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AFBC Co-Firing of Coal and Hospital Waste

**Quarterly Report
August - October 1995**

James M. Stuart

March 1996

Work Performed Under Contract No.: DE-FG21-91MC27205

For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
Morgantown, West Virginia

By
Donlee Technologies, Incorporated
York, Pennsylvania

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I. INTRODUCTION

A. PROJECT OBJECTIVE

The project objective is to design, construct, install, provide operator training and start-up a circulating fluidized bed combustion system at the Lebanon Pennsylvania Veteran's Affairs Medical Center. This unit will co-fire coal and hospital waste providing lower cost steam for heating and possibly cooling (absorption chiller) and operation of a steam turbine-generator for limited power generation. This would permit full capacity operation of the FBC year round in spite of the VA laundry that was shut down as well as efficient destruction of both general and infectious hospital waste and steam generation. The steam generated is as follows:

- Steam = 20,000 lb/hr
- Temperature = 353 F (saturated)
- Pressure = 125 psig
- Steam quality = ~98.5%

B. REPORTING PERIOD

The reporting period is from August 1, 1995 to October 31, 1995.

C. REPORT LAYOUT

The Progress Reports will show progress and direction for each task and subtask. The Final Technical Report will also provide a coherent chronology of tasks and subtasks throughout the project. Weekly status meetings were held. In part, this report summarizes the primary issues discussed in those meetings and relating to the completion of this project.

II. TASK ONE - Design, Specify, Procure, Install and Start-Up Facility

A. SUBTASK 1-A - DESIGN

Progress: The process of filling out fact sheets for each piece of equipment for the operation and maintenance manual continues, and about 85% of the fact sheets have been completed.

The status of the fact sheets is as follows:

- 56 fact sheets have been written.
- 56 fact sheets have been typed and completed.
- 6-10 fact sheets remain to be written.

Currently, the stack, base and anchoring system have been designed and materials have been procured. The stack fabrication has not been started yet but the completion date for DONLEE fabrication and transport to the site is projected to be December 11, 1995. Installation will be

during that week. Three other systems need to be designed by DONLEE and/or installed at the LVA site:

- Steam silencer and support - to be located next to the Southeast corner of the baghouse.
- Ash conditioner system - supports for the ash screw and the rotary valve and ash conditioner.
- Support to raise the skiphoist approximately two feet above the existing foundation floor. Note this will be done to match the two-foot raised platform to be installed by the building contractor.

The feedwater and chemical treatment system was redesigned for the new system. A vendor was selected for the chemical treatment and the pump and tank were selected. The sterilization system has been designed. Procurement of the remaining equipment will be done shortly.

The shredder system's piping and hose connections have been designed. Bids will currently be sought for the installation of these items.

Problems: None

Plans: Continue filling out fact sheets for the equipment. Continue design and drafting work.

B. SUBTASK 1-B - EQUIPMENT PURCHASE AND FABRICATION

Progress: The status of the major pieces of equipment in the procurement process is shown on Table 1. The fabrication procedure developed for the combustor, boiler, economizer and bins allowed these items to be fabricated by DONLEE.

Problems: None

Plans: Continue with authorized expenditures. Proceed with the equipment fabrication.

C. SUBTASK 1-C - INSTALLATION

Progress: The construction work has been broken into smaller contracts. This allows us to take advantage of smaller constructors who specialize in specific portions of the construction package. The progress in the various work being done on-site is discussed below. Table 2 lists the general tasks, their descriptions, the hours completed and percentage completion during the time of this quarter. Tables 3 through 8 shows a further breakdown of the task items during August 1 through October 31, 1995.

TABLE 1. LEBANON VA PROJECT EQUIPMENT STATUS

ITEM NUMBER	EQUIPMENT	VENDOR	PURCHASE ORDER NO.	RELEASE FOR FABRICATION	TARGET DELIVERY DATE
1	Air Compressor	C.H. REED	70054	5/31/94	7/12/94
2	Ash Conditioner	DETROIT STOKER	70009	7/27/93	12/31/93
3	Ash Conditioner: Chutes	DETROIT STOKER	70062	6/6/94	11/4/94
4	Ash Handling: Storage and Screw	MACAWBER SYSTEMS	13456B/70046	7/27/93	3/14/94
5	Bed Material Cooling/Cleaning System	CSI SYSTEMS INC.	70041/70042	5/25/94	8/3/94
6	Bin, Sand (Sand funnel)-Replaces bed matl bin estimated @ \$10,000	DONLEE	WO	5/1/94	7/1/94
7	Bins: Ash, Limestone & Coal				
7a	Coal Bins	DONLEE	WO	5/1/94	7/20/94
7b	Limestone Bin - 30 Ton	DONLEE	WO	5/1/94	11/1/94
7c	Limestone Bin - 2 Ton	DONLEE	WO	5/1/94	8/19/94
7d	Ash Bins (2)	DONLEE	WO	5/1/94	11/18/94
8	Boiler & Economizer: Boiler	DONLEE	WO	10/1/93	4/29/94
9	Boiler & Economizer: Boiler Sootblower	FUEL EFFICIENCY	70001	6/28/93	8/2/93
10	Boiler & Economizer: Boiler Sootblower-Engr Only	FUEL EFFICIENCY	41916		8/2/93
11	Boiler & Economizer: Economizer Casing	DONLEE	WO	6/1/94	7/6/94
12	Boiler & Economizer: Economizer Sootblower	COPE-S-VULCAN	41917B	3/4/94	6/16/94
13a	Stack (Chimney)	TRI FAB INC	41819	2/28/94	10/31/94
13b	Stack (Chimney) - 2nd Design	DONLEE	WO	2/10/95	10/15/95
13c	Stack (Chimney) - Anchoring system	DONLEE/Aycok	70059	11/15/95	12/8/95
14	Circulating Pumps, Feedwater	CHESTER PUMP		6/1/94	7/15/94
15	Coal Storage, Handling & Feeding	BEAUMONT BIRCH	13455B	7/27/93	12/15/93
16	Combustor/Cyclone/Cooling Bed Unit -No Tubes	DONLEE	WO	6/10/93	11/1/93
17	Controls Computer Package	HONEYWELL	42190B	8/16/93	9/1/95
18	Cooling Bed & Economizer Tubes*	ALLEGHENY BOILER TUBE	70000	6/15/93	9/15/93
19	Dry Injection Fabric Filter: Baghouse	AEROPULSE INC	42019B	6/3/94	9/19/94

