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QUARTERLY PROGRESS REPORT

TRW UTILITY DEMONSTRATION UNIT

DOE C.A. #DE-FC22-88PC88750

FEBRUARY, MARCH, APRIL 1989

DISCLAIMER

TRW

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TRW ADVANCED SLAGGING COAL COMBUSTOR
UTILITY DEMONSTRATION
SECOND QUARTERLY PROJECT PROGRESS REPORT
FEBRUARY 1989 THROUGH APRIL 1989

ABSTRACT

The TRW Advanced Slagging Coal Combustor Demonstration Project consists of retrofitting the Orange and Rockland (O&R) Utility Corporation Lovett Plant Unit No. 3 with four slagging combustors which will allow the current gas/oil fired unit to fire 2.5% sulfur coal. The slagging combustor process will provide NO_x and SO_x emissions that meet NSPS and New York State environmental standards.

Stone & Webster Engineering Corporation (SWEC) has the responsibility of performing the day-to-day program management function. Implementation of the program policies and overall direction is provided by TRW-Utility Development Unit (TRW-UDU). SWEC has set up the organization to perform budgeting, cost and scheduling, performance measurement and general administration required to perform and support the engineering design, purchasing, construction, testing and analysis of the project. The scope of work for TRW-CBU includes the design and supply of the slagging combustors, coal and limestone feed systems and a control system for the operation of these components. In this report period, the TRW(CBU) design activities for all systems progressed to permit procurement to start in the next period.

O&R's primary responsibilities are environmental licensing and permitting activities, transmitting technical and operating data to team participants, providing the operating staff at their facility to implement the test program and participating in analyzing the test results. O&R will review and approve all specifications, P&IDs, schedules, bidders lists and input to construction specifications.

1. EXECUTIVE SUMMARY

During this reporting period, SWEC performed budgeting, cost and scheduling, engineering, design, purchasing and general administration of the project. These programs were reviewed and approved by TRW-UDU and O&R. The approved Project Manual was issued to DOE during the reporting period.

With the completion of the conceptual design phase of the TRW Advanced Slagging Coal Combustor Utility Demonstration in January 1989, preliminary engineering commenced. Based on conceptual design criteria, specifications and drawings were prepared by SWEC with technical and operational information provided by O&R. O&R reviewed, commented and approved drawings and specifications issued for bids.

SWEC began issuing equipment specifications for bid during this reporting period.

SWEC issued the General Arrangement drawings and the Detailed Electrical Load Study.

Bids were received and evaluation begun for the following specifications:

- Fly Ash Handling System Specification
- Slag Handling System Specification
- Baghouse Specification
- 2400V Switchgear
- Unit Substation

SWEC's and O&R's environmental licensing and permitting activities continued during this reporting period. Technical and operating data was provided by O&R in support of all efforts to complete the conceptual design within the designated time schedule.

The environmental permit application and associated documents including the Air Model Study for the project was finalized and submitted to the New York State Department of Environmental Conservation of April 28, 1989.

Primary work activities carried out during this reporting period included study of the final location of combustor, identification of boiler modifications and specifications for major equipment were issued for bid. Search and subsequent selection of a Boiler Modification Vendor (Boiler Manufacturer) continued through this quarter.

TRW-CBU is responsible for the design, procurement and delivery of four Model 65 slagging combustors, the corresponding coal and limestone feed systems and a control system for these functions. The CBU project also supports the engineering effort of SWEC to integrate these components into O&R's Lovett plant.

The work during the February - April period has resulted in a potential satisfactory resolution of combustor arrangement and integration with respect to the boiler and plant structure. The arrangement requires review and acceptance by the ultimately selected Boiler Modification Vendor before it can be considered final. All design efforts are moving ahead with the selected arrangement.

The design of the combustors, solids feed systems and the control system is being completed. Procurement specifications are expected to be completed in June permitting the issue of proposal requests in June - July 1989.

