

Received by OSTI

Report DOE/PC/90281-5

APR 19 1989



FIFTH QUARTERLY REPORT FOR THE PERIOD —
AUGUST 1 THROUGH OCTOBER 31, 1988

INTEGRATED MHD BOTTOMING CYCLE

**DO NOT MICROFILM
COVER**

Prepared for
The U. S. Department of Energy
Pittsburgh Energy Technology Center
Under Contract DE-AC22-87PC90281

MASTER

Submitted by
The Babcock & Wilcox Company
Research and Development Division
Alliance Research Center

November 1988

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

FEB 27 1989

INTEGRATED MHD BOTTOMING CYCLE

DOE/PC/90281--5

DE89 010014

FIFTH QUARTERLY REPORT FOR THE PERIOD —
AUGUST 1 THROUGH OCTOBER 31, 1988

November 1988

Report No. DOE/PC/90281-5

Sponsored by

The U. S. Department of Energy
Pittsburgh Energy Technology Center

Work Performed Under Contract DE-AC22-87PC90281

MASTER

The Babcock & Wilcox Company
Research and Development Division
Alliance Research Center
Alliance, Ohio 44601-2196

ep
DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

"This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy, Babcock & Wilcox, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, mark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof."

1.0 EXECUTIVE SUMMARY

The Integrated MHD Bottoming Cycle project, DOE Contract No. DE-AC22-87PC90281, progress for August through October relates to Task 1 - Modification of the Existing Coal Pulverizer and Dryer System, and Task 2 - Design, Fabrication, and Installation of an Automated Spent Seed/Ash Handling System and Task 4 - Participation on the MHD Technology Transfer Integration and Review Committee. No activities were scheduled for Task 3 prior to or during this period.

We have received a formal bid from one of the three vendors for the coal drying equipment. We requested that he supply bids for partial and complete drying of the coal in the dryer. Complete drying in the dryer eliminates the need for the inefficient, expensive inert gas generating system for the pulverizer. We have decided that complete drying in the dryer is by far the most cost effective route based upon this vendor's bid and discussions with the other vendors.

We expect bids from the remaining two dryer vendors during the next report period. Gilbert/Commonwealth has prepared an evaluation matrix (spread sheet) for evaluation of the bids. We anticipate selecting the vendor during the next period and proceeding with the preparation of the Preliminary Design Review.

We received bids for the equipment needed for the Spent Seed/Fly Ash Handling System. We visited a vendor of the pneumatic system components with representatives of DOE/PETC and Gilbert/Commonwealth to witness transport tests of spent seed/fly ash supplied by the University of Tennessee Space Institute from the DOE Coal Fired Flow Facility. We were all impressed with the demonstration and also with operation of a commercial installation supplied by the vendor. The customer's manager was very pleased with the system.

A vendor has determined spent seed/ash characteristics significant to mechanical (screw) conveying of the ash. We expect no problems in handling the seed/ash.

We expect to select vendors for both the pneumatic and mechanical handling equipment during the next report period, conduct the Critical Design Review, and issue purchase orders.

2.0 INTRODUCTION

As per the Contract No. DE-AC22-87PC79670 dated September 11, 1987, the following quarterly report has been prepared. This quarterly progress report covers the period of August 1988 through October 1988.

The Project Description, Section 3.0, is an expansion of contract statement of work language to be used as a guide for WBS purposes, and is not intended to modify or replace contract language.

3.0 PROJECT DESCRIPTION

3.1 BACKGROUND

The Integrated MHD Bottoming Cycle project is part of the DOE MHD proof-of-concept program. Since 1985 the key aspects of the program have been:

- The design, construction, and operation of (1) an integrated topping cycle (i.e., an MHD power train), (2) an integrated bottoming cycle (i.e., a heat recovery/seed recovery subsystem), and (3) a seed regeneration system.
- Baseline subsystem development efforts to acquire the knowledge necessary to proceed with the integrated test facilities and the seed regeneration system.

These POC tests are critical to the advance of the technology to the retrofit stage.

Since 1985 the effort at the DOE Coal-Fired Flow Facility operated by the University of Tennessee at Tullahoma, Tennessee, has been directed toward preparing for and conducting long duration testing of the Integrated MHD Bottoming Cycle. To date, all the components of the bottoming cycle have been combined into an integrated bottoming cycle and 453 hours of testing have been completed with a high sulfur eastern coal, Illinois #6. Fourteen hours of testing have also been conducted with a low sulfur western coal, Montana Rosebud.