TABLE 1. LEBANON VA PROJECT EQUIPMENT STATUS

ITEM NUMBER	EQUIPMENT	VENDOR	PURCHASE ORDER NO.	RELEASE FOR FABRICATION	TARGET DELIVERY DATE
20	Ducting & Piping	McClure	70085	9/28/94	12/21/94
21	Electrical Equipment & Installation	DBG/Carpenter Engr	70024	2/3/94	2/28/95
22	Emissions Monitoring Equipment	ENERTEC	14172B	8/2/93	12/20/94
23	Emissions Monitoring Equipment: Oxygen	W.A.GREGORY & CO	70040	6/3/94	7/20/94
24	Expansion Joints	SENIOR FLEXONICS	70011	8/8/93	10/28/93
25	Fans & Blowers: ACB & LCB**	SPENCER TURBINE	41809	3/15/94	6/30/94
26	Fans & Blowers: Primary & ID	ROBINSON	41811	6/28/93	12/31/93
27	Flyash ReInjection System	DONLEE/FOX VALVE	70034	6/6/94	7/15/94
28	Flyash ReInjection System: Bed Mat'l Blowers	R.M. ASSC	41810	5/25/94	7/20/94
29	Natural Gas line moved	UGI	70028	3/1/94	3/15/94
30	Hospital Waste, Handling & Sub-Systems	ESSEX CONVEYOR	41820	3/1/94	9/23/94
31	Instruments: Pressure Indicators/Transmitters	DWYER/HONEYWELL	70055	6/15/94	7/15/94
32	Instruments: Pressure Transmitters	HONEYWELL	70010	7/27/93	8/25/93
33	Instruments: Pressure Transmitters (Additional)***	HONEYWELL	70045	6/15/94	7/15/94
34	Instruments: Thermocouples	CGS	70052	6/7/94	7/19/94
35	Insulation Materials & Installation	DONLEE	W/O	7/1/94	9/18/94
36	Limestone Storage, Handling & Feeding	MACAWBER SYSTEMS	41684B	7/27/93	12/15/93
37	Outside Review of Bldg-Preliminary/Final	ENTECH		6/24/93	7/1/93
38	Painting	DONLEE		7/15/94	2/28/96
39	Plant Encl./Site Prep/Foundation: Geotechnical Engr.	SCHNABEL	70027	2/16/94	7/1/94
40	Plant Encl./Site Prep/Foundation: Bldg & Foundation***	ARTHUR FUNK	70023	1/24/94	9/30/94
41	Plant Encl./Site Prep/Foundation: Building			9/30/93	4/29/94
42	Plant Encl./Site Prep/Foundation: Design	DBG/Steckbeck		6/10/93	2/15/94
43	Plant Encl./Site Prep/Foundation: Engineer	DBG/Steckbeck	70026	2/16/94	9/30/94
44	Plant Encl./Site Prep/Foundation: Foundation			9/30/93	4/29/94

TABLE 1. LEBANON VA PROJECT EQUIPMENT STATUS

ITEM NUMBER	EQUIPMENT	VENDOR	PURCHASE ORDER NO.	RELEASE FOR FABRICATION	TARGET DELIVERY DATE
45	Platforms, Supports and Stairs and Design	BSM, Inc.	70084	9/27/94	12/5/94
46	Refractory Materials & Installation: Installation	DONLEE	WO	11/1/93	5/31/94
47	Refractory Materials & Installation: Materials	J.T.THORPE	70002	6/28/93	8/30/94
48	Refrigerated Room	PERLEY-HALLADAY	70012	7/28/93	8/30/94
49	Scale	B&M SCALE	70048	6/8/94	8/30/94
50	Shredder	SSI SHREDDING SYSTEMS			
51	Shredder Blower	ROBINSON	38764B	8/20/93	12/31/93
52	Shredder: Move from York to Site	DONLEE	70035	11/19/93	7/15/94
53	Slide Gates	ROVALVE/TECHNAFLOW	70007	7/28/93	2/28/94
54	Soil Borings	Schnabel			
55	Start-up Burner	ECLIPSE/YORKAIRE	70013	9/1/93	1/3/94
56	Start-up Burner (Mod. Motor)	HONEYWELL	70014	8/20/93	9/30/93
57	Startup Burner Panel	DONLEE	W.O.	12/7/93	6/30/94
58	Steam Silencer	VIBRATION & NOISE ENGR	70070	6/7/94	8/15/94
59	Steelwork or Equipment Support	DONLEE	W/O	11/15/93	5/30/94
60	Sterilization System	DONLEE	70067	6/8/94	8/15/94
61	Sterilization Testing	DONLEE	70049	8/30/94	9/30/94
62	Transformer for Lab VA Equipment	Blatt & Myers	70085	7/31/94	12/1/94
63	Valves & Dampers	IPS	70044	5/31/94	7/26/94
64	Vendor Equipment Installation	AYCOCK	70059		12/15/94
65	Computerized Portable Analyzers	ECOM America	70030	3/11/94	3/25/94
66	Additional payment/performance bonds	TBD			
67	Onsite refractory cure	Hotworks	70081	10/7/94	1/15/96
68	Bonding and Grounding	TBD			
69	Sump pumps and controls	Raeden			