2. INTRODUCTION

Phase I activities on TRW's Entrained Coal Combustor Utility Demonstration Program continued during the second quarter of this project. Principal activities consisted of program planning and subcontract preparation and negotiations between TRW's Utility Demonstration Unit (UDU), SWEC and O&R progressed successfully during this quarter. An extended letter agreement between TRW (UDU) and SWEC was reached to allow continuance with the engineering activities until the contract is finalized. One major contract issue is the insurance coverage between TRW, SWEC and O&R which has yet to be resolved.

Funding Agreements submitted to ESEERCO and NYSERDA for their final approval are not yet received. OCDO has yet to furnish their approved funding agreement. Similar agreement with Industrial Mining Company was signed by TRW and is now waiting for IMC's approval. Presentation of the program and scope of work was discussed with EPRI at their headquarters in Palo Alto, CA. An agreement is expected to be finalized during the next quarter.

The first Semi-annual Advisory Committee Meeting was held in Pearl River, NY, on March 3, 1989. TRW, in conjunction with Stone & Webster and Orange and Rockland Utilities, presented the project overview which outlined schedules, critical task status and main program issues. The other program sponsoring agencies which attended the meeting were the New York State Energy Development Authority, Empire State Electric Energy Research Corporation, Electric Power Research Institute, Industrial Mining Company and Unit States Department of Energy.

The first Project Management Committee Meeting was held on April 19, 1989, at Orange and Rockland Corporate Headquarters to review major program issues such as precipitator removal, auxiliary transformer replacement, instrumentation and controls and Unit 3 boiler modifications.

Several meetings among TRW (UDU), SWEC and O&R were held during this period to review the overall schedule, scope of work and resolve the insurance issue. DOE requested TRW to present a paper on the program at a Conference to be held in Washington, D.C. in March 1990.

Several of the Phase I Contract Deliverables were completed and issued during the period. These included:

- Project Evaluation Plan
- Project Manual
- Project Procurement Plan
- Project Master Schedule (updated)
- Project Summary Network
- Project Detail Schedule

The scope of work to be performed by TRW-CBU over the program duration includes the design, procurement, delivery and start-up support for four Model 65 entraining combustors, coal and limestone feed systems and a control system for these functions. The work performed during this report period (February - April 1989) in support of Phase I (Design and Permitting) of the program will result in the completion of specifications for procurement of the combustors, solid feed systems and the control system. Efforts were therefore directed at defining the retrofit performance requirements of Lovett Unit No. 3, taking designs from the conceptual to specification levels, integration of the combustion system to be provided by CBU with the plant design/engineering effort performed by SWEC and satisfying the project sponsor's administrative requirements.

Specifically, the February - April work resulted in:

Combustor

- Finalization of the location and interface of the combustors with the boiler wall subject to the subsequent approval of the selected Boiler Modification Vendor.

- Revision of the combustor design in certain areas (such as combustor supports, precombustor air inlet orientation, cooling water manifolds and slag chutes) to accommodate combustor location.

- Provision of data to the project, including combustor loads, assembly drawings, thermal growth and interface details for the furnace inlet.

- Completion of P&IDs for the HP and LP cooling systems. Awaiting comments from O&R and SWEC.

Coal and Limestone Feed Systems

- Completion of conceptual designs, basis of design, flow diagrams and general arrangement drawings.

- Preparation of P&IDs including instrumentation.

- Provision of the systems' motor horsepower needs and system weights.

- Preparation of draft specifications for engineering review.

Control System

- Completion of a control system logic diagram.

- Integration of the design and logic of the combustor control system with the corresponding balance of plant system provided by SWEC.

- Development of assembly instrument identification for the I/O (input/output) list and graphic sketches.

- Development and initial review of a control systems specification.

- Preparation of a bidder's list.

3. PROJECT DESCRIPTION

The activities of the proposed demonstration program will be accomplished in a three-phase effort:

Phase 1 involves the engineering and design of the slagging combustor system, overall slagging combustor systems engineering and balance of plant design for Lovett Station and the limestone injection and recycle process work at Cleveland. Phase 2 includes all work necessary to modify the Lovett Station Unit, to return it to commercial operation and to prepare the unit for Phase 3 testing. In Phase 3, the operation of the slagging combustor will be demonstrated.