The major objectives of the current Integrated MHD Bottoming Cycle project, DOE Contract No. DE-AC22-87PC90281, are:

- Upgrading the DOE CFFF to permit continuous testing with Montana Rosebud coal. This requires modifications to the coal pulverizer and dryer subsystem.

- Addition of an automatic spent seed/ash removal system for seed recovery. The system will contribute to more efficient and prototypical, continuous, long duration testing.
- Providing a procurement-enabling package for an Intermediate Temperature Air Heater which will replace the existing vitiation heater, if necessary. This will contribute to more reliable and more prototypical long duration operation.
- Participation on the MHD Technology Transfer, Integration, and Review Committee.

3.2 TASK DESCRIPTION

An overall project work breakdown structure (WBS) is presented in Figure 1 as an overview of the DOE Integrated MHD Bottoming Cycle project.

The remainder of Section 3, Project Description, is a statement of work which provides a complete description of the tasks and subtasks of the project. The schedule for performing the tasks is shown in Figure 2.

The progress during this quarter is detailed in Section 4, Project Status. Planned activities for the next quarter are presented in Section 5, Planned Activities.

3.2.1 Task 1 - Modification of the Existing Pulverizer and Drying System (WBS 1.1)

3.2.1.1 Subtask 1.1 - Preliminary Design (WBS 1.1.1)

B&W will perform the preliminary design of the system for modifying the existing pulverizer and drying system. B&W will arrange to have preliminary designs of components prepared as necessary. The preliminary design will include site preparations, foundations, support structure, access platforms, stairs, ladders, lighting, etc. as required.

B&W will schedule; provide drawings, calculations, and documentation as appropriate; and participate in a Preliminary Design Review per the DOE Design Review Manual. The design review will evaluate the capability of the components and system to meet the following requirements:

1. Safely pulverize and dry 3.5 tons per hour (nominal) of a mixture of seed and either Illinois No. 6 or Montana Rosebud coal to a moisture content of 3 to 4%.
2. Be capable of local or remote control from the CFFF control room including start-up, operation, and shutdown. Preclude operation from the control room while people are working on the system.
3. Be compatible with the CFFF system functionally and physically.
4. Be capable of operation in adverse weather conditions, including rain and below-freezing temperatures.
5. Meet all applicable building, construction, safety, and health codes.
6. Be designed and constructed to facilitate inspection and maintenance.

In compliance with the commitments and agreements reached during the Preliminary Design Review, B&W will modify the system design as required, prepare specifications for equipment, solicit bids, and, with DOE approval, release the selected vendor(s) to perform Preliminary Design (Title I) of the equipment. (Detailed Design, fabrication and delivery will be performed during Subtask 1.2, below.)

3.2.1.2 Subtask 1.2 - Final Design, Material and Component Procurement, Fabrication, and Delivery to the CFFF (WBS 1.1.2)

B&W will perform the final design of the modifications to the existing pulverizer and drying system. During this design phase, B&W will order certain

long lead materials or components with DOE approval. At the 90% completion of the system design, B&W will submit the documentation, drawings, etc. required for a Critical Design Review (CDR) per the DOE Design Review Manual. B&W will arrange the time for the design review, participate in the design review, and document the commitments and agreements reached during the design review.

B&W will arrange to have the components fabricated and delivered to UTSI. UTSI will provide receiving inspection and storage. The components will have been assembled into subassemblies, subsystems, and systems to the maximum extent practical.

The components supplied by B&W will include:

1. A dryer and associated coal handling equipment.
2. Instrumentation and wiring for local control, and wiring to a terminal for others to hookup a remote control system.
3. Needed valves, piping, fittings, insulation, heat tracing, wiring, etc. for internal system connections.
4. The pulverizer and drying system side of connections such as the remote control system, the No. 2 oil system, instrumentation air, and electrical power. B&W will replace the SD HCN46581-201 interior of an existing CPPI panel board with an SD HCM2373-4M interior.
5. Foundations, support structures and associated platforms, ladders, stairs, lighting, etc.

B&W will prepare a draft Operational Readiness Document (ORD) with checklists for mechanical checkout.