TABLE 1. LEBANON VA PROJECT EQUIPMENT STATUS

ITEM NUMBER	EQUIPMENT	VENDOR	PURCHASE ORDER NO.	RELEASE FOR FABRICATION	TARGET DELIVERY DATE
70	Steam/Feedwater Valves	IPS	70092		
71	Shredder Hydraulic Filter	SSI	70094	1/24/95	2/15/95
72	Air Cannons	Airmatics	70099	1/6/95	1/20/95
73	Noise Suppression: Motor/Blowers	BRD Noise/Vibration	70096	11/29/94	12/20/94
74	Heatless Air Dryer	Air Flow Co., Inc.	70191	1/25/95	3/10/95
75	Orifices and venturis	C/B/ NES	70093	1/4/95	2/15/95
76	Cart for medical waste	CONSOLIDATED PLASTIC CO	70102	1/25/95	2/1/95
77	Site trailer rental - 13 months	GE CAPITAL MODULAR SPACE	70098	12/20/94	1/23/95
78	Heat Tracing	DONLEE		9/1/95	11/30/95
79	Added Lighting	DONLEE		9/1/95	11/30/95
80	Sump Pump/Controls	RAEDEN		9/1/95	10/30/95
81	Cal Gases and Regulators	SCOTT SPECIALTY		9/1/95	12/15/95
82	Sink/Shower Decontamination Stations	LAB SAFETY		9/1/95	12/8/95
83	Sand for Beds	U.S.SILICA SAND	70080	9/15/95	12/15/95
84	Coal Pit Cover	DONLEE		9/15/95	11/15/95
85	Grizzly Cover	DONLEE		9/15/95	12/15/95
86	Chemical Feedwater System	Nutmeg	70112	10/31/95	12/15/95

Table 2. LVA PROJECT PROGRESS SUMMARY REPORT August 1, 1995 - October 31, 1995					
Task	Description	Estimated Man-Hours to Complete	Actual Reported Man-Hours	Percentage Completed Aug. 21, 1995	Percentage Completed Oct. 31, 1995
01	Piping	1800	1152	65	88
02	Platform Installation	880	937	25	100
03	Control Room	300	265	50	90
04	Equipment Installation	1420	917	75	88
05	Electrical	2200	1180	40	75
06	Building	400	100	90	92
07	Insulation	600	0	0	0
08	Painting	300	0	0	0
	TOTAL	7900	4551	60	82

TABLE 3. TASK 01 - PIPING Summary Progress Report - 88% Complete		
Subtask	Work Description	% Complete
1-01	Compressed air system	100
1-02	Water service system	96
1-03	Natural gas lines	100
1-04	Steam piping	85
1-05	Feed recirculation water	95
1-06	Ash silo piping	90
1-07	Solids lines	70
1-08	Air duct	95
1-09	Fuel and gas duct	95
1-10	Sterilization	0
1-11	Hospital waste	75
1-12	Instrumentation	40
1-13	Sample lines	0
1-14	Baghouse rework	100
1-15	Punch list	10

TABLE 4. TASK 02 - PLATFORMS Summary Progress Report - ~100% Complete		
Subtask	Work Description	% Complete
2-01	Small pit	100
2-02	Combustor	100
2-03	Hot cyclone	100
2-04	Sluice bed	100
2-05	Heat exchanger	100
2-06	Startup burner	100
2-07	Shredder	100
2-08	Coal silo	100
2-09	Boiler & economizer	100
2-10	Ash silo	100
2-11	Large pit	100
2-12	Final punch list	100
2-13	Additional platforms	63

TABLE 5. TASK 03 - BUILDING/FOUNDATION - CONTROL ROOM Summary Progress Report - 90% Complete		
Subtask	Work Description	% Complete
3-01	HVAC	100
3-02	Ceiling	100
3-03	Lighting	100
3-04	Painting	100
3-05	Glass	100
3-06	Flooring - <i>Will be completed after the electricians are done and out of the control room.</i>	0
3-07	Control panels	80

TABLE 6. TASK 04 - EQUIPMENT Summary Progress Report - 88% Complete		
Subtask	Work Description	% Complete
4-01	Dryer	100
4-02	Refrigeration system	100
4-03	Stack fabrication	50
4-04	Stack erection	0
4-05	Sterilization skid	95
4-06	Ash conditioning system	0
4-07	Baghouse rework	100
4-08	Steam silencer	0
4-09	Skiphoist rework	80
4-10	Limestone storage bin	100
4-11	Weigh belt rework	80
4-12	Coal silo rework	94
4-13	Hot cyclone	97
4-14	Ash silo system	100
4-15	Combustor	96

TABLE 7. TASK 05 - ELECTRICAL Summary Progress Report - 75% Complete		
Subtask	Work Description	% Complete
5-01	Motor control center	85
5-02	Dust suppression	100
5-03	Startup burner	95
5-04	Sootblower	75
5-05	Fans control	75
5-06	Bed cleaning system	60
5-07	Limestone and ash	20
5-08	Baghouse	80
5-09	Local thermocouple	80
5-10	Coal handling system	85
5-11	Hospital waste sterilization	40
5-12	Building light	55
5-13	Main controls and analyzers	39
5-14	Boiler	0

TABLE 8. TASK 06 - BUILDING Summary Progress Report - 92% Complete		
Subtask	Work Description	% Complete
6-01	Roof opening - <i>Will be performed when the stack is installed.</i>	0
6-02	Drywall ceiling	100
6-03	Ventilation system	100
6-04	Loading dock platform	0
6-05	Paving	0
6-06	Seeding	0

TASK 07 - INSULATION - Summary Progress Report. The insulation work has not started yet. A vendor will be selected shortly.

TASK 08 - PAINTING - Summary Progress Report. The outside painting and the interior structural painting have not started yet. A vendor needs to be selected.

Problems: The electrical contractor came to the site much later than the other contractors and has been behind schedule through this quarter due to providing insufficient manpower for much of this time.

Plans: The installation continued this quarter and is projected to be completed by late December.

**D. SUBTASK 1-D - SHREDDER SYSTEM VERIFICATION
AND TESTING**

Part of Phase I Contract testing to be done at DONLEE Pilot facility.