The following is brief description of the required tasks to be performed during the life of the contract.

SWEC will be responsible for the following tasks:

BAGHOUSE AND DRAFT SYSTEM

- Addition of two (2) new induced draft fans.
- Addition of a baghouse filter to remove particulates from the boiler flue gases.
- Addition of the two (2) forced draft HP booster fans and two (2) LP booster fans to provide combustion air required for combustor operation.
- Engineering and design of ductwork systems to connect the forced draft booster fans with combustor, baghouse, and stack.
- Design and implementation of boiler and equipment control logic.
- Relocation and modification of ductwork in order to maintain oil/gas firing during construction and demonstration phases of the project.

BOILER MODIFICATIONS

- Arrangement of Combustors.
- Installation and integration of TRW Coal Combustors.
- Status and arrangement of control systems.
- Heat release, gas flow, and circulation evaluation.
- Results of sensitivity study evaluated.
- Identify boiler modification requirements, issue a specification, and select a boiler vendor to design, fabricate and install modifications.
- Maintain oil and gas firing.

FLY ASH HANDLING SYSTEMS

- Addition of a pneumatic type fly ash transport system for baghouse ash removal. (This will be done in conjunction with recycle system.)
- Addition of a fly ash handling system.
- Addition of fly ash reinjection system into boiler furnace.
- System controls.

SLAG ASH HANDLING SYSTEM

- Addition of slag tanks, clinker grinders, hydroejectors, pumps and heat exchanger equipment for slag handling for continuous quench and removal of molten slag ash.

- Integration of the slag ash handling system with the existing plant slag ash removal system and with the new (Unit 4 & 5) ash sluice hydrobin system.

- System controls integration.

COAL HANDLING SYSTEMS

- Refurbishing of existing coal handling system including coal bunkers, tripper conveyor, and addition of accessories (such as dust control system, controls, and alarms).

- Refurbishing of existing coal pulverizers, coal feeders and addition of the accessories (such as cyclone separators, dust collection system exhaust fans, controls, and alarms).

- Addition of piping and chutes to deliver coal from existing pulverizer outlets to cyclones and dust collection system.

- Installation and integration of the TRW-CBU dense phase feed system.

- Installation and integration of the TRW-CBU surge hopper.

- System controls integration.

LIMESTONE HANDLING

- Addition of a limestone storage silo.

- Addition of limestone pneumatic transport system.

- Investigate integration of system controls with other systems.

- Installation and integration of the TRW-CBU dense phase feed system and surge hoppers.

TURBINE GENERATOR SYSTEMS

The turbine generator manufacturer, General Electric (GE), will evaluate the capability of the turbine generator for the new cycle conditions defined by SWEC and recommend modifications, if any, to the turbine generator. SWEC will review GE recommendations and determine necessary modifications.

FEEDWATER SYSTEM

- Addition of a Combustor Shell cooling heat exchanger.
- Determine which existing feedwater heaters are to be bypassed.
- Modification of feedwater piping system.
- System Controls Integration.

COMBUSTOR COOLING SYSTEM

- Addition of the combustor shell cooling water pumps.
- Addition of circulating water piping to and from the combustors.
- System controls.

COMPRESSED AIR

- The addition of compressors/blowers and dryers for the TRW-CBU dense phase coal feed system, limestone injection and baghouse reinjection system.
- Extension of existing plant and instrument air systems to suit the Combustor retrofit work.
- Addition of piping systems.
- System controls.

MISCELLANEOUS SYSTEMS

Provide engineering and design required for the development of miscellaneous fluid systems. These include: Ignition Gas, Inerting Gas, Makeup Water, Service Water, and Miscellaneous Vents and Drains.

HEATING AND VENTILATION

Revise plant H&V facilities to assure sufficient ventilation in light of the coal handling and heat generation equipment to be added. Required additions and modifications to the existing systems will be implemented.