3.2.1.3 Subtask 1.3 - Installation at the CFFF and
Mechanical Checkout (WBS 1.1.3)

B&W will hire local contractors for site preparation, installation of foundation, erection of support structures, and stairs, ladders, etc.

B&W will use UTSI trades people as available for installing the equipment on the platforms, foundations, etc. and for installing connecting piping, wiring, etc.

B&W will participate in the mechanical checkout of the equipment. Any equipment which must be operated will be operated by UTSI personnel at no charge to B&W.

B&W will arrange to have any modifications, additions, etc. made to correct discrepancies or deficiencies found during mechanical checkout. B&W will update the ORD, if necessary.

B&W will prepare a draft Operation and Maintenance Manual. This will include Operation and Maintenance Manuals from vendors where applicable.

B&W will comment on a system shakedown test plan prepared by UTSI. B&W will work with DOE and UTSI to resolve any comments.

3.2.1.4 Subtask 1.4 - System Shakedown (WBS 1.1.4)

B&W personnel will be available during the system shakedown to make any recommendations and decisions on unforeseen events.

B&W will correct any deficiencies in the B&W scope of supply discovered during the shakedown testing.

B&W will finalize the ORD and update the Operation and Maintenance Manual as required.

B&W will prepare a draft Acceptance Document. B&W will obtain the advice of vendors as deemed appropriate. The document will contain design and expected performance data, and data to be taken during test to evaluate equipment acceptability. To the extent practical, these specifications and predictions will be organized by component and subsystem to permit acceptance of individual components or subsystems.

3.2.1.5 Subtask 1.5 - Final System Acceptance Test (WBS 1.1.5)

B&W and selected vendor representatives will witness the Acceptance Test conducted by others. The vendor representatives may not be required in all cases. Need for vendor representatives will be identified on a case-by-case basis. B&W will correct any deficiencies discovered during the acceptance test.

B&W will finalize the Operation and Maintenance Manual.

3.2.1.6 Subtask 1.6 - Management (WBS 1.1.6)

B&W will use its existing management system to monitor and control the schedule and costs. The B&W system provides for monitoring and controlling schedule and costs by task and subtasks.

As part of this task, B&W will work closely with DOE and UTSI to minimize interference with the testing at the CFFF.

3.2.2 Task 2 - Design, Fabrication, and Installation of an Automated Spent Seed/Ash Handling System (WBS 1.2)

3.2.2.1 Subtask 2.1 - Preliminary Design (WBS 1.2.1)

B&W will perform the preliminary design of an automated spent seed/ash handling system (SS/A HS). B&W will arrange to have preliminary designs of components prepared as necessary. The system will include site preparation, foundations, support structures, access platforms, ladders, etc. as required.

B&W will schedule, provide documentation, and participate in a Preliminary Design Review per the DOE Design Review Manual. The design review will evaluate the capability of the components and system to meet the following requirements:

1. Safely and automatically collect the spent seed/ash from 16 hoppers and, if practical, a 17th hopper, of the Superheater Test Module of the CFFF, weigh the spent seed/ash, and convey it to an existing storage hopper. Provisions are required to discharge the spent seed/ash to alternate storage.
2. Safely and automatically collect the spent seed/ash from the two baghouse hoppers, weigh the spent seed/ash, and convey it to the existing storage hopper or alternate storage.
3. Safely and automatically collect the spent seed/ash from the four electrostatic precipitator hoppers, weigh the spent seed/ash, and convey it to the existing storage hopper or alternate storage.
4. Be capable of local or remote control from the CFFF control room including start-up, operation, and shutdown. Preclude operation from the control room while people are working on the system.
5. Be compatible with the CFFF system functionally and physically.
6. Be capable of operation in adverse weather conditions, including rain and below-freezing temperatures.
7. Meet all applicable building, construction, safety, and health codes.
8. Be designed and constructed to facilitate inspection and maintenance.

B&W will document the commitments and agreements reached during the design review.

3.2.2.2 Subtask 2.2 - Final Design, Material and Component Procurement, Fabrication, and Delivery to the CFFF (WBS 1.2.2)

B&W will perform the final design of the automated spent seed/ash handling system. During this design phase, B&W will order certain long lead materials or components with DOE approval. At the 90% completion of the system design, B&W will submit the documentation, drawings, etc. required for a Critical Design Review (CDR) per the DOE Design Review Manual. B&W will arrange the time for the design review, participate in the design review, and document the commitments and agreements reached during the design review.

