

Project Status Report for January and February, 2000

Project Title: Ultra Low NO_x Integrated System for Coal-Fired Power Plants
Project Number: 91890460 **Report Manager:** John Marion
Customer Name: US DOE / Perf. 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 REPORT¹:

Initiate project activity via:

- Obtain / sign contract with US DOE
- Enter project plan into appropriate databases
- Assemble project team
- Hold appropriate internal and external (w/US DOE) kickoff meetings
- Initiate development work

¹Note: This is the first monthly status report for this project upon which work began January 3, 2000.

ACCOMPLISHMENTS FOR REPORTING PERIOD:**Overview:**

The work accomplished during this reporting period constituted project planning / management related activities necessary to kickoff the project. Project management accomplishments include the following:

- Project work initiated on January 3, 2000
- Signed contract with US DOE on Feb. 9, 2000
- Participated in project kickoff meeting at US DOE on Feb. 10, 2000
- Submitted patent waiver application covering all arising intellectual property with US DOE
- Developed / mailed invitations to alliance partners to participate in the Advisory Panel

In addition to the project management work noted above, project development work was initiated including:

- Reviewed / initiated Advanced Control System task workscope
- Reviewed / initiated Global Mixing Process / firing system design task workscope
- Identified preliminary parameters for evaluation during BSF combustion test period 1 & 2
- Kicked off BSF facility preparation task

Discussion:

Work initiated on this project on January 3, 2000, in keeping with the overall project schedule. A signed contract was obtained from US DOE on January 20, 2000. After internal review, the contract was signed by US PPL personnel on February 9, 2000. Subsequent to the contract signing, a project kick-off meeting was held with US DOE at the National Energy Technology Laboratory (NETL) in Pittsburgh, PA on February 10, 2000. This meeting was rescheduled from the originally planned date of January 26, 2000 at the request of US DOE. Attendees to the meeting included Soung Kim, the project Contracting Officer, together with Tom Feeley, Anthony Mayne, Sean Palsynski, Harvey Ness, and Richard Rogus of US DOE, and John Marion and Charles Maney of US PPL.

During the meeting, the overall project work plan was presented and accepted by US DOE thereby officially kicking off the project work. A Powerpoint file containing the materials presented to the US DOE is attached with this report.

Among the important points raised during the kickoff meeting was the need to ensure fly ash properties, as they may affect particulate collection device efficiency and cement use, are not significantly altered via the resultant low NOx system. Agreement was reached to incorporate this concern into the project plan, likely via post-test fly ash sample analysis. In addition, two follow on meetings with US DOE were scheduled to occur at NETL Pittsburgh, the first in the late fourth quarter of this year, and the second in mid-2001, upon completion of the development work.

On the development side, work was initiated on both the low NOx firing system design, and advanced controls system development tasks. Initiated firing system work has focused on reviewing existing, CE performance data to identify opportunities for improvement to the global OFA mixing process to increase staged residence time for additional NOx reduction and / or improve unburned carbon emissions. Toward that end, the set-up of Computational Fluid Dynamic (CFD) models of CE's Boiler Simulation Facility (BSF) have been initiated to assess the relative performance of various high and low velocity, and wall vs. t-fired overfire air (OFA) systems. Additional conditions, such as fuel and air balancing, will be considered for subsequent model runs.

On the controls side, a draft advanced process flow control system diagram was generated consistent with the goals of the overall project. Included components are coal and air flow / local stoichiometry control devices, and an upper level supervisory control system based on neural net technology. In addition, specification of the required sensing and control devices for use in the pilot scale test program was begun in preparation for this work.

WORK PLANNED FOR NEXT REPORTING PERIOD:

During the month of March, additional project management and developmental activities will occur, focusing on firing system design, and control algorithm development. Planned work scope includes:

Project Management

- Prepare and issue subcontracts for Progress Materials, Inc. and ABB Automation, Inc., Fossil Controls Division participation in the project work.
- Identify advisory panel members / schedule first panel meeting.
- Complete detailed project planning (scope / schedule) for and formally kick-off remaining tasks including Task 4 - Bubbling Bed Char Oxidation Study, and Task 5 - Engineering Systems Analysis and Economics.

Integrated System Development

- Initiate design of firing system hardware for large pilot scale (BSF) testing
- Finalize Global Mixing Process task work plan and run baseline TFS 2000™CFD simulation of BSF
- Initiate development of the neural network control model, and engineering of flame scanners and coal flow sensors for the BSF testing
- Assess current condition of the BSF and begin facility preparations