MISCELLANEOUS BUILDING FACILITIES SYSTEMS

Modify miscellaneous facilities systems. Required modifications include design developments arising from equipment procurement, and as-built conditions of the plant, and would include drainage systems, fire protection, and domestic water.

ENVIRONMENTAL

Based on an evaluation of applicable environmental laws and regulations SWEC will perform all engineering tasks required to support New York air, water pollution, and solid waste permit applications and DOE NEPA information requests. This task will include evaluation of effluent limits, evaluation of expected test emissions and preparation of technical documents required for air, water pollution, and solid waste permit applications. The information developed by SWEC and TRW-CBU will be input to the air, water pollution and solid waste disposal permit applications to be filed by O&R.

Additionally, SWEC will support the Environmental Assessment Report and Environmental Monitoring Program outline and final deliverables in conjunction with O&R.

CONTROL SYSTEMS

SWEC will engineer and design all plant control systems as specified below. The plant control philosophy will be based on the installation of a Distributed Control System (DCS). This system would combine modulating and sequential control with data acquisition and operator and computer interface. This equipment will be purchased in accordance with SWEC and TRW-CBU specifications. TRW-CBU will supply the functional requirements for their scope of work in the DCS.

The DCS will perform data acquisition functions, which will be displayed on CRTs and copied via color printers, for studying/computing combustor activity and related parameters on the boiler unit proper. The SWEC specified portion of the DCS will have the capability to control the following:

- Coal Preparation and Feed System (SWEC portion only)
- Limestone Handling (SWEC portion only)
- Unit Load Control
- Boiler Master & Firing Rate Control (Coal Only)
- Feedwater Control
- Deaerator Level Control
- Superheat/Reheat Temperature Control
- Excess Air Control
- Carrier Air
- Furnace Draft
- Deaerator Pressure
- Combustor Cooling Water

In support of this facility, a system to continuously monitor stack emission will be provided in accordance with the criteria set by the Environmental Protection Agency, local Department of EPA, and other cognizant regulatory bodies.

Data logging strategy will be coordinated with TRW-CBU and O&R.

SWEC will engineer and specify equipment such as pressure, temperature, and flow transmitters, control valves and drive units.

Some items on the existing boiler #3 control system (subject to SWEC inspection and O&R approval) will be reused.

Additionally, SWEC will review and adapt "packaged" control systems for baghouse, fly ash and slag handling systems to existing site conditions and O&R requirements. Common alarms will be brought to the DCS and displayed on operator/engineer stations.

ELECTRICAL SYSTEMS

The following equipment will be provided:

- New 2400V switchgear.
- New 480V unit substation.
- New feeder cables interconnecting the new and existing switchgear.
- New 480V Motor Control Centers (MCC) required for new loads installed during modifications.
- New 15KVA uninterruptible power supply for the new combustor control system.

STRUCTURAL ITEMS

Foundations - SWEC will engineer and design foundations for the following:

- Coal Pulverizing and Feed Equipment (including TRW-CBU dense phase feed system)
- Limestone Handling and Feed Equipment
- Combustor/Slag Removal System
- Control System
- Fans
- Baghouse
- Fly and Bottom Ash Handling Equipment
- Electrical Equipment
- Pumps and Heat Exchanger

Steel - SWEC will engineer and design steel and supports for the following:

- Boiler Ductwork Supports
- Ductwork/Building Wall Penetration
- Baghouse
- Combustors Support
- Limestone Handling & Feed Equipment Supports
- Miscellaneous Supports, Platforms, Stairs, etc.
- Relocation Platform, Stair, Steel
- Cyclones and Exhaust Fans
- Fabric Filters

CONSTRUCTION/INSTALLATION SPECIFICATIONS

SWEC will prepare construction/installation specifications for installation of all mechanical equipment, piping and ductwork installation and integration of electrical systems, structural and civil modifications and procurement of materials and miscellaneous equipment required to complete the plant conversion. Specifications to be prepared are as follows:

Mechanical Installation
Civil/Concrete Work
Structural/Miscellaneous Steel Installation
Electrical Installation
Instrumentation/Control Systems Installation
Insulation Installation
Asbestos Removal
Piping
Valves
Piping Specialties
Fire Protection
HVAC

TEST PLAN

A Test Plan will be implemented to demonstrate that an oil- or gas-fired utility boiler can be converted to burn coal efficiently while meeting all environmental requirements.