B&W will arrange to have the components fabricated and delivered to UTSI. UTSI will provide receiving inspection and storage. The components will have been assembled into subassemblies, subsystems, and systems to the maximum extent practical.

The components supplied by B&W will include:

1. Valves at each SHTM hopper to prevent excessive entrance of air or discharge of combustion gases as the hoppers are emptied.
2. Spent seed/ash grinder/crushers to process the hopper discharge to facilitate transport.
3. A system of conveyors to transport the spent seed/ash to a bin for weighing.
4. A conveying system to transport the spent seed/ash from the weighing bin to the storage hopper. The system will be equipped to divert the spent seed/ash to alternate storage.

5. Instrumentation and wiring for local control, and wiring to a terminal for others to a hookup to the remote control system. The instrumentation will provide a signal which will allow the above weights to be displayed in the control room.
6. Needed valves, piping, fittings, insulation, heat tracing, wiring, etc. for internal system connections.
7. The spent seed/ash handling system side of connections such as the remote control system, instrumentation, air, and electrical power.
8. Foundations, support structures and associated platforms, ladders, stairs, lighting, etc.

B&W will prepare a draft Operational Readiness Document (ORD) with checklists for mechanical checkout.

3.2.2.3 Subtask 2.3 - Installation at the CFFF and
Mechanical Checkout (WBS 1.2.3)

B&W will hire local contractors for site preparation, installation of foundation, erection of support structures, and stairs, ladders, etc.

B&W will use UTSI trades people as available for installing the equipment on the platforms, foundations, etc. and for installing connecting piping, wiring, etc.

B&W will participate in the mechanical checkout of the equipment. Any equipment which must be operated will be operated by UTSI personnel at no charge to B&W.

B&W will arrange to have any modifications, additions, etc. made to correct discrepancies or deficiencies found during mechanical checkout. B&W will update the ORD, if necessary.

B&W will prepare a draft Operation and Maintenance Manual. This will include Operation and Maintenance Manuals from vendors where applicable.

B&W will comment on a system shakedown test plan prepared by UTSI. B&W will work with DOE and UTSI to resolve any comments.

3.2.2.4 Subtask 2.4 - System Shakedown (WBS 1.2.4)

B&W personnel will be available during the system shakedown to make any recommendations and decisions on unforeseen events.

B&W will correct any deficiencies in the B&W scope of supply discovered during the shakedown testing.

B&W will finalize the ORD and update the Operation and Maintenance Manual as required.

B&W will prepare a draft Acceptance Document. B&W will obtain the advice of vendors as deemed appropriate. The document will contain design and expected performance data, and data to be taken during test to evaluate equipment acceptability. To the extent practical, these specifications and predictions will be organized by component and subsystem to permit acceptance of individual components or subsystems.

3.2.2.5 Subtask 2.5 - Final System Acceptance Test (WBS 1.2.5)

B&W and selected vendor representatives will witness the Acceptance Test conducted by others. B&W will correct any deficiencies discovered during the acceptance test.

B&W will finalize the Operation and Maintenance Manual.

3.2.2.6 Subtask 2.6 - Management (WBS 1.2.6)

B&W will use its existing management system to monitor and control the schedule and costs. The B&W system provides for monitoring and controlling schedule and costs by task, subtasks, B&W labor category, and purchases.

As part of this task, B&W will work closely with DOE and UTSI to minimize interference with the testing at the CFFF.

3.2.3 Task 3 - Preparation of a Procurement/Installation Enabling Package for an Intermediate Temperature Air Heater (ITAH) System (WBS 1.3)

3.2.3.1 Subtask 3.1 - Design (WBS 1.3.1)

B&W will solicit additional information from the bidders to the B&W request for proposals for the ITAH. B&W will evaluate this information and the information previously obtained and recommend a vendor. A package including the bid request, the responses, the recommended vendor, and the reasons for the selection will be forwarded to DOE PETC.

With DOE/PETC concurrence, B&W will issue a purchase order for preliminary design of the ITAH. B&W will obtain information from the vendor sufficient to proceed with the preliminary design of the remaining portions of the system. B&W will provide a document package and arrange for a Preliminary Design Review per the DOE Design Review Manual. B&W will document the commitments and agreements reached during the design review.

