C00--4740-4

management and technical services company

MASTER

OPERATION, MODIFICATION, AND MAINTENANCE
OF
DOE/PETC 700 H.P. COMBUSTION TEST FACILITY
CONTRACT NO. EW-78-C-02-4740

QUARTERLY ACTIVITY REPORT
For the Period
January 1, 1979 to April 1, 1979
FIRST QUARTER

Performed By
General Electric Company
Management and Technical Services Company
626 Cochrans Mill Road
Clairton, Pa. 15025

Prepared for the United States
Department of Energy

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REA

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BACKGROUND

The General Electric Company (MATSCO) was awarded the contract to operate, modify, and maintain the DOE/PETC 700 H.P. Combustion Test Facility. The 700 H.P. Combustion Test Facility was designed and built by the Department of Energy at Pittsburgh Energy Research Center and its ultimate success is the responsibility of DOE/PETC. G. E. Co/MATSCO will provide support to assist in the goal of successful operation of this pilot plant facility. The primary objective of the DOE/PETC 700 H.P. CTF is to establish the practicality of coal oil slurry combustion as a technically, economically, and environmentally feasible retrofit technology.

WORKSCOPE SUMMARY

The Contractor shall provide all things necessary for the operation, modification, and maintenance of the plant as provided in the Operating/Maintenance Manual, and carry out the experimental and developmental operations in said plant as directed by the DOE Technical Project Officer.

The operation, modification, and maintenance of the 700 H.P. CTF shall be in accordance with all applicable safety, health codes, standards, and regulations of DOE. The operation, modification, and maintenance shall include the following phases:

- a) Phase I - Preparatory Work - includes personnel staffing and training, preparation of detailed operating, maintenance, and safety manuals, purchase of tools, spare parts and initial operating supplies.
- b) Phase II - Start-Up and Adjustment Period - Check out and activation of all plant systems and subsystems including run-in adjustment and lubrication of all components, chemical cleaning and flushing of systems and lines, and any other activities necessary to achieve steady-state operating conditions.
- c) Phase III - Process Investigation Operations - Experimental establishment of the effect of applicable process variables and changes in configuration on plant parameters to determine optimum conditions and configuration for technical, economical and environmental analysis. This includes varying feed rates of consumables, varying temperatures and pressures, and accomplishing plant configuration changes necessary to investigate and all of the operating alternatives outlined in the Operating Manual as directed by DOE.

PROGRESS DURING THIS REPORTING PERIOD
700 H.P. COMBUSTION TEST FACILITY

This reporting period was spent in Phase III - Process Investigation Operations. The transition from Phase II to Phase III occurred on November 15, 1978. Time remaining on the contract will be spent on Phase III.

Number six fuel oil tests, 30% COM tests, and 40% COM tests were conducted during this reporting period. The 700 H.P. Combustion Test Facility section of this report will be divided into 1) Operations, and 2) Modification and Maintenance.

OPERATIONS

Below are listed test runs accomplished through the first quarter of 1979. Twenty-nine test runs were completed during January 1979. Seven test runs were completed during February 1979. Eighteen test runs were completed during March 1979.

January

Test Run HNNTN-2, Test #1
Test Run HNNTN-2, Test #2
Test Run FNNTN-3, Test #1
Test Run FNNTN-9, Test #1
Test Run FNNTN-9, Test #2
Test Run QASTS-1, Test #1
Test Run QASTS-1, Test #2
Test Run HNNTN-1, Test #1
Test Run FNNTN-8, Test #1
Test Run FNNTN-8, Test #1
Tests 700 BOFASTS, Run No. FNNTN-1, Test #1
Tests 700 BOFASTS, Run No. FNNTN-1, Test #2
Tests 700 BOFASTS, Run No. FNNTN-1, Test #3
Tests 700 BOFASTS, Run No. HNNTN-1, Test #1, 2, & 3
Test Run No. HNSNN-1, Test #1 & 2
Test Run No. HNSNN-1, Test #3
Test Run 700 BOFASTS, Run FNNTN-6, Test #1 & 2
Test Run 700 BOFASTS, Run FNNTN-6, Test 3
Test Run No. FNSNN-1, Test #1
Test Run No. TNNNN-1, Test #1, 2, & 3