Progress: Task completed in June 1992.

Problems: None.

Plans: Task completed in June 1992. Sterilization testing will be completed prior to completion of the installation. This testing uses a full-scale mock-up of a portion of the shredder hopper. The testing nozzles used are those to be used in the actual shredder system to ensure proper design.

E. SUBTASK 1-E - START-UP

Progress: Shakedown, startup and operation will begin after the completion of the equipment and instrument installation. The various subsystems of the facility will be started up one at a time during pre-startup check out. The 14 subsystems are:

1. Compressed air
2. Gas lines and startup burner
3. Water service lines
4. Baghouse
5. Limestone system
6. Coal handling system
7. Combustor and hot cyclone
8. Ash reinjection
9. Boiler and steam lines and feed and recirculation water lines
10. Ash conditioning system
11. Hospital waste
12. Main control system
13. Analyzers
14. Stack

Subsystems 1 through 9 are currently near, or above 90% complete and can be checked out as needed.

A computerized preventive maintenance program will be developed during shakedown, startup and the test program.

Problems: The Lebanon VA is currently searching for a responsible individual who will repair, replace or maintain the Honeywell control system of the CFB facility.

Plans: The facility is anticipated to be completed during the winter of 1995. Work has begun on the Training Program and the Operation and Maintenance Manual.

III. TASK TWO - Obtain Permits

Progress: Application for the extension of the Plan Approval to November 30, 1995 for the Lebanon VA facility was sent to the PA DEP. DONLEE has received the Plan Approval and the 180 day extension. This time period is now running out.

Problems: None. Preparation for the PA DEP site review after construction has started since the installation of the equipment has begun.

Plans: Since the construction is not yet complete, the Plan Approval will be extended again in early November so that construction and installation can be completed. This situation is due to the 5-month delay of the approval of the additional funds.

IV. TASK THREE - Procure Coal, Limestone and Ash Disposal Contracts

Progress: Early in the project the coal, limestone and ash disposal contracts could not be finalized because the initial supply date was in question due to NEPA approval related delays. Lebanon VA had received a supply proposal from Naughton Energy for coal, limestone and for ash disposal. During May 1994 the Lebanon VA set up a contract for procuring coal and limestone and for disposing of the generated ash when the facility is operational.

Problems: Naughton has a three-year contract (through September 1997) to supply the coal and limestone, and to dispose of the ash generated. The contract started in October 1994. From then until the time that the facility is operational, the right to purchase the coal and limestone and to dispose of ash is lost.

Plans: Limestone and coal shipments will be obtained to do check outs of the coal and limestone systems.

V. TASK FOUR - Conduct One Year Test Program

Progress: This task will be performed after the installation, pre-startup check outs and startup/shutdown of the facility have been completed. Stack testing and biospore testing are required by the Pennsylvania Department of Environmental Protection to demonstrate performance and for the proof of DRE (destruction removal efficiency), respectively. At least one test of each type are required by PA DEP, however, more tests can be required. Due to funding limitations, only one or two stack tests or biospore tests can be performed. A test matrix will also be performed to demonstrate the performance and operation limitations of the CFB facility and its emission levels.

Problems: None.

Plans: A preliminary request for proposal for performing stack sampling and biospore tests have been written and sent to four (4) vendors for competitive bids on October 13, 1995. These proposals will be reviewed for cost and content. A stack sampling vendor will be selected

and the final costs of the tests will be determined. The stack sampling vendor will also update and develop the protocol for the test facility.

VI. TASK FIVE - Prepare Final Report

Progress: None. The report is due 3 months after the test program is completed.

Problems: None. The task is to be completed after the test program is finished.

Plans: Currently information has been gathered concerning the equipment and facility. Preparation is being made to perform a matrix of tests that will demonstrate the performance and operation limits of the CFB system, quantify emission levels, identify problem areas and aid in performing scale-up analyses for future commercial designs.

VII. PROJECT COSTS

Changes to the contract

The following items have undergone price increases during this project. (The numbers in parentheses refer to Table 10 item numbers.)

- An air compressor will need to be purchased for the new facility. It was originally believed that the present system would be able to provide sufficient air quantities but the new facilities requirements are larger than originally anticipated. The cost of a 300 cfm air compressor rated at 110 psi was \$21,015 (revised). The air is supplied for the pneumatic transport of limestone and ash, pneumatic slidegates and instrumentation. (1)
- An ash conditioner needed to be added to the contract. The Solid Waste Division of Pennsylvania's Department of Environmental Resources requires that the ash be conditioned with water before transport. The ash conditioner was supplied at a cost of \$59,804 (revised), including ducts and screw conveyors. (2, 3, 4)
- The cost of the ash handling storage and screw system has increased to \$151,941 due to purchasing 21 NiHard 45° elbows for pneumatic ash transport. (4)
- The bed cleaning system which processes the ash generated from the combustion of the coal, limestone and medical waste currently costs \$26,114. The vendor agreed to upgrade the equipment being supplied to meet the equipment specifications. (5)
- The scope of the sand silo design has been reduced to a sand "funnel," resulting in a cost reduction of \$5,000 to \$10,000. The cost of the sand funnel was \$2925. (6)

