DOE/PC/92160--T1

ENGINEERING DEVELOPMENT OF ADVANCED
COAL-FIRED LOW-EMISSION BOILER SYSTEMS

QUARTERLY TECHNICAL PROGRESS REPORT
and
MONTHLY STATUS REPORT

DOE/PC/92160--T1

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Date
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QUARTERLY TECHNICAL PROGRESS REPORT

Reporting Period - October through December 1992

I. Work Completed

Task 1.0 - Project Planning

1. Project Work Plan was developed with joint participation by all subsystem teams. Meetings and/or telephone conferences were held with subcontractor as necessary to finalize the plan. Plan was completed and submitted to DOE on October 9, 1992. In supplement to the Work Plan, QA/QC Plan and Hazardous Substance Plan was prepared and submitted.
2. Comprehensive overall project activity schedules were developed for all individual B&W groups and subcontractors with participation in Phase I.
3. B&W participated in two kick-off meetings with DOE - PETC. A joint LEBS contractors and PETC managers meeting was attended October 16, 1992.

In a second meeting on November 23, 1992, B&W presented its Work Plan and status on current activities to PETC's managers.

4. In preparation for Subtask 2.4, Concept Selection Report, a draft outline for the report was developed and circulated to the subsystems teams for comment and use.

Task 2.0 - Concept Development

Subtask 2.1 - Coal Selection

- 1.0 B&W subsystem teams, jointly with PSIT, developed selection parameters and screened coal database information. Databases at both B&W and PSIT and analyses provided by Illinois Power were screened to identify potential coals. The final coal selections were determined by B&W's subsystem team after review of the identified selection to assess the impact of NOx and SO₂/Particulate considerations. Illinois #6, Wyodak Power River Basin and West Virginia Cedar Grove/Alma coals were selected respectively as the commercial design and the two alternate coals.
- 2.0 A Coal Selection Report was prepared and submitted to DOE for information.

Subtask 2.2 - Subsystem Technical Assessment

Activity - NOx Subsystem

1. Work with PSIT was started as part of the planning meeting held on October 13, 1992. Representatives from the boiler subsystem team participated in the meeting in addition to the B&W project manager and NOx control system team.
2. A teleconference was held with PSIT on October 29, 1992, to review proposed selection criteria. As a result, possible system components were defined and evaluation criteria were established and reviewed with B&W.
3. A concept screening review meeting was held with PSIT at their offices in Andover, MA. on November 17, 1992. The main topics of discussion were burner types, staged combustion system choices, and how the boiler could be configured to best achieve low NOx and superior operability and reliability.
4. Further information on the RSFC burner was sent by MIT to B&W and PSIT.
5. Conceptual design layouts were completed for three burner types, three staged combustion modes, six firing configurations, and four furnace types.
6. As a result of the discussions at the screening review meeting, some of the more esoteric concepts were ruled out, and the remaining subtask activities focused on narrowing the work effort to just three concepts. At this time, the favored concept is a deep-staged venturi furnace containing opposed, advanced aerodynamically air-staged burners capable of substoichiometric operation over a 50 to 125% load range. A key to the success of such a system will be controlling the air/fuel ratio to each individual burner throughout the load range of the unit.

Activity - SO₂ and Particulate Subsystem

1. Work with United Engineers & Constructors (UE&C) on the SO₂/Particulate Subsystem technical assessment was initiated. A kick-off meeting and teleconference were held with UE&C to initiate selection of the SO₂ and particulate subsystems. A list of forty-seven candidate FGD systems was developed and one-page technology descriptions were prepared and used to support the selection of the top six systems. B&W reviewed this document and provided comments and additional information. The "short list" of six SO₂ control technologies was chosen on the basis of the preliminary technical and economic screening criteria.