February

Test No. 700-C3FASTS, Run No. QNNNN-1
Test No. 700-C3FASTS, Run No. HNSNN-2
Test No. 700-C3FASTS, Run No. HNNTN-2
Test No. 700-C3FASTS, Run No. HANNN-1

March

Test No. 700-C3FASTS, Run No. FNSNN-3, Test #1, 2, & 3
Test No. 700-C3FASTS, Run No. HNNTN-1, Test #1 & 2
Test No. 700-C3FASTS, Run No. FNNTN-1, Test #1
Test No. 700-C3FASTS, Run No. TNNNN-5, Test #1, 2, & 3

Test No. 700-C3FASTS, Run No. FNNNS-1, Test #1 & 2
 Test No. 700-C3FASTS, Run No. FASNN-1, Test #1 & 2
 Test No. 700-C3FASTS, Run No. FNNNN-2, Test #1
 Test No. 700-C3FASTS, Run No. TANNN-1, Test #1
 Test No. 700-C3FASTS, Run No. FANNN-1, Test #1
 Test No. 700-C3FASTS, Run No. TNNNN-1, Test #1
 Test No. 700-C3FASTS, Run No. TNNNN-3, Test #1

A brief description of the computer language and abbreviations of the above listed test runs might be in order.

Example:

Test No. 700-C3FASTS

The 700 stands for the 700 H.P. test program.

The C3 stands for 30% COM.

The F position stands for fuel rate of which F, T, H, or Q for full, three quarter, half, or quarter for load can be substituted.

The A position stands for excess air. An N (Normal) in this position means excess air of 3.5, 4.0, 4.5, or 5.5 for loads of full, three quarter, half, or quarter.

The first S stands for atomizing steam-fuel pressure differential. An N in this position is normal.

The T position stands for fuel temperature. An N in this position is normal of 210°F, and a T in this position means a varied from normal fuel temperature.

The second S position designates the boiler swirl setting. N in this position again means a normal setting.

Dr. Mathur of D.O.E. conducted flame studies during this quarter. Isokinetic and high volume sampling also took place during this quarter. Problems encountered during this period of testing are listed below.

1. Test runs were cancelled on several occasions because of building utilities going off of the line. Electrical power interruptions, instrument air interruptions and site steam interruptions cancelled several runs, especially during the month of January. Fuel oil line steam tracing freeze up because of loss of station heating steam also occurred during January. Computer malfunctions negated or minimized data several times during the quarter. MATSCO is working to minimize the above problems.

2. Several finned tubes in the sub-cooler section of the air cooler condenser failed. These bottom tubes were eventually replaced by Ecodyne under warranty.

3. On several occasions, problems have been encountered with the boiler feed pump bearings. A spare boiler feed pump to give switch over capacity is on order. An auxiliary boiler feed pump and motor are on order and will provide backup service to the primary pump.

4. COM plugging problems occurred several times during this quarter. The 700 H.P. fuel train is undergoing modification to streamline COM flow. Sharp elbows are being replaced with large radius pipe bends. A smaller Moyno pump has been installed so COM pressure and flow can be more accurately regulated.
5. Several problems have been encountered with various rotary airlock valves during inclement weather. The sodium bicarbonate rotary airlock, the pulverizer baghouse rotary airlock, and the flue gas baghouse rotary airlock failed during this reporting period. Condensation freeze up caused much of the failure. The coal preparation area is scheduled to have siding installed during the summer months, and this should alleviate the rotary airlock valve freeze up problems.
6. Twice during this reporting quarter, the Ramsey gravimetric feeder company representative came out to the jobsite to help troubleshoot the feeder. Also, during this time frame, extremely wet coal was received from Consolated Coal Company. This extremely wet coal contributed to the feeder problem, and MATSCO is assuring raw dry coal is received in the future. Part of the feeder electronic controls are located outside near the weather elements, and siding installation this summer will help minimize moisture in this electronic control box.
7. During one of the scheduled runs in March, the ambient air temperature was approaching 75°F. Because the air cooled condenser and the blowoff muffler were at full capacity, a problem was encountered reaching full load test conditions on this particular day. During the summer time, more problems will be encountered reaching full load, unless steam condensation capacity is enlarged.