FIELD CONSTRUCTION SUPERVISION

SWEC will provide Field Construction Supervision for the project. These activities will include the following:

- Provide management of site contractors.
- Monitor contractor's operations relative to safety, compliance to the Engineer's specifications, and the Project Schedule.
- Coordinate site contractor operations with the Owner's plant requirements.
- Monitor site material receipts.
- Review contractor billings.
- Manage change control.

ADVISORY OPERATIONS/START-UP SERVICES

An operating and maintenance (O&M) manual will be assembled identifying systems and vendor-supplied O&M procedures for boiler and piping systems, equipment and components. The O&M Manual will include updated P&IDs.

START-UP/SHAKEDOWN/CHECKOUT ASSISTANCE

SWEC will provide start-up and operating procedures and will be supported in this work by TRW-UDU, O&R and TRW-CBU. O&R will provide the staff at their facility to operate the retrofitted unit.

PROCUREMENT

SWEC is responsible for purchasing all equipment for the BOP. Procurement activities include the following:

- Bid Documents for Major Equipment (Specifications by SWEC, invitations issued by Stone & Webster using SWEC Commercial Terms and Conditions).
- Bid Documents for General Construction (Specifications and Drawings by SWEC; Commercial and invitations by SWEC).
- Evaluation of Bids (Technical and commercial by SWEC) and preparation of purchase specification for selected Vendors by SWEC.
- Purchase Orders/Contracts (issued by SWEC).
- Change Orders (issued by SWEC), technical and commercial evaluation by SWEC.
- Invoice Review, Scheduling and Expediting of Shipments (by SWEC).

The work to be performed by TRW-CBU during the entire program includes the design, procurement and delivery of the following components:

COMBUSTORS

- Preparation of a preliminary specification.
- Development of fabrication and procurement specifications.
- Procurement, contract award, development of a fabrication schedule and quality assurance plan.
- Overview of vendor fabrication.
- Field support.

COAL FEED SYSTEM

- Preparation of a preliminary specification.
- Integration of TRW-CBU equipment and SWEC general arrangements.
- Review of SWEC P&IDs and interfaces.
- Development of fabrication and procurement specifications.
- Review of design data for vendor-supplied systems.
- Overview of vendor fabrication and delivery.
- Installation and start-up on-site liaison.
- Field support.

LIMESTONE FEED SYSTEM

- Conceptualization studies of alternate limestone feed systems.
- Adaptation and scale-up of design.
- Development of design specifications.
- Procurement of injection system.
- Review of SWEC general arrangement and P&IDs.
- Development of detailed system design data.
- Overview of vendor fabrication.
- Installation and start-up on-site liaison.
- Field support.

CONTROL SYSTEM

- Finalization of P&IDs, LSKs and ESKs.
- Development of fabrication and procurement specifications.
- Development of configuration, programming and documentation control.
- Overview of fabrication, testing, configuration, and delivery of components.
- Installation and start-up on-site liaison.
- Field support.

O&R's primary responsibilities are environmental licensing and permitting activities, transmitting technical and operating data to team participants, providing the operating staff at their facility to implement the test program and participate in analyzing the test results. O&R will review and approve specifications, P&IDs, schedules, bidders lists, general arrangements and proposed plant modifications. O&R will provide the staff at their facility to operate the retro-fitted unit.

4. PROJECT STATUS

Preliminary engineering work is continuing.

During this report period, SWEC began the technical and commercial bid evaluations for the following equipment:

- Fly Ash Handling System
- Slag Removal System
- Baghouse
- 2400V Switchgear
- Unit Substation

SWEC issued for bid the following specifications:

- Boiler Modification
- Blowers for Pneumatic Coal and Limestone Handling
- Combustor Cooling Water Heat Exchanger
- 15KVA UPS
- 480V MCC

SWEC issued a formal purchase order to General Electric for the Miscellaneous Electrical Equipment Evaluation confirming the verbal purchase order issued last month. Coal pulverizer, bunker and electrical equipment evaluations, remain on hold pending resolution of contract insurance issues.