- The total cost of the bins: ash, limestone (2) and coal has increased from \$43,065 to an estimated \$123,663. (7a thru 7d).
- The boiler required \$8,111.00 of additions to meet the VA specifications. This number will be revised pending final boiler design. (8)
- The cost of the economizer sootblower was \$8,784. (12)
- The redesign of the stack is complete. The total cost of the stack is now \$69,428. (13)
- The feedwater circulating pump was bought by LVAMC. DONLEE's cost is zero. (14)
- The coal feeders were originally proposed to be screws. The VA has requested weighing capability. Weigh belt feeders were selected in place of screw feeders. The cost was \$45,690.00. (15)
- The annunciator panel requested by the VA will be approximately \$8160.00. (17)
- The cost of the controls computer package has increased from \$83,442 to \$97,001. This cost increase is due to a required increase in the I/O capacity of the control system and for two computer courses. (17)
- The baghouse and sorbent injection system currently cost \$138,523 (revised). (19)
- The cost of the vendor doing the ducting and piping has increased to \$249,495 (revised). (20)
- The electrical contractor cost for the facility installation is currently \$279,348 (revised). (21)
- The emissions monitoring system required \$56,500 above the proposal for the HCl monitoring system and heated sample lines. (22)
- An oxygen analyzer to be used to measure oxygen at the boiler entrance and to be used to help control oxygen levels in the system was needed at a cost of \$6429. (23)
- Expansion joints were needed to allow for thermal growth throughout the system at a cost of \$25,862. (24)
- The cooling bed and lift channel blowers cost \$13,060. (25)
- The cost to move the gas lines at the facility was originally \$5,500. This cost was deleted by the gas company, UGI, in early February. (29)
- The hospital waste handling and subsystems (or skip hoist) currently cost \$36,815. (30)
- The cost of the added transmitters for pressure and flow indication added to the specification, was \$4,097. This cost increase is due to the number of transmitters that have been added. (33)
- The painting currently costs \$12,240 (revised). (38).

- Geotechnical Engineering Services for the building and foundation have been added to ensure that the facility is constructed properly and safely. The cost is partly offset by the October 1993 budget cost of the building and foundation. The cost of the services was \$9,512. (39)
- The building and foundation cost is currently \$636,628 due to change order increases. (40).
- Design Engineering Services have been added to provide independent supervision for the construction. The cost of these services is included in the October 1993 budget cost of the building and foundation. The cost has since been reduced to \$10,911 from \$17,000. (43)
- The cost of the design and manufacture of the initial platforms, supports and ladders was \$27,000. (45)
- The refractory engineering, materials and installation vendor's cost was \$88,007. (47)
- A refrigerated room is required for the storage of medical waste in the event that the unit is not operating. The cost of the refrigerated room was \$15,407 with freight included. (48)
- The Solid Waste Division of Pennsylvania's Department of Environmental Resources requires that the medical waste be weighed before disposal. The cost of a scale to be mounted in the loading dock was \$4382. (49)
- The price of the shredder blower has increased due to a freight charge. The final price was \$3,140. (51)
- Slidegates were needed for the coal, limestone and ash handling systems at a cost of \$52,665. (53)
- Soil borings were required to determine soil bearing capacity before the foundation design could be started. It was originally believed that the VA had this information. The cost of the soil borings was \$5850. (54)
- The start-up burner system, including its panel and motors, for the circulating fluidized bed cost is \$10,792. (55, 56, 57)
- The cost of the steelwork or equipment support (structure) has increased from \$72,290 to \$143,639 (estimated). (59)
- The general valves for the circulating fluidized bed system currently cost \$26,065. (63)
- The cost of the vendor equipment installation, including the platform installation and extras, is now \$478,107 (revised). (64)
- The cost of additional payment/performance bonds has been maintained in the individual contracts (vendor equipment installation and ducting and piping). This item as a result is \$0. (66)
- The additional feedwater and steam valves were ordered at a cost of \$2,258 (revised). (70)
- Spare shredder hydraulic filters were purchased for \$421. (71)

- The air cannons were purchased for the coal silos at a cost of \$5,527. (72)
- The noise control pads and bases for the blowers, fans, compressor and shredder hydraulic unit have been purchased and installed at a cost of \$4,288. (73)
- A heatless air dryer was purchased to provide air dried to -40 F dewpoint, at a cost of \$7,028 (revised). (74)
- The orifices and venturis for flow measurement have been designed and cost \$12,932. (75)
- A cart for medical waste handling was purchased to check out the skip hoist and shredder equipment. The cart cost was \$682. However, this cart was returned when it was discovered that the cart design had changed, and the cart dimensions were too large to be used. Another cart design was chosen by DONLEE and LVA and six or more have been purchased by LVA. (76)
- The site trailer for an office and storage space was rented for a minimum of 4 months at a cost of \$2,624 for an expected 13 months. (77)
- The equipment for the chemical feedwater system has been costed at \$1,305. (78)

Contract Costs-to-Date:

The Lebanon VA Project Costs-to-Date are shown on Table 9.

Equipment Costs

The equipment costs are shown on Table 10 Lebanon VA Project Equipment Cost Summary. Several of these costs are preliminary and purchase orders have not been released yet.

VIII. SUMMARY

The State permitting process required for construction will be completed in early November to allow installation and construction to be completed. Operating permits will be obtained after construction has been completed. A request for proposal for stack sampling and biospore tests was released to four (4) vendors in mid-October. The proposals shall be reviewed during November and the stack sampler will be selected.

Funding was approved as of August 1, 1995. Construction and installation resumed on August 21, 1995 at the LVAMC. Construction and installation continues and will be completed by late December 1995.

Fabrication of the stack parts and transport of these items to the site will be done by December 11, 1995. The steam silencer support system, the ash conditioning system supports and the skiphoist must all be designed and installed.

Pre-startup check outs of the subsystems will start in November.

A current schedule for the project is included with this report.