B&W will revise the ITAH system design to reflect the commitments and agreements reached during the PDR. B&W will provide a revised document package and arrange for Critical Design Review meeting per the DOE Design Review Manual. The package will include specifications, sketches, drawings, calculations, catalogs, brochures, and other appropriate data for all the equipment including instruments, controls, support structures, and foundations. All interfaces will be defined.

B&W will prepare a draft Operational Readiness Document and a draft Operation and Maintenance Manual.

B&W will document the commitments and agreements reached during the design review and revise the draft documents as appropriate.

B&W will participate in a Design Readiness Review (DRR). B&W will document commitments and agreements reached during the DRR.

B&W will incorporate the changes as necessary to the system documentation package and include this in the Procurement/Installation Enabling Package. B&W will deliver this package with the Draft Final Report.

3.2.3.2 Subtask 3.2 - Cost Estimate for Procurement, Installation, and Checkout Testing (WBS 1.3.2)

B&W will re-estimate the costs for procurement, installation, and mechanical checkout of the system. The estimate will consider the changes made to the design as a result of the reviews.

3.2.3.3 Subtask 3.3 - Management (WBS 1.3.3)

B&W will use its existing management system to monitor and control the schedule and costs. The B&W system provides for monitoring and controlling schedule and costs by task, subtasks, purchases, and B&W labor category.

As part of this task, B&W will work closely with DOE and UTSI to minimize interference with the testing at the CFFF.

3.2.3.4 Task 4 - Participation on the MHD Technology Transfer, Integration, and Review Committee (WBS 1.4)

B&W will support the efforts of and participate on the MHD Technology Transfer, Integration, and Review Committee. This will include:

- Distribution of B&W technical, topical, and progress reports to other members of the Committee as directed by DOE.
- Documentation of results of informal discussions with other members of the Committee to define interface properties.
- Attendance at periodic meetings of the Committee.

4.0 PROJECT STATUS

The period covered by this initial project quarterly report is August 1988 through October 1988. Progress will be discussed on a task and subtask basis.

4.1 TASK 1 - MODIFICATION OF THE EXISTING COAL PULVERIZER AND DRYER SYSTEM (WBS 1.1)

4.1.1 Subtask 1.1 - Preliminary Design (WBS 1.1.1)

The existing coal pulverizer and dryer system was designed to pulverize Illinois No. 6 coal which, as-received, contains about 10% moisture and is relatively non-flammable when dried. The system is to be modified to dry Montana Rosebud coal from a nominal 25% moisture to a nominal 3% moisture.

In Quarterly Progress Report No. 2, we concluded that a pre-dryer upstream of the pulverizer would be needed. The pre-dryer and pulverizer combination are necessary to reduce the moisture in the pulverized Montana Rosebud coal to 3%.

Four different pre-dryer designs have been proposed by the three vendors. These designs are a direct contact gas-solid dryer, a steam tube dryer, a multiple tray dryer and a fluid bed dryer.

The direct contact gas-solid dryer is a parallel current kiln dryer. The drying gas and solid are in contact. The hottest gas and the cold solid enter the kiln at the same end and the cooled gas and warmed solid leave at the other end. This arrangement keeps the solid at lower temperatures. The residence time is determined by the length of the kiln.

The steam tube dryer is similar to the dryer at the CDIF. Steam at 100 to 150 psig in an array of tubes is used as the heat source instead of the high temperature organic fluid used in the CDIF. The lower temperature steam will reduce the possibility of fires and hot spots within the coal. The equipment

will be much larger than the CDIF pre-dryer to obtain longer residence times needed with the reduced differential temperature between the heating fluid and the water evaporating from the coal.

The tray dryer consists of a large number of trays arranged vertically one above the other. The coal is fed into the top tray at the desired rate. The tray rotates under a spreader bar to distribute the coal into a thin layer. Drying gas is allowed to pass over the spread out coal. As the tray approaches 360 degrees of rotation, a scraper causes the coal to enter a hole and fall to the tray below where it is again spread out, exposed to drying and transmitted to the tray below. The residence time is controlled by the diameter and number of trays.

The fluid bed dryer is a bubbling bed dryer with overbed coal feed and underbed gas feed. Residence time is controlled by the bed dimensions. For a fixed bed diameter the residence time is proportioned to the bed height.