SWEC completed the following specifications:

- Sootblower Air Compressor Refurbishment
- Sootblower Refurbishment

SWEC continued with the preparation of the following specifications:

- DCS
- F.D. Booster and I.D. Fans
- Combustor Cooling Water Pumps
- Coal Handling System
- Coal Pulverizer System (excluding refurbishment of pulverizer)

SWEC continued work on the following drawings:

- Combustor Cooling Water & Feedwater System P&ID
- Combustion Air & Flue Gas P&ID
- Electrical One Line Diagrams
- Functional Logic Diagrams
- Instrument List
- Combustor and Ductwork Arrangements
- Baghouse and associated ductwork layout.

CBU presented a new plan for integrating the boiler and combustors. The side waterwall of the boiler will be "bowed" to allow the combustor to enter the boiler at a right angle. SWEC started new combustor general arrangement drawings. In order not to compromise the combustor technology, SWEC will relocate equipment, piping and structural steel (excluding major structural steel columns and beam and high temperature steam piping, etc.) and only as a last resort will SWEC and CBU modify the combustor design.

The actual percent complete for SWEC are behind the planned values. Equipment procurement packages, permitting and environmental licensing activities are approximately eight weeks behind schedule. Difficulties in establishing a final combustor attachment/orientation arrangement, the continued delays associated with obtaining the services of a boiler manufacturer and delays in the equipment evaluation studies caused by unresolved contract and insurance issues between TRW and O&R and between TRW and SWEC contributed to these schedule variances.

The finalization of the combustor location requires the participation of a boiler designer. If the project continues to experience a lack of interest by major boiler manufacturers there will be further schedule implications.

The overall project schedule status is presently being reviewed and the impact will be reported in the next quarterly report.

The overall status of the CBU project in Phase I is that the completion of the drawings for the procurement package is lagging by about six weeks due to difficulties in finalizing a retrofit arrangement for the combustor to the boiler wall. A satisfactory arrangement has now been selected, drawings are being revised. It should be recognized, however, that the arrangement from which engineering is proceeding is still subject to final review and acceptance by the subsequent Boiler Modification Vendor. The project is on schedule with regard to preparation of specification for the coal and limestone feed systems and the related control system.

Combustors

A detailed analysis of the initially selected arrangement of the four combustors into the boiler sidewalls without major modifications to the boiler and supporting columns of O&R's Lovett No. 3 unit showed that this arrangement would require unacceptable changes in the design of the combustors increasing the length of the hot gas exhaust duct and complicating tube arrangement at the combustor/boiler interface. An innovative plan for the attachment of the four combustors to the Lovett No. 3 boiler wall was defined by CBU. In this arrangement, the sidewalls of the boiler are extended with a "bay window" which permits perpendicular attachment of the combustors and avoids extending the hot gas exhaust duct. The arrangement does not interfere with existing major boiler/building support columns and introduces the CO/H_2 product gases with a high recirculation flow pattern desirable for high sulfur capture. The project team adapted the "bay window" modification as the final arrangement plan subject to final review and acceptance by the subsequent Boiler Modification Vendor.

The combustor design required modifications due to the revised layout concept and these are being completed.

Flow modeling tests of initial combustor/boiler arrangements were completed and a test of the selected final arrangement was planned.

The technical data necessary for SWEC to support the overall program engineering effort was provided. The documents included:

- a revised basis of design
- combustor loads and performance data
- assembly drawings
- thermal growth data
- interface design details
- P&IDs for the LP and HP cooling water systems. A CAD version, including instrumentation was completed.

Preparation of final drawings and a procurement specification was initiated.