Table 9. Lebanon VA Project Costs-to-Date Reported by Task

TASK	ACTUAL			May-95 Jul-95	ACTUAL			Aug-95 Oct-95	TO-DATE CONTRACT COSTS
	48 May-95	49 Jun-95	50 Jul-95	QRTLY TOTAL	32 Aug-95	33 Sep-95	34 Oct-95	QRTLY TOTAL	
TASK I: DESIGN/BUILD/INSTALL	18,814.75	33,652.01	262,124.61	314,591.37	77,225.00	122,485.51	128,496.01	328,206.52	\$5,854,883.97
TASK II: PERMITTING									\$38,030.59
TASK III: OBTAIN COAL, LIMESTONE & ASH CONTRACTS									\$44,098.29
TASK IV: TESTING									
TASK V: FINAL REPORT									
PROJECT TOTAL	18,874.15	33,691.61	262,124.61	314,690.37	77,225.00	122,869.63	128,496.01	328,590.64	\$6,253,451.70
COST SHARE	(68.37)	64.29	21,757.74	21,753.66	2,417.15	7,335.24	7,885.89	17,638.28	\$412,373.89
DOE BILLING	18,942.52	33,627.32	240,366.87	292,936.71	74,807.85	115,534.39	120,610.12	310,952.36	\$5,841,077.81

Table 10. Lebanon VA Project Equipment Costs

ITEM NUMBER	EQUIPMENT	VENDOR	QUOTE/ESTIMATE DATE	OCTOBER 1993 BUDGET	CURRENT COST (Quote/Est.)	ORIGINAL COST (3/25/91)	VARIANCE-Current vs. 10/93 costs	PAID TO-DATE	BALANCE
1	Air Compressor	C.H. REED	6/1/93	\$21,801	\$21,015		(\$786)	\$21,015	\$0
2	Ash Conditioner	DETROIT STOKER	7/22/93	\$34,815	\$34,815		\$0	\$34,815	\$0
3	Ash Conditioner: Chutes	DETROIT STOKER	5/28/93	\$4,000	\$2,979	\$0	(\$1,021)	\$2,979	\$0
4	Ash Handling: Storage and Screw	MACAWBER SYSTEMS	8/10/93	\$123,985	\$151,941	\$83,200	\$27,956	\$145,995	\$5,946
5	Bed Material Cooling/Cleaning System	CSI SYSTEMS INC.	9/2/93	\$21,113	\$26,114	\$31,200	\$5,001	\$26,114	\$0
6	Bin, Sand (Sand funnel)-Replaces bed mat'l bin estimated @ \$10,000	DONLEE		\$0	\$2,925	\$0	\$2,925	\$2,925	\$0
7	Bins: Ash, Limestone & Coal			\$0				\$0	
7a	Coal Bins	DONLEE		\$18,948	\$55,805		\$36,857	\$55,805	\$0
7b	Limestone Bin - 30 Ton	DONLEE		\$6,460	\$14,408		\$7,948	\$14,408	\$0
7c	Limestone Bin - 2 Ton	DONLEE		\$2,584	\$4,200		\$1,616	\$4,200	\$0
7d	Ash Bins (2)	DONLEE		\$15,073	\$34,250		\$19,177	\$34,250	\$0
8	Boiler & Economizer: Boiler	DONLEE	5/15/93	\$41,478	\$41,478	\$58,050	\$0	\$41,478	\$0
9	Boiler & Economizer: Boiler Sootblower	FUEL EFFICIENCY	6/18/93	\$5,102	\$5,113	\$0	\$11	\$5,113	\$0
10	Boiler & Economizer: Boiler Sootblower-Engr Only	FUEL EFFICIENCY	6/18/93	\$1,300	\$1,300		\$0	\$1,300	\$0

Table 10. Lebanon VA Project Equipment Costs

ITEM NUMBER	EQUIPMENT	VENDOR	QUOTE/ESTIMATE DATE	OCTOBER 1993 BUDGET	CURRENT COST (Quote/Est.)	ORIGINAL COST (3/25/91)	VARIANCE-Current vs.10/93 costs	PAID TO-DATE	BALANCE
11	Boiler & Economizer; Economizer Casing	DONLEE	5/15/93	\$6,352	\$8,205		\$1,853	\$8,205	\$0
12	Boiler & Economizer; Economizer Sootblower	COPE-S-VULCAN	6/9/93	\$7,923	\$8,784		\$861	\$8,784	\$0
13a	Stack (Chimney)	TRI FAB INC	8/3/93	\$21,921	\$19,428	\$9,390	(\$2,493)	\$19,428	\$0
13b	Stack (Chimney) - 2nd Design	DONLEE	2/7/95	\$0	\$25,000	\$0	\$25,000	\$7,045	\$17,955
13c	Stack (Chimney) - Anchoring system	DONLEE/Aycock	8/7/95	\$0	\$25,000	\$0	\$25,000	\$5,617	\$19,483
14	Circulating Pumps, Feedwater	CHESTER PUMP	7/15/93	\$7,000	\$0	\$9,640	(\$7,000)	\$0	\$0
15	Coal Storage, Handling & Feeding	BEAUMONT BIRCH	7/21/93	\$291,152	\$297,203	\$265,200	\$6,051	\$297,203	\$0
16	Combustor/Cyclone/Cooling Bed Unit-No Tubes	DONLEE	5/15/93	\$123,355	\$123,355	\$150,230	\$0	\$123,355	\$0
17	Controls Computer Package	HONEYWELL	4/30/93	\$83,442	\$97,001	\$80,500	\$13,559	\$97,001	\$0
18	Cooling Bed & Economizer Tubes*	ALLEGHENY BOILER TUBE	6/9/93	\$29,000	\$29,000	*	\$0	\$29,000	\$0
19	Dry Injection Fabric Filter; Baghouse	AEROPULSE INC	5/20/92	\$130,376	\$138,523	\$161,250	\$8,147	\$136,511	\$2,012
20	Ducting & Piping	McClure		\$65,292	\$249,495	\$26,570	\$184,203	\$136,004	\$113,491
21	Electrical Equipment & Installation	DBG/Carpenter Engr	2/3/94	\$245,000	\$279,348	\$135,200	\$34,348	\$212,950	\$66,398
22	Emissions Monitoring Equipment	ENERTEC	8/11/93	\$135,300	\$135,300	\$87,050	\$0	\$113,098	\$22,202

