

Task 3.3 – Combustion Testing and Cleanup

- *Complete cleanup from the second combustion test period in the BSF.*

The last remaining BSF cleanup task is to de-slag the furnace and dispose of the hopper ash. This task was to have been completed in August. However, due to other priorities in the laboratory, personnel were not made available to complete this task. This is a relatively minor task and will be completed when resources become available.

Task 5 – Engineering Systems Analysis & Economics

- *Finalize matrix of test cases and begin the final economic analysis.*

The scope of this task has been expanded to cover an even broader range of low NO_x retrofit scenarios. Due to ALSTOM business unit interest, the economic analysis will be performed for 3 units, one firing a Powder River Basin coal, another firing a midwest bituminous coal, and the final unit firing an eastern bituminous coal. The first 2 units selected for the analysis are the Scottish Power (PRB) and the IP&L (midwest bit) units recommended by the advisory panel in our Jan. 31, 2001 meeting. The 3rd unit was selected by ALSTOM personnel as a typical unit firing an eastern bituminous coal. The economic analysis of the 2 units firing the bituminous coals will also include the cost of a fuel switch to fire PRB.

Cases to be evaluated include:

1. Baseline – as fired
2. TFS 2000™ firing system
3. Ultra Low NO_x firing system
4. Baseline + SCR
5. Ultra Low NO_x firing system + CBO™ device
6. Fuel switch to PRB

To date, the baseline emissions performance of the units has been documented and the emissions levels for each of the retrofit cases was estimated. The firing system modifications for each unit / case have been selected and material costs were generated for 2 of the 3 units. Boiler performance models have also been generated for 2 of the 3 units.



Task 7 – Data Compilation and Final Report

- *Develop outline of the final project report.*

Work on the final project report has begun. A preliminary report outline / report structure was developed. Awaiting individual task reports for integration into the final report.

WORK PLANNED FOR NEXT REPORTING PERIOD:

Task 1.0 – Test Fuels Characterization

- Begin drafting task report.

Task 2.3 – Global Mixing Process Improvement

- Begin drafting task report.

Task 2.4 – Advanced Control System Design

- Begin drafting task report.

Task 3.3 – Combustion Testing and Cleanup

- Complete cleanup from the second combustion test period in the BSF.

Task 5 – Engineering Systems Analysis & Economics

- Complete preliminary cases for final economic analysis.

Task 6 – Advisory Panel

- Schedule final meeting of the Utility Advisory Panel.

Task 7 – Data Compilation and Final Report

- Continue work on final report.