Coal and Limestone Feed Systems

A feed system to supply coal with a ±0.5% accuracy to each precombustor/ combustor set was designed. Based on the conceptual design, a Basis for Design description (including flow diagrams) was prepared. This system was projectized for the Lovett plant conditions (e.g., location and space available, interfaces, coal characteristics).

Pulverized coal for the four TRW combustors will be provided by the existing Unit 3 pulverizers. Coal/air mixture from the pulverizers will be conveyed to dust collectors which will discharge the collected coal particles into a pulverized coal surge bin. It should be pointed that conveying the pulverized coal with hot air may not be acceptable for this application. SWEC is reviewing this and may elect to use another gas (for conveying the coal) with a lower oxygen content. The coal feed system (supplied by TRW) includes the coal surge bin, coal metering feeders and pneumatic conveyors which inject coal into the precombustor and main chambers.

For the limestone storage and feed systems, conceptual design engineering was completed early in this period. The work then proceeded through the Basis of Design stage to preparation of a draft specification which will be reviewed during the next quarter's activities. In addition, the following documents were completed for both solids feed systems:

- General arrangement drawings
- Motor horsepower requirements list
- P&IDs CAD versions showing instrumentation
- Weights lists
- Draft specifications for review

A draft specification for the limestone feed system will be completed and reviewed in the next reporting period.

Limestone will be delivered to the power plant by truck and transferred pneumatically to a storage tank. From this tank the limestone will be transferred to a feed bin, through a gravimetric mass weighfeeder into a transfer hopper and then will be conveyed to the combustors by a pneumatic conveyance system.

Combustor Control System

Work continued to develop the burner management logic and the control system specification. A meeting was held on 29-30 March and resolve interface issues between the combustor control system (TRW-CBU scope of supply), the balance-of-plant control system (SWEC-NY scope of supply) and integration of the DCS with O&R Lovett Plant. A joint procurement strategy was established and a list of potential senders were agreed on.

A control system logic diagram was completed and assembly of instrument identification for the I/O list and preparation of graphic sketches was started. A preliminary specification was prepared and reviewed. Preparation of a final procurement specification was started.

Other Work

Samples of three low-sulfur WV coals fired at Lovett werre received and T_{250} properties were measured with a high temperature viscosimeter.

Orange and Rockland Utilities, Inc. performed the following activities during the second quarter period.

1. Reviewed and commented on demonstration design drawings, basis of design, schedules, request for proposals and related correspondence.

2. Provided coal analysis data for coal to be supplied by O&R for demonstration.

3. Finalized comments on draft of TRW/ORU Demonstration Contract and contined to negotiate commercial terms.

4. Prepared monthly Activity Summary and Cost Performance Reports for January, February and March 1989.

5. Evaluated proposed control system technical information for project and provided comments.

6. Verified for SWEC various existing conditions relative to equipment and operation.

7. Responded to questions by DOE on information contained in the Environmental Impact Volume (EIV).

8. Continued modeling study for New York State Department of Environmental Conservation (NYSDEC) Environmental Impact Statement.

9. Received scoping document for NYS EIS from DEC and prepared required documents with SWEC for submittal to the State.

10. Participated in the first semi-annual Advisory Committee Meeting held at the Hilton Hotel in Pearl River, NY, on March 3, 1989. The Advisory Committee was presented with a project overview which outlined project schedules, critical task status and main program issues.

11. Met with SWEC at Orange and Rockland Utilities' Corporate Headquarters and Lovett Generating Station on March 7 and 16, 1989, to address issues raised by the Lovett Unit 3 Electrical Load Study and related feeders, transformers, and relay protection.

12. Researched engineering and plant records to provide various technical information to support SWEC's design effort.

13. Attended a meeting with SWEC's New York Office engineers on March 29 and 30, 1989, in Denver, Colorado, to resolve instrumentation and control interface issues and establish computer system requirements for the demonstration combustion system and related systems.