Even with the pre-dryer, inert gas will be required in the pulverizer. To reduce burner size and oil consumption, we had decided to evaluate a system with recycle of the inert gas through a dehumidifier. We were unable to obtain bids for the dehumidifier.

We reviewed the dryer technology and concluded that laboratory scale tests would be required for sizing dryers to dry coal to 3% moisture. We concluded that drying time and equipment size is dependent upon the manner in which the inherent, non-surface, moisture is retained in the coal. Laboratory scale tests were performed by each of the three vendors and observed by representatives of DOE/PETC, Gilbert-Commonwealth and ourselves. Reports of the tests and discussions with the vendors indicated that any of the equipment could be designed to dry the coal completely. Complete drying to 3% moisture in the dryer would eliminate the need for completion of drying in the pulverizer. Without the requirement for drying in the pulverizer we are able to use a recycle system for the inert gas in the pulverizer without a dehumidifier.

We requested bids from the dryer vendors for complete drying, in addition to partial drying. The difference in price for complete drying in the one bid received during this period was an order of magnitude less than the cost of modifying the pulverizer for drying in the pulverizer. We expect like incremental costs from the other vendors.

We have decided to complete the drying in the dryer and inert the pulverizer with nitrogen which will be recycled to minimize nitrogen usage.

4.1.2 Subtask 1.2 - Final Design, Material and Component
Procurement, Fabrication, and Delivery (WBS 1.1.2)

Activity on this task has been delayed until the needed equipment has been defined and the dryer vendor selected.

4.1.3 Subtask 1.3 - Installation at the CFFF and
Mechanical Checkout (WBS 1.1.3)

No activity scheduled on this task to date.

4.1.4 Subtask 1.4 - System Shakedown (WBS 1.1.4)

No activity scheduled on this task to date.

4.1.5 Subtask 1.5 - Final System Acceptance Test (WBS 1.1.5)

No activity scheduled on this task to date.

4.1.6 Subtask 1.6 - Management (WBS 1.1.6)

The project team has been assembled, and lines of communication have been developed. The project organization is shown in Figure 3. The project team will be responsible for the management of this and the other tasks in the project.

The Integrated MHD Bottoming Cycle project team is headed by Mr. P. B. Probert of B&W's Research and Development Division. As Project Manager, Mr. Probert directs the work of the B&W team and coordinates the project activities with DOE and within the B&W Company. He is the Project Manager on the MHD Heat Recovery Seed Recovery project, thus maintaining excellent continuity of B&W's participation in the DOE MHD program. Mr. Probert is assisted by Mr. S. C. Datsko on all day-to-day technical activities.

Mr. C. H. Smith from B&W's Contract Research Division is the Contract Manager and is responsible for the financial and contractual aspects of the project.

Within B&W, Mr. J. D. Martin, Hudson Engineering, is responsible for the design and construction of foundations, structural supports, and for installation of the equipment at the CFFF. In addition, Messrs. G. D. Lindstrom, R. R. Piepho, and R. Bruckner will coordinate engineering or procurement activities in their areas of expertise.

Mr. C. W. Wurst of UTSI will supervise UTSI trades personnel during installation of the equipment at the CFFF. He will receive direction from the B&W on-site supervisor. In addition, Mr. Wurst will be responsible for providing information on current and planned site configurations to assist in the location of the equipment to be furnished during the Integrated MHD Bottoming Cycle project.

The Management Plan, including the Work Plan, the Milestone Schedule Plan, and the Cost Plan was submitted for review during the previous report period.

The Work Plan and the Milestone Schedule Plan have been updated to reflect changes in equipment design requirements for the coal drying and pulverizing and the spent seed/fly ash handling systems.

4.2 TASK 2 - DESIGN, FABRICATION, AND INSTALLATION OF AN
AUTOMATED SPENT SEED/ASH HANDLING SYSTEM (WBS 1.2)

4.2.1 Subtask 2.1 - Preliminary Design (WBS 1.2.1)

The Preliminary Design Review package was revised during the previous period and the Preliminary Design Review meeting was conducted.

During the meeting UTSI explained the need for additional cooling sections in the Superheater Test Module/Air Heater system. The review team agreed on the need and B&W/Hudson Engineering were requested to revise the design to accommodate removal of ash from these cooling sections. The design review team agreed that moving the existing ash/spent seed storage tank to a location near the electrostatic precipitator would facilitate access to this system and existing components. B&W/Hudson Engineering with assistance from UTSI has determined the details of rerouting the conveying systems.