MAINTENANCE AND MODIFICATION

Facility maintenance and modification were performed throughout this quarter around the operational schedule. Completed maintenance and modification items are listed below.

The COM-test loop is progressing toward completion. Five Ron-Petcos, four thermocouples, and a sludge density meter have been installed in the test loop. Electrical and tubing plumbing, and transmitter installation is progressing.

An electro-mag electromagnetic water conditioning system has been installed in the boiler water feed line between the boiler feed pump and the boiler. Experience to date with this new piece of equipment has been pleasant. No sulfate or phosphate chemicals have been used after the installation of the electro-mag. The conductivity is controlled to a maximum of 3,500 micro-mhos by surface and bottom blows.

A state boiler inspection was performed on Monday, February 5, 1979, with good results. A copy of the inspection report was given to Mr. Rich Cimino of the D.O.E. Safety Office.

Thermocouples were installed at sixteen different locations inside the boiler. The first bank of eight thermocouples is 5 feet from the boiler back wall, and the second bank of eight thermocouples is 7 feet from the boiler back wall. A local digital readout is located outside of the boiler, and these 16 readings are recorded during test runs.

The fuel oil steam heater is undergoing streamlining and modification. One inch swagelock fittings and one inch tubing (ID = .810", OD = 1.000") are ordered and will be used to streamline pipe ID and eliminate elbows. The elbows will be replaced with large constant radius tubing bends.

Startup and calibration of the sodium bicarbonate injection system were completed during January 1979. A variable speed vibrator has been installed on the sodium bicarbonate storage bin. A NaHCO_3 storage tank drier has been installed to keep the chemical dry. Immediately after startup and calibration of the NaHCO_3 system, its rotary airlock valve failed and a replacement valve was ordered. A portable sodium bicarbonate system has been used when available to inject NaHCO_3 into the flue gas system. Data has been collected to calculate the efficiency of sulfur dioxide removal. The new rotary airlock valve arrived on site and will be used to generate data during April and May 40 & 50% COM testing.

Other maintenance and modification items are listed below:

- a. Oxygen readouts were installed in the control room before and after the baghouse.
- b. A calibration schedule was set up for all gauges in the facility.
- c. A suitable method of attaching flame study targets inside of the boiler has been found, so flame study targets stay in place longer.
- d. New additional steam trace line couplings were installed in case of another freeze up.

100 H.P. & 20 H.P. UNITS

The 100 H.P. and 20 H.P. facility is in Phase I - Construction.

Because the 100 & 20 H.P. units are under construction, the operation, maintenance, and modification of these units will not be described here.

Tasks completed during January 1979:

- 20 H.P. boiler support stand fabrication
- Fire door installation
- 100 H.P. boiler tube punching
- Motor control center foundation installation
- Four inch wire way installation
- Extension of 700 H.P. utility lines to 100-20 H.P. areas

Tasks completed during February, 1979:

100 H.P. boiler personnel platform installation
Flue gas baghouse installation
20 H.P. boiler installation
20 H.P. boiler personnel platform installation
1,500 gallon holding tank installation
Motor control center installation
Feed water tank installation

Tasks completed during March, 1979:

Slogan Engineering piping drawings completion
Facility mercury vapor light installation
Oil & water recirculating and feed pumps installation
Mix and hold tank steam jackets piping installation
Flue gas baghouse conduit installation
100 H.P. surface control valve installation
100 H.P.-20 H.P. transformer activation
100 H.P. & 20 H.P. boiler preventive maintenance initiated

FISCAL SECOND QUARTER FORECAST WORKLOAD

700 H.P. Unit

The 40% COM test program is scheduled to start in April. The 50% COM test program is scheduled to start in May.

100 H.P. & 20 H.P. Units

Control panel receipt is due in April. Completion of the upper control room will follow shortly. The mezzanine level work is scheduled to start around the middle of May.

Installation of piping and wiring is forecast throughout the entire length of the next quarter. Some piping and electrical wiring will be held up until after installation of the mezzanine.

David E. Jones
Project Manager

DEJ/jl