Table 10. Lebanon VA Project Equipment Costs

ITEM NUMBER	EQUIPMENT	VENDOR	QUOTE/ESTIMATE DATE	OCTOBER 1993 BUDGET	CURRENT COST (Quote/Est.)	ORIGINAL COST (3/25/91)	VARIANCE-Current vs. 10/93 costs	PAID TO-DATE	BALANCE
23	Emissions Monitoring Equipment: Oxygen	W.A.GREGORY & CO	9/3/93	\$6,119	\$6,548		\$429	\$6,548	\$0
24	Expansion Joints	SENIOR FLEXONICS	7/13/93	\$26,099	\$25,862		(\$237)	\$25,862	\$0
25	Fans & Blowers: ACB & LCB**	SPENCER TURBINE	11/13/91	\$12,709	\$13,060	**	\$351	\$13,060	\$0
26	Fans & Blowers: Primary & ID	ROBINSON	7/13/93	\$54,608	\$54,608	\$28,900	\$0	\$54,608	\$0
27	Flyash ReInjection System	DONLEE/FOX VALVE	12/5/91	\$14,290	\$14,290	\$41,600	\$0	\$9,031	\$5,259
28	Flyash ReInjection System: Bed Mat'l Blowers	R.M. ASSC	7/27/93	\$10,075	\$10,025		(\$50)	\$10,025	\$0
29	Natural Gas line moved	UGI		\$0	\$0	\$0	\$0	\$0	\$0
30	Hospital Waste, Handling & Sub-Systems	ESSEX CONVEYOR	7/15/93	\$31,010	\$36,815	\$72,800	\$5,805	\$36,815	\$0
31	Instruments: Pressure Indicators/Transmitters	DWYER/HONEYWELL	9/10/93	\$2,500	\$1,090		(\$1,410)	\$1,090	\$0
32	Instruments: Pressure Transmitters	HONEYWELL	5/24/93	\$12,569	\$12,569	\$16,490	\$0	\$12,569	\$0
33	Instruments: Pressure Transmitters (Additional)***	HONEYWELL		\$0	\$4,097	***	\$4,097	\$4,097	\$0
34	Instruments: Thermocouples	CGS	5/26/93	\$4,347	\$5,428		\$1,081	\$5,428	\$0
35	Insulation Materials & Installation	DONLEE	5/26/93	\$17,220	\$17,220	\$17,220	\$0	\$0	\$17,220
36	Limestone Storage, Handling & Feeding	MACAWBER SYSTEMS	5/23/93	\$60,881	\$60,881	\$72,800	\$0	\$60,881	\$0

Table 10. Lebanon VA Project Equipment Costs

ITEM NUMBER	EQUIPMENT	VENDOR	QUOTE/ESTIMATE DATE	OCTOBER 1993 BUDGET	CURRENT COST (Quote/Est.)	ORIGINAL COST (3/25/91)	VARIANCE-Current vs. 10/93 costs	PAID TO-DATE	BALANCE
37	Outside Review of Bldg-Preliminary/Final	ENTECH		\$5,000	\$926	\$0	(\$4,074)	\$926	\$0
38	Painting	DONLEE		\$15,000	\$12,240	\$31,200	(\$2,760)	\$0	\$12,240
39	Plant Encl./Site Prep/Foundation: Geotechnical Engr.	SCHNABEL		\$0	\$9,512	\$0	\$9,512	\$9,512	\$0
40	Plant Encl./Site Prep/Foundation: Bldg & Foundation****	ARTHUR FUNK	9/8/93	\$545,700	\$636,628	****	\$90,928	\$574,028	\$62,600
41	Plant Encl./Site Prep/Foundation: Building					\$87,680	\$0	\$0	\$0
42	Plant Encl./Site Prep/Foundation: Design	DBG/Steckbeck	9/1/93	\$25,725	\$29,128	\$0	\$3,403	\$29,128	\$0
43	Plant Encl./Site Prep/Foundation: Engineer	DBG/Steckbeck		\$0	\$10,911		\$10,911	\$8,911	\$2,000
44	Plant Encl./Site Prep/Foundation: Foundation					\$209,560	\$0	\$0	\$0
45	Platforms, Supports and Stairs and Design	BSM, Inc.		\$4,400	\$27,000		\$22,600	\$27,000	\$0
46	Refractory Materials & Installation: Installation	DONLEE	6/24/93	\$52,915	\$88,799	\$52,915	\$35,884	\$88,799	\$0
47	Refractory Materials & Installation: Materials	J.T.THORPE	6/24/93	\$76,975	\$88,007	\$77,515	\$11,032	\$88,007	\$0
48	Refrigerated Room	PERLEY-HALLADAY	7/19/93	\$14,877	\$15,407		\$530	\$14,407	\$1,000
49	Scale	B&M SCALE	6/7/93	\$4,597	\$4,382		(\$215)	\$4,382	\$0
50	Shredder	SSI SHREDDING SYSTEMS		\$0	\$0	\$0	\$0	\$0	\$0

AFBC Co-Firing of Coal and Hospital Waste
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 Quarterly Progress Report
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Table 10. Lebanon VA Project Equipment Costs

ITEM NUMBER	EQUIPMENT	VENDOR	QUOTE/ESTIMATE DATE	OCTOBER 1993 BUDGET	CURRENT COST (Quote/Est.)	ORIGINAL COST (3/25/91)	VARIANCE-Current vs.10/93 costs	PAID TO-DATE	BALANCE
51	Shredder Blower	ROBINSON	4/26/93	\$3,019	\$3,140		\$121	\$3,140	\$0
52	Shredder: Move from York to Site	DONLEE		\$5,200	\$5,200	\$5,200	\$0	\$5,200	\$0
53	Slide Gates	ROVALVE/TECHNAFLOW	7/28/93	\$52,461	\$52,664		\$203	\$52,665	\$0
54	Soil Borings	Schnabel		\$5,850	\$5,850		\$0	\$5,850	\$0
55	Start-up Burner	ECLIPSE/YORKAIRE	8/6/93	\$9,242	\$9,242	\$6,230	\$0	\$9,242	\$0
56	Start-up Burner (Mod. Motor)	HONEYWELL	8/20/93	\$266	\$266		\$0	\$266	\$0
57	Startup Burner Panel	DONLEE		\$0	\$1,284	\$0	\$1,284	\$1,284	\$0
58	Steam Silencer	VIBRATION & NOISE ENGR	7/12/93	\$3,415	\$3,065		(\$350)	\$3,065	\$0
59	Steelwork or Equipment Support	DONLEE		\$72,290	\$143,639	\$45,430	\$71,349	\$143,639	\$0
60	Sterilization System	DONLEE	12/10/91	\$6,187	\$6,187		\$0	\$1,650	\$4,537
61	Sterilization Testing	DONLEE		\$7,000	\$888		(\$6,112)	\$888	\$0
62	Transformer for Leb VA Equipment	Blatt & Myers		\$8,000	\$49,400		\$41,400	\$49,400	\$0
63	Valves & Dampers	IPS		\$14,364	\$26,065	\$26,020	\$11,701	\$26,065	\$0
64	Vendor Equipment Installation	AYCOCK		\$194,930	\$478,107		\$283,177	\$394,837	\$83,270