A vendor measured characteristics of the seed/ash mixture significant to mechanical (screw) conveying. We and the vendor believe the mixture will handle easily. Problems could be encountered if the mixture and flue gas cools below the boiling point of water and the flue gas contains relative humidities exceeding about 50 percent.

A vendor of pneumatic solid transport systems arranged for representatives of DOE/PETC, Gilbert-Commonwealth and B&W-Hudson Engineering to visit his laboratory and the site of a commercial installation. The vendor performed a demonstration transport test using spent seed/fly ash furnished by UTSI. This sample of the seed-ash produced in the DOE CFFF was successfully transported in the laboratory equipment. At the commercial installation, the above representatives witnessed the transport of a difficult to handle moisture sensitive material at a maleable iron foundry. The foundry manager willingly expressed his satisfaction with transport system.

4.2.2 Subtask 2.2 - Final Design, Material and Component Procurement,
Fabrication, and Delivery to the CFFF (WBS 1.2.2)

The changes resulting from the Preliminary Design Review are being incorporated into the final plot plan and P&ID drawings. The flow sheet and plot plan are both over 50% complete.

We received and are evaluating bids from vendors of the pneumatic transport system. We will forward the results of the evaluation, the procurement specification and copies of the bids to DOE/PETC. We will include a request for approval to purchase from a recommended vendor.

Only one of the vendors has submitted a bid for the mechanical screw conveyors. The other vendors have declined to bid. We have solicited bids from two other vendors. If these vendors bid or decline to bid, we will prepare a package and recommend purchase from one bidder.

4.2.3 Subtask 2.3 - Installation at the CFFF and
Mechanical Checkout (WBS 1.2.3)

No activity on this subtask to date.

4.2.4 Subtask 2.4 - System Shakedown (WBS 1.2.4)

No activity on this subtask to date.

4.2.5 Subtask 2.5 - Final System Acceptance Test (WBS 1.2.5)

No activity on this subtask to date.

4.2.6 Subtask 2.6 - Management (WBS 1.2.6)

See 3.2.6 for general management activities. The Management Plan included the work plan, etc. for this task as well as Task 1.

4.3 TASK 3 - PREPARATION OF A PROCUREMENT/INSTALLATION-ENABLING PACKAGE
FOR AN INTERMEDIATE TEMPERATURE AIR HEATER SYSTEM (WBS 1.3)

No activity on this task to date.

4.4 TASK 4 - PARTICIPATION ON THE MHD TECHNOLOGY TRANSFER,
INTEGRATION, AND REVIEW COMMITTEE (WBS 1.4)

Paul Probert participated in the first meeting of the Committee in June,
1988.

5.0 ACTIVITIES PLANNED FOR NEXT QUARTER

Planned activities for November, December, and January 1988 will focus on completion of the preliminary design of the revised coal pulverizer and dryer system and completion of the final design of the spent seed/ash handling system.

Significant plans in each task are:

Task 1 - Modification of the Existing Pulverizer and Dryer System (WBS 1.1)

The key activity is to secure and evaluate bids from vendors of coal dryers, select the drying system for final design, and conduct the Preliminary Design Review.

Task 2 - Design, Fabrication, and Installation of an Automated Spent Seed/Ash Handling System (WBS 1.2)

The key activities planned for the next quarter are completion of plot plan, elevation and P&ID drawings. We will evaluate the equipment proposed by the vendors, select the vendors and submit procurement packages for DOE approval. We will also conduct the Critical Design Review.

Task 3 - Preparation of a Procurement/Installation-Enabling Package of an Intermediate Temperature Air Heater (WBS 1.3)

No activity is planned for this task at this time.

Task 4 - Participation on the MHD Technology, Transfer, Integration, and Review Committee (WBS 1.4)

B&W plans to participate in the meeting scheduled for June 1988.

6.0 SUMMARY

Integrated MHD Bottoming Cycle project progress for August 1988 through October 1988 was in obtaining and reviewing vendor quotes for the coal dryer and modifying the system to eliminate the necessity of drying in the pulverizer.

Vendor preliminary quotes for coal dryers were received. We received reports of drying tests conducted by the vendors. Test results were reviewed, and a decision to do all the drying in the dryer was reached. A final bid was received from one of the three vendors.

