TECHNICAL PROGRESS REPORT

October 1992 - December 1992

for

U.S. Department of Energy
Morgantown Energy Technology Center

Under:

DOE Cooperative Agreement
No. DE-FC21-90MC27229

PULSED ATMOSPHERIC FLUIDIZED BED COMBUSTION

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January, 1993

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Preface

This Quarterly Technical Progress Report presents the results of the work accomplished during the period October 1, 1992 through December 31, 1992 under DOE Contract No. DE-FC21-90MC27229, entitled "Pulsed Atmospheric Fluidized Bed Combustion."
The Design and Engineering of most components in the Pulsed Atmospheric Fluidized Bed System was completed prior to September 1992. The components remaining to be designed at that time were:

1. Aerovalves for the Pulse Combustor.
2. Gas and coal injectors for the Pulse Combustor.
3. Lines for PC tailpipes.
4. Air plenum and inlet silencer.
5. Refractory lined hot gas duct connecting outlet hot cyclone to boiler.
6. Structure and platforms, and ladders around PAFBC vessel access and major equipment.

Design work is currently in progress on all of the above components. Items 1, 2, 3 and 4 are 50% completed, and items 5 & 6 are 75% complete.
The Piping and Instrumentation drawings and Plant Layout have not changed since the last quarterly report.

**Design Changes**

The design of the Pulsed Atmospheric Fluidized Bed Combustor (PAFBC) plant was not changed since the Quarterly report for the period of July to September 1992. However, during the progress of fabrication, periodic review revealed the need for small design changes to various components. Notably, reinforcement was added to the hot gas ductwork connecting the PAFBC vessel to the hot cyclone, and the size of the Pulse Combustor flange that matches the opening on the Fluidized Bed vessel was adjusted to accommodate dimensional variances that occurred during fabrication.

**Fabrication and Procurement**

The following text refers to the component lists on Figures 1, 2 and 3. Referring to Figure 1, fabrication of the following components is in progress: Coal dump hopper (V-1), air classifier (C-2), fines splitter (C-7), and classifier cyclone (S-2). Again, regarding Figure 1, the following pieces of equipment have been procured and are in storage: Coarse coal silo (V-2), screw conveyor (C-1), screw conveyor (C-3), bucket elevator (C-4), coarse coal silo vent filter (S-1), coarse coal belt scale (C-5), classifier air fan (F-1), fines conveying air fan (F-2), coarse coal metering feeder (M-2), limestone metering feeder (M-3), and coal
mill (C-F). Coal fines silo (V-3), limestone silo (V-4), airlock feeder (C-6), coal fines silo vent filter (S-3) and limestone silo vent filter (S-4) are being procured.

Referring to Figure 2, combustor vessel (H-2) is being fabricated, pulse combustor (H-1) and in-bed heat transfer modules (H4-HR) have been fabricated by a boiler manufacturer to ASME code 1 specifications. Fabrication is in progress on the following components: Hot cyclone (S-5) and J-valve (C-E). The following components have been procured and are in storage: pulse combustor combustion air fan (F-3), fluid bed combustion air fan (F-4,5), conveying air blower (F-6), induced draft fan (F-7), ash cooling screw conveyors (E-2, 3), boiler bank ash feeders (C-0 and C-H), bed drain dump feeders (C-9,A) waste heat boiler (E-4), economizer (E-5), baghouse (S-6), and baghouse ash dump feeders (C-B.C). Boiler circulation pumps (P-2,3) are being manufactured, and will be delivered in February 1993.

Referring to Figure 3, all components have been procured and are in storage.

Included on the following pages are photographs of components that are in the process of fabrication or have been completed.
Figure 1  Coal/Limestone Handling System
Figure 2  Fluidized Bed/Steam Cycle
Figure 4  Pulse Combustor Water Jacket

Figure 5  In-Bed Heat Transfer Modules
Figure 6  PAFBC Vessel Bed Section

Figure 7  PAFBC Vessel Air Plenum
Figure 8 Baghouse

Figure 9 Economizer
Figure 10  Forced Draft Fan

Figure 11  Coal Crusher