2. Process and preliminary economic information on B&W's Advanced LIDS technology was also sent to UE&C. Information on LIDS included a process schematic, a sample mass balance, and capital cost data.
3. UE&C completed and provided the results of their Kepner-Tregoe evaluation for selecting the three SO₂ processes from the "short list" of six SO₂ control technologies. This evaluation methodology assigned quantitative economic, performance, environmental, and availability ratings to each technology. The processes chosen for further consideration were B&W's Advanced LIDS Process, Advanced Wet FGD, and the SOXAL process (a sodium-based regenerable process). A meeting was held with B&W's Environmental Equipment Division personnel to discuss and finalize the selections.
4. UE&C completed the advanced Wet FGD subsystem cost model that will be used in under Subtask 2.3 - Concept Development and Evaluation.
5. UE&C completed evaluation of particulate removal concepts. A pulse-jet fabric filter has been selected for particulate removal.
6. Compilation of preliminary information on the B&W Advanced LIDS process for UE&C was also completed. The information provided included a process schematic, a mass balance, and preliminary capital cost data. The mass balance was for an Advanced LIDS system without ammonia enhancement.

Activity - Boiler Subsystem

1. Definition of project goals and objectives, and the specific activities associated for each relative boiler subsystem (boiler, pulverizers and airheater) were established. A kick-off meeting was held October 30, 1992, to initiate work within the respective groups.
2. Various furnace and convection pass types with potential application were identified, and assessment criteria established for initial evaluation. A total of six different furnace types and four different convection pass arrangements are being considered. Comments were collected and assembled in preparation for final furnace selection in conjunction with the NO_x subsystem downselection. Preliminary furnace and convection selections have been made, using the Kepner-Tregoe evaluation methodology.
3. Various pulverizer concepts and/or potential system improvements were identified with information needed for assessment. Information regarding relative cost, operating power and technical readiness for each concept has been

developed. A final pulverizer selection will be made later in conjunction with the NOx subsystem downselection.

Activity - Commercial Design Guidelines

1. A preliminary draft of the Commercial Design Document was developed and submitted to various subsystem team leaders. This Commercial Design Document, which contains the design guidelines for this project, will be continually updated as the appropriate information becomes available, and will become part of the Concept Selection Report.

Activity - Balance of Plant

1. Work with UE&C on the BOP subsystem assessment was initiated with a kick-off meeting held October 9, 1992.
2. Generic steam cycles performance information was reviewed with four cycles selected and evaluated. A supercritical 4500 psi cycle with double reheat have been selected.

II. Work in Progress

Subtask 2.3 Concept Development & Evaluation

Activity - NOx Subsystem

1. Work continued on the downselection to three NOx control subsystems. Rankings of the furnace/combustion systems are being done to permit final selection at the planned Assessment Results Review Meeting in January, 1993.

Activity - SO₂/Particulate Subsystem

1. UE&C has begun development of cost models for LIDS and SOXAL that will be used under Subtask 2.3 - Concept Development and Evaluation. Design criteria and related questions on SOXAL were transmitted to the supplier, for their review and comment.
2. Work has begun on the compilation of data and information including the latest design criteria for Advanced LIDS that will be needed for UE&C's comprehensive economic and risk evaluation to be carried out under this subtask.
3. UE&C has begun work on final design criteria and scope of work definition for the particulate control subsystem.
4. Work has also begun on identifying and defining potential boiler and balance-of-plant impacts and interfaces with the final three systems being evaluated.

Activity - Boiler Subsystem

1. Final preparation of information developed in Subtask 2.2 for use in final concept system selections is underway. Final selection of the boiler subsystems will be completed in conjunction with the final NOx and SO₂ subsystem downselection.
2. Work is in progress assisting UE&C in finalizing steam and water cycle conditions. This work includes evaluating the feasibility of using a low temperature flue gas heat exchange to improve overall plant efficiency.
3. Work has begun on developing information regarding impact on boiler design due to limestone injection. This information will be used by UE&C in their final evaluation of SO₂ subsystems which includes the LIDS system.

Activity - Balance-of-Plant

1. Work continues on identifying and selecting BOP subsystems and improvements.

III. Work Not Completed

Task 2.0 - Concept Development

Activity - Balance-of-Plant Subsystems

1. Selection and improvement considerations for BOP systems have not been finalized. This is due to the interrelationship between these systems and the other subsystem being assessed and finalization of steam cycle conditions. It is still not anticipated that this delay will affect the overall task completion.

END

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