We received several bids for the pneumatic conveyor portions of the Automated Ash/Seed Handling system. We received one bid and several no bids on the mechanical (screw) conveyor for the system. We have solicited two additional vendors.

We plan to select the vendors for the Automated Ash/Seed Handling system in the next quarter, conduct the Critical Design Review and submit procurement approval packages for the equipment during the next quarter.

Integrated MHD Bottoming Cycle

Project Organization

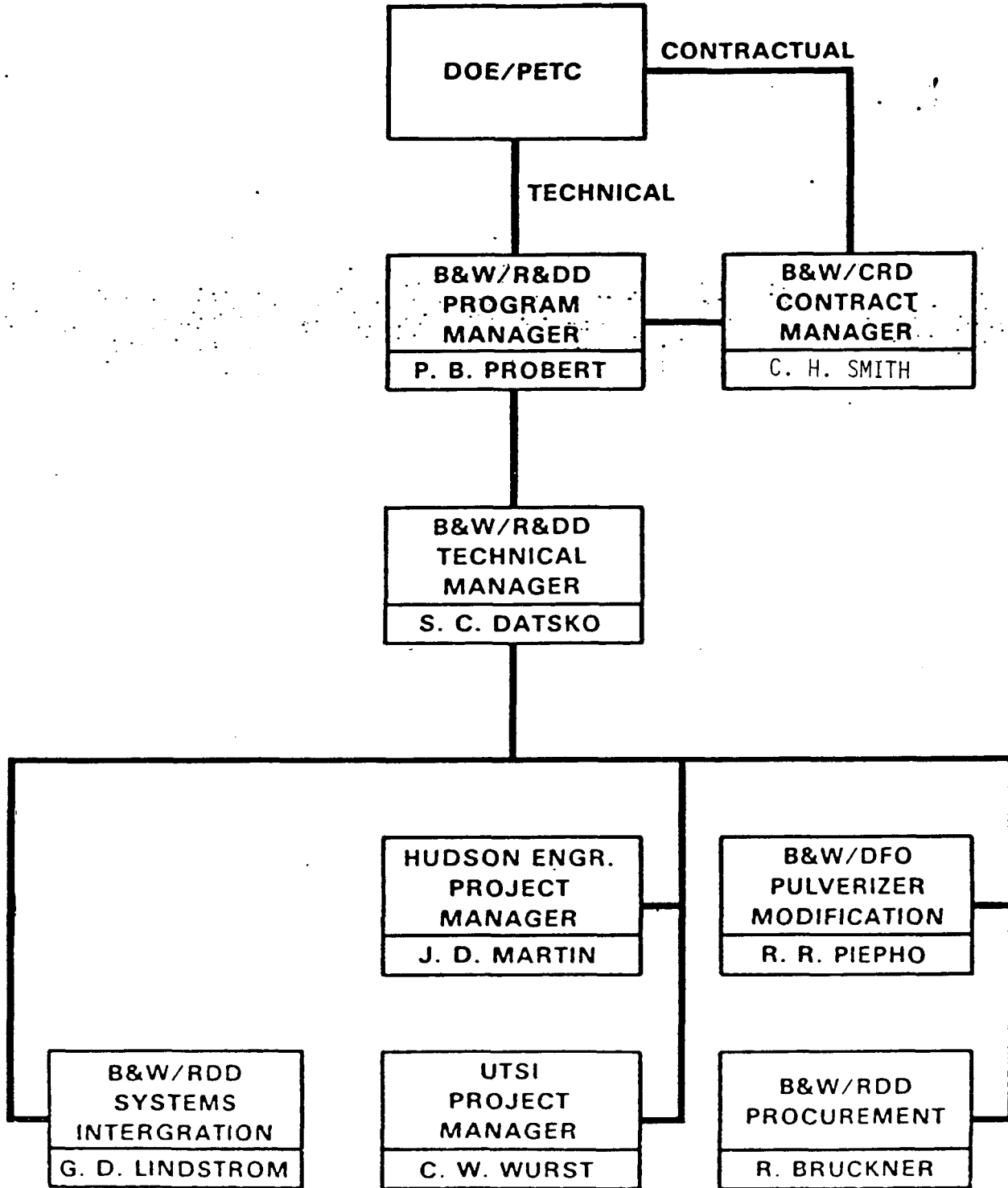


FIGURE 3