14. Received and commented on the following specifications:

    a) 480V Motor Control Center
    b) 2400V Switchgear Revision 1
    c) Secondary Unit Substation Revision 1
    d) 460V Squirrel Cage Induction Motors
    e) 2300V Squirrel Cage Induction Motors
    f) Uninterruptible AC Power System (UPS)
    g) Air Blowers for the Pneumatic Coal and Limestone Feed Systems
    h) Combustor Cooling Water Heat Exchangers
    i) Boiler Modification for Retrofit of TRW Slagging Combustors
    j) Baghouse

15. Received and approved and/or revised bidders list for all specifications issued by SWEC.

16. Reviewed and commented on SWEC's revision of Commercial Terms and Conditions for a Furnish and Erect Contract.

17. Meetings were held on April 7, 1989, and April 27, 1989, with SWEC and TRW-UDU to review schedules and Scope of Work and related issues to ensure coverage of project activities.

18. The Project Management Committee held its first meeting at Orange and Rockland Utilities, Inc. Corporate Headquarters on April 19, 1989. The primary purpose of the meeting was to review major program issues such as precipitator removal, auxiliary transformer replacement, new instrumentation and controls and Unit 3 boiler modifications.

19. The Environmental Permit Application and associated Air Modeling Study for the Slagging Coal Combustor Demonstration was finalized and forwarded to the New York State Department of Environmental Conservation on April 28, 1989.

20. Meeting was held with SWEC on April 11, 1989, at Lovett Generating Station to review the locations and possible interferences of all the electrical distribution equipment and supply locations.

5. PLANNED ACTIVITIES

SWEC plans the following work for the next reporting period (May 1 to July 31, 1989).

- Obtain the services of a boiler manufacturer, preferably Combustion Engineering, to perform the Boiler Modification work.

- Continue preparation of general arrangement and ductwork drawings and make 50% issue.

- Issue Electrical One Line Drawings.

- Start work on the Coal Feed General Arrangement Drawings and make 50% issue.

. Issue the following P&IDs (50%) issue:

- Index & nomenclature sheets 1 & 2
- Coal Preparation & Feed System
- Limestone Preparation & Feed System
- Combustion Air & Flue Gas System
- Flyash System
- Combustor Cooling Water & Feedwater System
- Slag Handling System..

. Issue the following specifications for bid:

- F.D. Booster and I.D. Fans
- Coal Handling System (except refurbishment of bunker)
- Coal Pulverizer System (except refurbishment of pulverizers)
- Asbestos Removal

. Complete bid evaluation and issue purchase orders for the following equipment:

- Baghouse
- Fly Ash Handling System
- Slag Removal System
- 15KVA UPS
- 2400V Switchgear
- Unit Substation
- Combustor Cooling Water Heat Exchanger
- Blowers for Pneumatic Coal and Limestone Handling
- 480V MCC

Also to be issued during this period:

. General Arrangement Drawings
. One Line
. Test Plan
. Logic Diagrams
. Elementary Electrical Diagrams
. Project Estimate Review and Update
. Construction Schedule Planning
. Overall Schedule Review and Planning
. Hold the DOE 40% Engineering Review Meeting
. Prepare for 2nd Advisory Committee Meeting

The following TRW-CBU activities are planned for the next reporting period:

Combustors

. Completion and review of the combustor specification.

. Issue of a bid package, receipt of bid and start of contract negotiations.

Coal and Limestone Feed Systems

- Completion and review of coal and limestone feed system specifications.
- Issue of competitive bid packages; receipt of proposals and start of proposal evaluations.

Control System

- Completion of specification.
- Issue of competitive bid packages and receipt of proposals.

The following O&R activities are planned for the next reporting period:

Work planned during the next quarter includes continued input to the permitting and licensing process and assistance to TRW/SWEC in plant preparation to accommodate the demonstration project and associated detailed preliminary engineering.

J.O. 18561.11

TRW

QUARTERLY ENVIRONMENTAL MONITORING REPORT

(Feb. 1989 - April 1989)

1. The EMPO does not call for environmental monitoring during the report period (Feb. 1989 - April 1989). Therefore, no monitoring was performed or reported.

2. The EMPO does not call for environmental monitoring in May/June/July 1989; thus, none is planned.