Table 10. Lebanon VA Project Equipment Costs

ITEM NUMBER	EQUIPMENT	VENDOR	QUOTE/ESTIMATE DATE	OCTOBER 1993 BUDGET	CURRENT COST (Quote/Est.)	ORIGINAL COST (3/25/91)	VARIANCE-Current vs. 10/93 costs	PAID TO-DATE	BALANCE
65	Computerized Portable Analyzers	ECOM America		\$0	\$4,638		\$4,638	\$4,638	\$0
66	Additional payment/performance bonds	TBD		\$0	\$0		\$0	\$0	\$0
67	Onsite refractory cure	Hotworks	Jul-95	\$0	\$6,950		\$6,950	\$0	\$6,950
68	Bonding and Grounding	TBD		\$0	\$6,000		\$6,000	\$0	\$6,000
69	Sump pumps and controls	Raeden		\$0	\$2,500		\$2,500	\$0	\$2,500
70	Steam/Feedwater Valves	IPS	11/4/94	\$0	\$2,258		\$2,258	\$0	\$2,258
71	Shredder Hydraulic Filter	SSI	11/3/94	\$0	\$421		\$421	\$0	\$421
72	Air Cannons	Airmatics	11/16/94	\$0	\$5,527		\$5,527	\$5,527	\$0
73	Noise Suppression: Motor/Blowers	BRD Noise/Vibration	10/28/94	\$0	\$4,288		\$4,288	\$4,288	\$0
74	Heatless Air Dryer	Air Flow Co., Inc.	12/8/94	\$0	\$7,028		\$7,028	\$7,028	\$0
75	Orifices and venturis	C/B/ NES	10/20/94	\$0	\$12,932	\$0	\$12,932	\$12,932	\$0
76	Cart for medical waste	CONSOLIDATED PLASTIC CO	12/15/94	\$0	\$0		\$0	\$0	\$0
77	Site trailer rental - 13 months	GE CAPITAL MODULAR SPACE	12/15/94	\$0	\$2,624		\$2,624	\$1,872	\$752
78	Heat Tracing	DONLEE	7/31/95	\$0	\$5,200	\$0	\$5,200	\$0	\$5,200

Table 10. Lebanon VA Project Equipment Costs

ITEM NUMBER	EQUIPMENT	VENDOR	QUOTE/ESTIMATE DATE	OCTOBER 1993 BUDGET	CURRENT COST (Quote/Est.)	ORIGINAL COST (3/25/91)	VARIANCE-Current vs. 10/93 costs	PAID TO-DATE	BALANCE
79	Added Lighting	DONLEE	7/31/95	\$0	\$14,500	\$0	\$14,500	\$0	\$14,500
80	Sump Pump/Controls	RAEDEN	11/16/94	\$0	\$2,500	\$0	\$2,500	\$0	\$2,500
81	Cal Gases and Regulators	SCOTT SPECIALTY	12/15/94	\$0	\$4,530	\$0	\$4,530	\$0	\$4,530
82	Sink/Shower Decontamination Stations	LAB SAFETY	7/3/95	\$0	\$1,750	\$0	\$1,750	\$0	\$1,750
83	Sand for Beds	U.S.SILICA SAND	9/23/94	\$0	\$2,367	\$0	\$2,367	\$0	\$2,367
84	Coal Pit Cover	DONLEE	7/3/95	\$0	\$3,200	\$0	\$3,200	\$0	\$3,200
85	Grizzly Cover	DONLEE	7/3/95	\$0	\$4,800	\$0	\$4,800	\$0	\$4,800
86	Chemical Feedwater System	Nutmeg	10/11/95	\$0	\$1,305	\$0	\$1,305	\$0	\$1,305
PROJECT EQUIPMENT TOTALS				\$2,822,612	\$3,897,733	\$1,889,040	\$1,075,121	\$3,403,088	\$494,646

NOTES:

- * The cost of the cooling bed tubes was originally included in the combustor/cyclone/cooling bed cost of \$150,230 (Item 16). The economizer tube cost was originally included in the boiler cost of \$58,050 (Item 8).
- ** The cost of these blowers was originally included in the fans and blowers cost of \$28,900 (Item 26).
- *** The cost of the additional pressure transmitters is included in Item 32.
- **** The cost of the building and foundation originally included Items 41 and 44 at a cost of \$297,240.

Table 10. Lebanon VA Project Equipment Costs

NOTES:

1. Items 1-28 and 30-64 were all part of the original October 1993 Budget.
2. Item 29 was added in March of 1994 prior to the start of the foundation.
3. Items 20, 45 and 62 have been modified and approved after the equipment installation started.
4. Item 64 was formed from two previous items: "Vendor Equipment Installation" and "Vendor Equipment Installation: Rentals, etc."

Lebanon VA Medical Center Project

Project: LVAMC Project
Date: November 15, 1995

Critical

Noncritical

Progress

Milestone

Summary

Rolled Up

DOE QUARTERLY REPORT - August 1, 1995 - October 31, 1995